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The PC is not what it used to be. Everything you want to do on a Macintosh, you can just as easily do on a PC. And now, all of the most popular Mac applications are available for PCs, including those by Aldus, Microsoft, Adobe, Quark and Broderbund.

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perspective, Intel486™ DX2 processor-based PCs outperform the Mac Quadra™ 840av, and Pentium processor-based PCs are even faster.

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So before you buy another Mac, stop and ask some questions. Find out where Apple is going, especially with the PowerPC. Then ask Intel about the Pentium processor. What you find out might put you on a whole new path.

To learn more about the Pentium processor and other innovative technologies, call 1-800-395-7009, Ext. III.
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March 1994, PC Computing

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When Not to Buy a Power Mac

Sometimes, buying a Quadra makes more sense

This situation reminds me somewhat of the introduction of the Quadra 700 and 900, the first Macs using the 68040 CPU. Many programs had to be updated to deal with the 040, and in some cases it took several months to work out all the kinks. Just when developers had resolved these problems, Apple introduced a faster version of the Quadra 900—the Quadra 950. Many 900 owners wished they had simply waited a bit longer.

Who knows if this scenario might not be repeated? It probably will. At the rate Apple is updating Macs, a few months is a very long time in the life cycle of a particular model. And Apple has made it clear that a new generation of Power Macs with more-significant design differences, such as a new peripheral-expansion bus, is coming in the next 9 to 12 months. It's unlikely that Apple will have Power Macs with the faster PowerPC 604 CPU available for some time, but it is easily conceivable that higher-clock-rate 601 models could be offered before then.

A Quadra is likely not only to provide quicker performance for current software but also to leave you the option of upgrading to a faster Power Mac when the software is ready and perhaps when other capabilities are added.

If you own a Mac using a 68030 or earlier CPU, you'll have little or no performance loss when you move to a Power Mac. You will probably even get a performance gain if you now use, say, a Classic or LC II. Owners of the IIci, IIvx, and IIfx fall into the gray area where Power Mac performance may be slightly less than they're used to. But if you have a Centris or Quadra, waiting is probably a better option. Likewise, if your company needs to add ten Macs to a new field office, and Quadras are the standard Mac, go ahead with more Quadras.

Supply and Demand

In any case, you may have a difficult time getting Power Macs for a while. Anticipation for the Power Macs has built steadily for several months, resulting in a lot of pent-up demand. Apple has gotten much better at forecasting demand, but despite its best efforts to build up a supply, I believe that Apple is likely to have underestimated again.

Sales of higher-end Quadras, such as the 840AV and the 650, have slowed dramatically in the last several months, apparently because users have been waiting for the Power Macs. This may also mean that there is more pent-up demand for higher-end Power Mac models like the 7100 and 8100. As a result, the Power Macs (particularly the higher-end machines) might be hard to come by, and dealers might charge more than the Apple estimated price, which is fairly low. (Some dealers have complained that they can't afford to charge their customers as little as Apple's published estimates.)

continues
That demand will in turn make Quadra prices drop as dealers try to clear them out—you're likely to see some terrific bargains. One lesson from the last couple of years is that Mac prices are fluid. With the Power Mac introduction, I wasn't surprised to see Quadras priced for $1000 less than their Power Mac equivalents.

All these trends point to one conclusion. If you need a Mac right away and you'd have to wait a long time for a Power Mac or pay a lot more for one, you should definitely consider a Quadra. The key issue is price: if Quadra prices drop and Power Mac prices rise, a Quadra may be the best choice.

**When to Buy a Quadra**

Here's a guideline for making a decision. If the price of a new Quadra plus a Power Mac motherboard upgrade is no more than 10 to 20 percent higher than the price of a new Power Mac system, you should seriously consider buying the Quadra. You'll pay a little more but suffer no performance penalty.

Consider a hypothetical example to see how this might work (and keep in mind that actual prices will vary). In your daily work, you spend a lot of time creating financial reports. You write the analysis in Word, crunch the numbers in Excel, and lay out all this information in QuarkXPress. Say you can buy a Power Mac 6100 for $1800 (not including monitor or keyboard) but you can buy a similarly configured Quadra 610 for $1100. A motherboard upgrade is likely to cost about $1000 now and perhaps slightly less later. You should buy the Quadra now and upgrade to a Power Mac later.

In this example, the Quadra 610 will provide you with better performance for several months while developers introduce their native PowerPC software versions and work the kinks out of them. Another way to look at it is that you will pay $300 later so that you can run your software more quickly and without headache for several months.

It does not make sense in some situations to buy an AV Quadra and upgrade later to an AV Power Mac. If you use the video input and output features, the cost of buying an AV Quadra now and an AV Power Mac motherboard replacement later is simply too high. A PowerPC-based accelerator board is out of the question, since neither DayStar's nor Apple's will work in an AV Quadra. But if you don't use the video features, getting an AV Quadra now makes more sense, since the audio and telephony features of AV Quadras are included in the standard Power Macs and thus won't cost extra when you buy a Power Mac motherboard for the AV Quadra.

**When to Buy a Power Mac**

In many cases, buying a Power Mac makes the most sense. A Power Mac is the ticket if you can take advantage of the fast new software and you can live with the speed of emulated applications until they are updated. A Power Mac is also the way to go if you are trading up from an O30 or earlier Mac, since the speed of even emulated 680X0 applications is faster than you are now experiencing.

At the start of the Power Mac era, it's ironic that sticking with 040 technology, at least for a while, may be a better strategy for some buyers than jumping on the Power Mac bandwagon. However, until the Power Maces settle in, the wisest course is to consider when a Power Mac or a Quadra is the best choice, rather than assuming the Power Mac will meet your immediate needs. Timing is everything.
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Anniversary Acolades and Memories

THOROUGHLY ENJOYED MACWORLD'S Special Tenth Anniversary Issue articles on the history of Apple and the Macintosh (February 1994). As a young patent attorney working as outside counsel to Apple starting in 1981, I wrote many of the fundamental patents for the Lisa and the first Macs. As the original Mac innovators described their projects and methods, I remember thinking, How in the world am I going to protect this?

Computer patent law was like the Wild West. In preparing the original patent application for the first Apple mouse, I wrote claims covering the use of the mouse by the user, and the resulting action of the computer; this became known as the Mouse Pull-Down patent for the Mac interface. It caused quite a stir among lawyers and the technical community to see that Apple actually got a patent on a feature of the user interface.

I will always remember those years on Bandley Drive. Every day I have the satisfaction of using those innovations (and patents), even as I type this letter on my Macintosh Centris 650.

Jeffrey J. Blatt
Los Angeles, California

THANKS FOR TWO VERY INTERESTING pieces in your February issue regarding the Mac’s failure to live up to its potential: “Macintosh Mystique” and “1984 Redux” (Wise Guy).

However, I think you missed the irony of an important point. While PC-compatible manufacturers were competing through lower prices, better service, and shared architecture, Apple was gouging purchasers, scaring customer support, and being secretive with its technology. The ironic part is that while the Mac appealed to the “creative free-thinkers” and “agents of change,” the company that produced it was being run like an old-fashioned, fat-cat, capitalist business. Short-run profit and stock price were much more important than they should have been.

Mitchell Ostrom
Los Angeles, California

CONGRATULATIONS ON YOUR COMPREHENSIVE issue about the history and future of the Macintosh—it’s probably the best issue you folks have ever done. Kudos to the researchers and interviewers who helped paint a clear picture.

Alex Johnson
via America Online

IT’S ABOUT TIME SOMEONE APPLAUDED your art director and staff, specifically on the images done by Hans Nelemann that appeared in the February issue (“Macintosh Innovations,” “PowerPC Preview,” “Macintosh Mystique,” and the cover). Amazing imagery, even if not completely desktop published.

Doug Moench
Fort Collins, Colorado

THIS LETTER IS A HATS-OFF TO GUY Kawasaki for his “1984 Redux” in the February Macworld. Worth noting is the quote, “We lived under [the misconcep-
tion that] every Macintosh programmer would be as good as Andy Hertzfeld.”

Only someone with Guy’s experience can remind us that the original Macintosh development team were good, but what they did, and they’re tough acts to follow.

Theresa Marie Rhyne
Research Triangle Park, North Carolina


This mass of dates, companies, and products was condensed to “[1986] ... Attain releases FileMaker,” which isn’t true—Attain wasn’t even founded until 1990! Since 1988, FileMaker has been developed and marketed by Claris.

Dan Chadwick
President
Attain Corporation
Somerville, Massachusetts

“Mass of dates and companies” doesn’t begin to describe the FileMaker story. According to Mr. Chadwick, FileMaker began life as the Mac incarnation of a PC file manager called Nutshell that Nashoba wrote for Leading Edge. Nashoba licensed the publishing rights for the Mac software to Forethought, who named it “FileMaker,” Microsoft bought Forethought, and the rights to FileMaker reverted to Nashoba. Nashoba released FileMaker Plus and FileMaker 4, the company was sold to Claris, and Claris republished the program as FileMaker II.—Ed.

PowerPC: Not Fast Enough

IN YOUR MARCH ARTICLE “CPU BOOSTERS” you discussed the speed improvements that changing the clock crystal on the logic board will have. Near the end of continues
In the March review of the Quadra 605, we incorrectly identified the machine's 25-pin SCSI connector as 30-pin. Also, the Quadra 610 CPU is a 68LC040, not the 68040.

In the March New Products section, APS's phone and fax numbers should have been 816/483-6100 and 816/483-3077, respectively.

In March PowerBook Notes, MicMac dictation-recording software from Nirvana Research was incorrectly referred to as MicMan.

In the table “What You Can Manage with SNMP” in “SNMP Revealed” (February 1994), Compatible Systems' phone numbers should have been 503/444-9532 and 800/556-0283.

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In the March story “Mainstream Storage,” Tim Warner wrote that APS Technologies “fell down on tech support for this article, but historically has provided very good support.”

MacProducts USA also received a “poor” rating in that article, but without a similar ameliorating comment in the text. I searched back through tech-support ratings in previous issues and found three articles that MacProducts appeared in; in all three, we were rated either “very good” or “excellent.”

MacProducts has a history of top-notch technical support—an fact that has frequently appeared in Macworld’s pages.

Russ Honey
Natick, Massachusetts

Maurie Bensley
Macworld's Public Relations Director
MacProducts USA
Austin, Texas

Databases That Work, Companies That Don’t

Charles Seiter’s article, “Databases That Work” (January 1994), was a good update on the state of multi-user relational databases for the Mac. But I feel that one very important aspect was left out of the reviews: the quality and responsiveness of the vendors’ technical-support departments. The availability of timely and accurate technical support can mean the difference between happy database developers and users, and everyone involved tearing their hair out.

I have been developing databases in 4th Dimension since version 1.0.6. One thing that has remained constant over the years is ACI US’s cavalier attitude toward technical support. Recently, just getting them to answer the phone has been nearly impossible. Although 4th Dimension is a capable tool, it is a very complex piece of software. And the more complex a system is, the less reliable it tends to be. The bugs and idiosyncrasies would be bearable if ACI US’s technical-support group were as good as the software.

Victor Delarier
Bellevue, Washington

Clean Track-Record

In the March story “Mainstream Storage,” Tim Warner wrote that APS Technologies “fell down on tech support for this article, but historically has provided very good support.”

MacProducts USA also received a “poor” rating in that article, but without a similar ameliorating comment in the text. I searched back through tech-support ratings in previous issues and found three articles that MacProducts appeared in; in all three, we were rated either “very good” or “excellent.”

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Maurie Bensley
Public Relations Director
MacProducts USA
Austin, Texas

Sinner Becomes Saint

Deborah Branscum, in “Saints and Sinners Revisited” (Conspicuous Consumer, February 1994), harnessed us with horns because of some warranty woes we ran into a while ago. We launched a lifetime-warranty program to cover our line of hard drives and advertised this for two months in Macworld. But because our suppliers could not comply with our new program, we had to drop the lifetime-warranty policy, and we immediately pulled this information from our ads. However, for the two months that the lifetime-warranty ads ran, every hard drive sold came with that policy. In other words, Mirror has honored and will continue to honor the lifetime warranties of those customers who purchased drives while the warranty was advertised.

continues
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Formal Protest

WELL, I SUPPOSE THERE’S NO feeling of satisfaction so great as the one you get when you insult a whole class of people with an offhand, flip (and erroneous) remark. David Pogue has shown a lack of sensitivity and a misunderstanding of TrueForm by Adobe Systems, which he reported on in the February issue (The Desktop Critic, February 1994). The class of people offended by his remarks are the thousands in the forms-analysis and forms-design industry. Good grief, who do you think designed the forms Adobe meant to be scanned in? Righto!

TrueForm failed, not because there are only “17 people in the forms design industry,” but because of Apple’s failure to position large volumes of networked Macs in office environments. I’ll bet if they reintroduced it for Windows, it would be a hit.

Harris Ruben
Berkeley Heights, New Jersey

The Desktop Critic’s Column about products that survive and those that don’t cites Adobe System’s TrueForm as an example of software that failed because the market failed. Not so. The market did not fail; it has been waiting for Windows. It was Adobe and Claris, who axed their forms programs for this reason. (It’s not about a lack of Macintosh offices—if it were, then Mac word processors, spreadsheets, and graphics programs would have died along with TrueForm.) Even so, I certainly meant no insult to the fine, if few, forms fans.—David Pogue

Push Which Button?

T HE “ARTIST’S RENDITION” OF A hypothetical version 15 of Microsoft Word made me laugh (The Desktop Critic, February 1994). Whose creation was it? I couldn’t find a credit. It was of particular interest to me because I recently sat down to teach my mother the basics of the Macintosh, including “that typing program,” as she calls it. I explained Word 5.1 feature by feature, beginning with the ruler, then the ribbon, then the strip, then the hand, then the beam, then the . . . .

After I had finished explaining all those buttons (she took careful notes), I opened up the menus to show her what else there was.

“Didn’t we already do that?” she asked when I described formatting from the menu.

“Yes, but this is another way to do the same thing.”

“Oh.”

“And then there are the keyboard shortcuts,” I explained, making it three ways to do some of the most common things. My mother paused, checked her notebook, looked at me, and said, “I just want to type.”

Graham Segroves
via Internet

Maybe Mr. Segroves’s mom should emulate a client of mine. This woman not only hid Word’s tool bars, she also discovered she could remove superfluous commands from Word’s menus. By the time she was done, the only menu commands left standing were Bold, Save, and Print. As for the Word 15 illustration: my friend Steve Alper, a composer and Mac guru in New York, dreamed up the joke with me and did the actual artwork.—David Pogue

Letters should be sent to Letters, Macworld, 501 Second St., San Francisco, CA 94107; via fax, 415/442-0766; or electronically to CompuServe (70370,702), MCI Mail (294-8078), America Online (Macworld), or AppleLink (Macworld), or via Internet (70370.702@compuserve.com). Include return address and daytime phone number. Due to the high volume of mail received, we can’t respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of Macworld.
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Now Up-to-Date schedules events, sets reminders, manages to-do lists, prints calendars and keeps all your associates informed. Combine it with Now Contact and you'll have a complete record of all correspondence and appointments with your contacts.

So, how productive would you be if you were as organized as you've been pretending to be? Get Now Up-to-Date and Now Contact and find out. Or pick up the phone and call us today for more information at 1-800-275-5669.

Put it on your to-do list right away. That is, of course, if you can even find it.
"All he left me was this guitar, a hound dog, and a broken heart."

Why is it that some software companies remind you of country music? Is it because their love lies elsewhere?

Not so at WordPerfect. New WordPerfect 3.0 says we're completely faithful to the Macintosh platform. In fact, when Apple introduced the Power Macintosh, we were there—running native. That "Windows" company wasn't.

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DayStar designed the PowerPro 601 for the graphics professional seeking the maximum in PowerPC performance. You save time and money compared to purchasing a new Power Macintosh system. And, if emulation is too slow, the PowerPro lets you restart as a 68040 based Macintosh.

Developed in cooperation with Apple Computer, the PowerPro 601 has actual PowerPC ROM chips. So, you get the same functionality and compatibility as Apple’s own Power Macintosh solutions.

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Circle 7 on reader service card
Apple's System Software Plans  Apple recently outlined its system software strategy for the next several years, saying it would move from today's passive interface to active assistance, from network communications to collaboration, from monolithic applications to component software (see OpenDoc item below), and of course, from CISC (680X0) to RISC microprocessors (PowerPC). The main points:

- Apple expects to ship System 7.5 this summer both for 680X0 and for PowerPC systems. System 7.5 will include AppleGuide (the first instance of active assistance), a scriptable Finder, drag and drop, the long-overdue QuickDraw GX, multithreading, PowerTalk, MacTCP, file synchronization and management, and support for translating DOS and Windows files.

- Copland ("System 8"), a future operating system, may arrive in 1995. Copland will offer active assistance, multitasking, and memory protection; and will work with a "new I/O architecture," probably a reference to the PCI bus and/or the FireWire serial bus.

- Gershwin, an operating system projected for 1996, will include preemptive multitasking; intelligent assistance; a microkernel architecture; and advanced graphics with cut, copy, and paste.

- OpenDoc, the document-centered component operating environment that may be the future of the Mac and other computers, will take a major step forward when software-development kits ship this fall from Component Integration Laboratories.

Canon to Make PowerPC Systems  Canon announced that PowerHouse Systems, a Silicon Valley start-up, will build computers using PowerPC chips. PowerHouse will sell the computers to other systems vendors. Although Apple CEO Michael Spindler has said that Apple would license the Macintosh Operating System to (unnamed) companies that will use the PowerPC chip, PowerHouse has said only that its machines would comply with the PReP spec (which is not yet Mac-compatible) and would run operating systems including Windows NT, Workplace OS, AIX, Solaris, Taligent, and "others." Sources close to Apple and PowerHouse said they expect PReP to be Mac-compatible within a year.

Premiere 4.0  Adobe Systems' Premiere 4.0, the latest version of the digital-video-editing software, includes a trim window for precise rolling edits, a floating preview window, filters that vary over time, support for true 29.97-frames-per-second playback, improved audio handling, and instant previews of projects under construction. Due on May 25 in fat-binary format (PowerPC- and 680X0-compatible) on CD-ROM only, it will list for $795. Upgrades from Premiere 3.0 will be $79. Adobe, 415/961-4400.

Yet Again More Price Cuts  Apple has dropped the prices of the PowerBook 180 4/120, Duo 250 4/200 and 12/200, and Duo 270c 4/240 and 12/240 by 9 to 14 percent. The smallest percentage cut was on the Duo 270c 12/240 with Express modem (now $3299), and the largest was on the PowerBook Duo 250 4/200, now $1959 without a modem.

Resolve Fails  Claris has thrown in the towel for its Resolve spreadsheet, saying that the product's sales failed to justify further development. The company will offer support until March 31, 1995, and is selling its ClarisWorks suite of programs (including a spreadsheet) to current Resolve owners for $29.

Software Giants Merge  Software publisher Electronic Arts has announced that, subject to stockholder and federal approval, the company will purchase rival Brøderbund in a stock swap.
Apple Refines the Newton

After the hype surrounding Apple's Newton personal digital assistant (PDA) died down, the 80,000 pioneers who bought one were left with a promising device that offered mediocre handwriting recognition and showed the signs of being the first product in a new category. But if the original Newton MessagePad offered a lot of sizzle, the new MessagePad 110 delivers some steak.

The MessagePad 110 (about $599) is not the next-generation Newton, but it is a better MessagePad. It refines the core Newton capabilities by providing better handwriting recognition, additional RAM, a more ergonomic design, and more.

The most significant change is the addition of deferred handwriting recognition, which allows you to take notes, save them as "digital ink" (a bitmapped image), and then go back and convert that image to text when convenient. With the original MessagePad, if you don't tell it to immediately translate your handwriting, your data can never enter the more useful world of ASCII text.

Another improvement to the ROM is the addition of letter-by-letter recognition, useful for reading words not in the Newton word list—proper names, for example.

Newtons use their RAM for both active memory and data storage; the original MessagePad had 640K, leaving about 160K of work space. The 110 offers 1MB of RAM with about 480K available.

To make it easier to hold, the 110 is a little longer and less wide than the original MessagePad. The 110 also has a new stylus. Unlike the flat plastic stylus of the original MessagePad, the new one is round and slides into a compartment in the right-hand corner above the screen.

There are several ways to get information to and from a MessagePad, but beaming data with its infrared transmitter is by far the coolest. The 110 beams data at a warp speed of 38.4 Kbps, versus the
The Newton Connection
The Newton Connection Kit 2.0 (about $99) is a new version of the Newton using AAA batteries, and four times the modem-like 9600-bps speed of the original MessagePad.

The 110 uses four AA alkaline batteries; Apple estimates the 110's battery life will be twice as long as that of the original Newton using AAA batteries, and four times longer than with NiCad batteries. For intermittent use, the AA batteries last up to four weeks. For continuous use, expect up to 12 hours. Apple will also offer a new caddy-style charger (less than $100) that restores NiCads in about two hours.

Apple will offer a more affordable MessagePad 100 (about $499) that uses the same case as the original Newton, but features the new ROM. You can upgrade an original MessagePad to the new ROM for $99.

The Newton Connection Kit 2.0 (about $99) is a new version that provides translators for popular applications, as well as comma- and tab-delimited text. Apple scheduled both the 110 and the kit for shipment in early March. The Windows version of the connection kit was scheduled to ship this spring.

The Newton's future centers around additional new technology, but for now, users will be pleased to find a MessagePad that simply works better.—DAN MUSE

Battle over Color Printers
HUE AND CRY

With color printers increasingly in demand for use in homes and offices, both Apple and Hewlett-Packard have new ink-jets that can produce color or monochrome output at higher resolutions than before.

The Apple Color StyleWriter Pro prints up to 2 pages per minute in monochrome, or 1 page every two minutes in color, both at 360 dpi. It uses a new Canon print engine, 64 TrueType fonts, a ColorShare driver that supports printer sharing, and a 100-sheet paper feeder that can hold 15 envelopes.

The Apple printer's ink cartridges are clear plastic so you can judge how much ink is left, and the cartridges are all separate so you don't have to throw out ink if one color runs out. The company estimates that a page of black text with 5 percent coverage will cost 2.4 cents, and that a color page with 30 percent coverage will cost 15 cents. Apple has also included its ColorSync color-matching software.

The Color StyleWriter Pro can operate in three modes—photographic, business graphics, and spot color—and can print on letter, legal-, and A4-size plain paper, or on transparencies. Scheduled to ship in late March, the Energy Star-compliant printer will have a direct price somewhere between $649 and $749.

With its DeskWriter 560C, Hewlett-Packard offers even higher resolution (in one direction): 600 by 300 dpi. Replacing the DeskJet 550C, the 560C produces 3 pages per minute in monochrome, or about 1 color page in four minutes (seven minutes in best mode), according to HP. The 560C includes 35 TrueType fonts; HP's ColorSmart color-rendering software; improved ink-jet cartridges to reduce misting; and an automatic sheet-feeder that holds 100 sheets of paper, 50 transparencies, or 20 envelopes.

Only the black-ink cartridge is separate on the HP printer, so if you're printing a lot of one color (other than black), you may have to throw away some ink. HP estimates an average monochrome page will cost 2.5 cents. At press time, HP did not have an estimate for the cost of an average color page. The 560C also accepts letter-, legal-, and A4-size paper and standard transparencies. The 560C, also Energy Star-compliant, began shipping March 3 at a list price of $719. The new HP color printer will eventually replace the existing DeskWriter 550C, which was reduced in price to $599.

HP also introduced the $365 DeskWriter 520, a monochrome ink-jet printer that will replace the DeskWriter 510. It also shipped March 3; HP will also offer a $249, software-only upgrade for the 560C. Apple, 408/996-1010, 800/776-2333; HP, 800/752-0900.—T.M.
Unix workstations running the HP-UX operating system with the Motif interface, and on Sun Microsystems Unix workstations running the Solaris operating system with the OpenLook interface.

MAE comes out of Apple's Business Systems division, whose mandate it is to bring the Mac into the corporate MIS and engineering market with such products as the Apple Workgroup Servers and MAE. This foray into Unix should help Apple show that it has not ceded this market to ever-lower-cost Unix workstations or high-end PCs, as several makers of Mac science and engineering software have charged.

Apple estimates MAE's performance on a midrange Sun Sparc-2 workstation to be comparable to a Mac LC II, while performance on a high-end Sparc-10 will be comparable to a Centris 650. That's about 10 percent the size of the Mac market and 1 percent the size of the PC market—but Unix dominates the large corporations that Apple is pursuing aggressively.

Macintosh Application Environment uses System 7.1, with a few modifications to make it work in a Unix environment. For example, there's a Keyboard control panel to map Unix control keys to their Mac equivalents, as well as an additional option in the Monitors control panel to create the Mac's window size. There's also a tool bar at the bottom of the Mac window that lets you mount 1.4MB Mac floppies, cut and paste graphics and text between Unix and Mac windows, and constrain the mouse to the Mac window. The tool bar can be hidden and its functions replaced with commands.

MAE supports TCP/IP and the Unix NFS file structure, so Unix networking and file access is supported through the standard Mac interface. But the few applications that call the Mac OS's SCSI or NuBus managers will not work, since MAE does not support the Mac's external hardware standards. Also, MAE does not support QuickTime (movies play, but there's no sound support), and system extensions (INITs) are not supported, although some may work. Native PowerPC software also is not supported.—GALEN GRUMAN

**DayStar 68060 Accelerators**

DayStar Digital has announced that it will introduce a series of Macintosh PDS accelerators based on the Motorola 68060 CPU, the successor to the 040 that Apple decided to forgo when it adopted the PowerPC chip as the future Mac CPU. DayStar will still sell its Turbo 040 line of 68040-based accelerators but plans to gradually supplant it with the new Turbo 060 family. The main reason for introducing products based on a chip that Apple may never use is that DayStar expects it will be a while before a lot of 680X0-based applications are available in native PowerPC versions. DayStar says its 060 accelerators will run any software that's compatible with the 040, because the 060 uses exactly the same instruction set.

The advantage of using the 060, DayStar says, is that users can get near-PowerPC speed without replacing their software, which they must do to get that speed on a PowerPC-based Macintosh (see "The Power Macintosh Arrives," in this issue). The Turbo 060 runs at 66MHz, although DayStar is investigating the possibility of a less-expensive 50MHz version.

DayStar plans to have 060 boards for most Mac II's and Quadras (the IIx and the Quadra 840AV are exceptions) and for the Centris. The boards are expected to ship in May, depending on availability of the chips from Motorola. The 060 boards should have street prices starting around $1500. One version will have four SIMM sockets for adding up to 128MB of RAM to the accelerator. DayStar Digital will also offer the Image 060, a model that adds a daughterboard with twin digital signal processors for accelerating Adobe Photoshop filters. Prices for the Image 060 weren't final, but should start around $2000. The Image 060 comes with Charger Suite software, filters and plug-ins for Photoshop, Storm Technology's Picture Press 2.5 JPEG compression software, Kudo Image Browser from Impcase Systems, Xaos Tools' Paint Alchemy, and Kodak's Photo CD Access and Sampler.

Those who purchased the 40MHz Turbo 040 between January 7 and March 31 will be able to upgrade to DayStar's planned 80MHz PowerPro 601, a PowerPC-based accelerator (see "Apple Unveils First PowerPC Product," News, Macworld, March 1994). Buyers of the 33MHz Turbo 040 can upgrade to a 66MHz PowerPro 601. Both upgrades will cost $199 and can be done from July 1 through December 31, 1994. DayStar Digital, 404/967-2077, 800/962-2077.

—GALEN GRUMAN

**THE AmCoEx INDEX OF USED MAC PRICES**

<table>
<thead>
<tr>
<th>Machine/RAM/Hard Drive</th>
<th>Average Sale Price</th>
<th>Monthly Change</th>
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<tr>
<td>PowerBook 100/4MB/20MB</td>
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<td>Quadra 900/8MB/160MB</td>
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</table>

*Index provided by the American Computer Exchange of Atlanta, Georgia (800/766-0717). It reflects sales during week of February 19th. Configurations include keyboard and exclude monitor and display board for nonseparat models.*
QuickDraw Accelerator

RADIUS GRAPHICS BOARD

Continuing the race for graphics professionals’ NuBus slots, Radius debuted its $2999 LeMans GT video board, which it says is the fastest 24-bit Macintosh QuickDraw accelerator available.

The 6.5-inch board’s optimized ASIC chips deliver QuickDraw performance 230 percent faster than a Quadra’s built-in video does, according to Radius. The LeMans GT’s 3MB of VRAM lets it display 24-bit images at resolutions as high as 1152 by 882 pixels. Radius includes a lifetime warranty with on-site, overnight replacement of defective boards. Radius, 408/434-1010, 800/227-2795.

—JIM FEELEY

Two-Page Apple Display

LOWER-PRICE MULTISYNC

The Apple Multiple Scan 20 Display is a two-page color monitor intended for graphics and publishing professionals. The heart of the package is Sony’s new NI 20-inch Trinitron tube with a 0.31mm stripe pitch. The new monitor is not of as fine a quality as Apple’s current 13-inch and 16-inch offerings, nor as fine as the current Macintosh 21” Color Display, which it will replace; but the Multiple Scan 20 is still not bad for a monitor of its size. As its name suggests, the monitor supports multiple resolutions, ranging from 640 by 870 pixels up to 1280 by 1024 pixels, all at a 75Hz vertical refresh rate. At the standard Apple two-page resolution of 1152 by 870, images appear at about 80 dpi. By way of comparison, an average 14-inch monitor displays images at between 65 and 70 dpi.

Users of the new Apple monitor will find bells and whistles typically offered only on large, high-end monitors; there’s a front panel loaded with digital controls—brightness, contrast, horizontal and vertical size, convergence, trapezoid, and pin cushion. Meanwhile, color perfectionists can adjust the monitor’s color temperature by choosing one of three white points (the unit’s ColorSync profiles are included). Users can fine-tune the display for different resolutions, and since all the controls are digital, the monitor will remember up to ten groups of settings and automatically configure itself when it recognizes a resolution.

The Multiple Scan 20 comes with new Display Manager and Monitors control panel software that lets you switch resolutions without a restart, if the on-board video hardware or graphics card supports this feature. According to Apple, older Macs won’t be able to do this, and most graphics-card manufacturers will have to update their board. With the new system software, users will also be able to continue.

In Brief

Mobius Drops Accelerator Prices

Until March 31, Mobius Technologies is offering a promotion on its Speedster line of 68040 accelerators. You can save $300 on a 25MHz model without FPU (now $399). Savings on the same model with FPU ($499), on 33MHz versions with and without FPU ($599 and $799, respectively), and on a 40MHz version with FPU and cache (now $1199) are all around $400.

Practical Peripherals Cuts Modem Prices

Practical Peripherals has reduced prices on several high-speed fax modems. The PM-14400FX PKT/Mac (portable 14.4-Kbps fax modem) now retails for $429; the PM14400-PXMT/Mac (desktop 14.4-Kbps fax modem), for $279; and the PM9600FXMT/Mac (desktop 9600-bps fax modem), for $229.

Dayna’s ProFiles

Dayna Communications is shipping its $129 ProFiles file-management application. Users can synchronize files and folders; move, copy, and compress in the background; and create custom, compiled directories of files and folders in different locations (hard drives, removable media, file servers). A PowerPC native version will ship this spring.

Nanao USA has cut the price of its FlexScan monitors, extended its warranty on all existing FlexScan IW monitors to three years, and offered rebates of up to $100 for monitors bought this year. Prices now start at $799 for the 15-inch color F3400W and top out at $2799 for the 20-inch color Trinitron T6601.

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adjust their monitors’ orientation (virtual-desktop layout and menu-bar location) without restarting. The Multiple Scan 20 is compliant with both the MPR II guidelines and Energy Star, and the monitor ships with a tilt-and-sweep base with one ADB-in port and two ADB-out ports—but without audio in/out jacks.

The display will work with any Mac that has a video-out port, and will sync to most PC-compatible standards, including VGA and SVGA. Apple includes a Mac-to-PC adapter. The announced price of $2149 puts the company in direct competition with third-party monitor manufacturers.

Apple, 408/996-1010, 800/776-2333.—CAMERON CROTTY

SyQuest’s 270MB Drive

SyQuest has announced a Mac version of its 3.5-inch, 270MB removable hard drive mechanism. The SQI270S is SCSI-2 (backward-compatible to SCSI) and features 13.5ms average seek times and 21.8ms average access times. The drive will read and write SyQuest 3.5-inch 105MB cartridges, and so far MacWarehouse, PLI, FBW, MicroNet, APS, MacUSA, ClubMac, Focus, and Procom expect to use the mechanism in their products. At press time, suggested retail prices for companies’ external versions were ranging from $699 to $899. Internal versions will be about $675 list. SyQuest, 510/226-4000, 800/245-2278.—CAMERON CROTTY

TREND

Wireless Communicator

WITH GENERAL MAGIC’S TECHNOLOGY

Since no PDA should be an island, Motorola introduced the envoy, a 1.6-pound, $1499 personal communicator that is the first to integrate two-way wireless communications with General Magic’s Telescript and Magic Cap communications software. With a serial cable Mac owners can use the envoy as a wireless modem or adjunct to a PowerBook.

With its wireless modem and software, the envoy can reach any Internet address, fax machine, or pager in the world. The envoy provides automatic routing of messages to AT&T Mail, Skytel, EMCARC, and MCI Mail.

Unlike the Newton, the envoy does not claim to recognize handwriting. Instead, like the Newton, the envoy records handwriting as a bimapped graphic and accepts data typed in through a small keyboard on the screen.

Navigating the Magic Cap operating system’s Desk, Hallway, and Downtown interface, users can access software applications and online services. Telescript’s intelligent agents can select, deliver, and retrieve data.

The device includes 1MB of RAM; a fax/data modem; a 4800-bps wireless RF modem; a 38.4-Kbps infrared transceiver; and two Type II PCMCIA slots for RAM, ROM, or flash memory.

The envoy ships with RadioMail Eudora, AT&T Magic Mail, AOL Client, PenCell (a spreadsheet), OAG Client (for flight information), Pocket Quick-en, and e-Shop.

Motorola plans links with information services. The envoy should ship this spring. Motorola, 708/576-1600.—JIM FEELEY

AppleScript Development

EASIER DEBUGGING

By April, Main Event plans to release Scripter, a development environment for writing AppleScript scripts. Unlike Apple’s AppleScript Editor, which has minimal tools for script creation, Scripter has debugging tools (such as stepping and syntax checking) and find/change facilities. It can load the language specifications for any AppleScript-enabled program and can display the correct syntax and options for program commands and objects, so developers or end users can learn the syntax for any programs they want to script.

Main Event, 202/298-9595.—GALEN GRUMAN
Finally a storage system that can store it all. Introducing Pinnacle's Patent Pending Orray™ technology.

The Pinnacle Orray™ is the world's first optical drive system to utilize multiple heads and multiple disks - similar to hard disk technology. The Orray™ can perform as fast as most hard disk drives, with the added benefit of removable, reliable, inexpensive optical media. Each color-coded media set holds up to 5.2 Gigabytes of data.

With its multi disk/multi channel architecture, speeds can be achieved to store all types of data... Digital Video, Digital Audio, Graphics/Prepress, Color Imaging, Animations, Databases, Server Applications.

The versatility of the Pinnacle Orray™, with its intelligent RISC processor controller, allows for operation in multiple environments. In streaming mode the Orray™ can be used for Digital Video or Digital Audio with a sustained data transfer rate up to 8MB per second. In transaction mode the Orray™ can be used as a file server or database storage system with its advanced intelligent segmented caching controller (up to 64MB of RAM). Multiple transactions can be executed quickly and much faster than traditional hard disk arrays on a network. All settings including operational modes, SCSI addresses, and status indicators are controlled and viewed from a front panel LED for easy access and identification.

The Pinnacle Orray™ is the future of data storage. For more information or to order call: 800.553.7070

8 MB/Sec Data Transfer Rate - 5.2 Gigabyte Capacity
As a prominent leader in today's display technology, CTX proudly introduces its new GM Series of Macintosh compatible products that may change the way you think of monitors.

In sizes from 14" to 17", the GM Series provide features and capabilities that meet virtually any user's requirements for performance, resolution and price. Low Radiation (MPR II) and Power Saving Management are standard. As you may know, CTX monitors are built through stringent internationally recognized quality standards, such as ISO-9000. They offer crisp, steady and brilliant images as well as advanced features, while maintaining superb reliability and affordability.

To get a closer look at these true quality world-standard monitors, contact your nearest CTX dealer today.
Apple Servers

Join Lineup

SPEED BOOST TO COME LATER IN THE YEAR

As part of its strategy to move the entire Mac line to PowerPC, Apple Computer plans to release versions of two Workgroup Servers in May that use the PowerPC 601 CPU. However, the servers won't realize the benefits of the 601's faster speed for at least several months, when the server software is rewritten as native PowerPC software, Apple says.

The lineup Apple's two PowerPC-based servers are based on the desktop counterparts—the Power Macintosh 6100 and 7100—that began shipping on March 14 (see the feature "The Power Macintosh Arrives," in this issue). Apple hadn't finalized the pricing at press time.

• The 6100-based server is essentially the same as the Power Macintosh 6100/60, with the addition of a 256K secondary cache and standard Workgroup Server software. It is basically a PowerPC-based Workgroup Server 95.

• The 8100-based server is essentially the same as an 8100/80. It is fundamentally a PowerPC-based Workgroup Server 80.

Both servers lack the video card that comes with their Power Mac counterparts. Instead, they rely on the RAM-based back-panel video port, which supports 14-inch and 16-inch monitors at 16-bit and 8-bit color, respectively.

Apple says it will continue to sell the Workgroup Server 60, 80, and both configurations of the 95—at least as long as customers buy them.

Upgrade options There will be motherboard upgrades from the Workgroup Server 60 and 80 to the PowerPC equivalents. Upgrade prices were not final at press time. The 601-based servers will require updates to the Apple networking software to make the software PowerPC-compatible, since servers are more sensitive to operating-system peculiarities than desktop Macs are, Apple says. The first set of networking software to be revised will be AppleShare, AppleSearch, and Apple Remote Access, all of which will be updated in time for the PowerPC servers' ship date, Apple says. Later in the year, Apple expects to ship native PowerPC versions of these programs.

Equivalent performance Apple expects no noticeable performance difference between the current 040-based Workgroup Servers and the new 601-based servers because much of a server's performance is determined by the network, not by the CPU, and most of the communications services that are available for the PowerPC servers will still be running in 68X0 emulation, not as native PowerPC code. But Apple expects better performance for the communications services as more and more network software is ported to PowerPC code.—GALEN GRUMAN

Power Watch

THE LATEST PRODUCTS FOR THE POWER MACS

Apple Computer has detailed the bundles it will offer of Insinia Solutions' SoftWindows software with certain configurations of the Power Mac. The bundles will ship with 16MB of RAM and include a 250MB drive on the 6100/60 and 7100/66 and a 500MB drive on the 8100/80. The bundle will cost (depending on model) about $385 to $825 more than a similarly configured Power Mac without SoftWindows. SoftWindows is also available separately for $499 from Insinia.

• Light Software plans to introduce three new programs in fat-binary format for use on Power Macs and 680X0 Macs: Light Paint for image editing, Light Compress for file compression, and Light Protect for file encryption. The prices will be about $100 for Light Paint and $50 for the others. (The feature "Power Mac Software," in this issue, includes details on other companies' PowerPC software plans.)

• Yarc Systems Corporation has begun shipping the Zuma 601, a PowerPC 601-based coprocessor board that accelerates Specular International's Infin-D, CoSaS's After Effects, Strata's StudioPro, Pixar's MacRenderMan, and VIDI's Presenter Professional. Yarc expects other programs to support the board later this year. A 50MHz board costs $3095, a 66MHz board $3395, and an 80MHz board $4095. The boards include 16MB of RAM and work in any Mac that supports 12-inch NuBus boards.

• NEC Technologies will offer a free AV video adapter to owners of its current monitors. That adapter is needed to connect a standard monitor to a Power Mac's back-panel video port or to a 680X0-based AV Mac's video port.

Apple, 408/996-1010; Insinia, 415/694-7600; Light, 408/253-4277; NEC, 708/860-9500; Yarc, 805/499-9444.—GALEN GRUMAN
Now you can print from your Macintosh™ to over 1,000 PC-compatible printers.

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New Products

THE LATEST MACINTOSH RELEASES

by Cameron Crotty

This section covers Macintosh products formally announced but not yet evaluated by MacWorld. Unless otherwise stated, the minimum requirements for operation are a Mac Plus with 1MB of RAM, running System 6. All information and performance claims are supplied by the product vendor and have not been independently verified by MacWorld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

Cascade CD 100

This 100-platter SCSI CD-ROM jukebox drive with 310ms average access times and 400-Kbps sustained data-transfer rates. The drive can handle most disc formats, including CD-ROM, Quic, ISO 9660, and CD-I. Pinnacle’s Virtual File System software is included, and allows access to the library through volume or file aliases. Users select a volume, and PFS automatically retrieves the appropriate disc, usually in under six seconds. $9995. Pinnacle Micro, 714/727-3200, 800/622-1722; fax 714/727-1913.

Jet Stream Color Image Servers

Based on Silicon Graphics Indigo workstations, this line of image processors downloads and renders TIFF, TARGA, and PostScript files over an Ethernet network, on 3.5-inch floppy drives, or on 4MB or 8MB removable hard drive cartridges. Or you can simply print PostScript files to the Jet Stream as if it were a laser printer, and the server then sends the output to one of the company’s film recorders via a SCSI interface. The Jet Stream 16 comes with an SGI Indigo R4000, a 1.7GB hard drive, and 80MB of RAM. The Jet Stream 8 comes with an R3000, a 1.7GB hard drive, and 4MB of RAM. The Jet Stream 4 comes with an Indigo R3000, a 256MB hard drive, and 32MB of RAM. Jet Stream 16 $14,990; Jet Stream 8 $4,900; Jet Stream 4 $3,400. Management Graphics, 612/854-1220, fax 612/851-6159.

Mac CD Stations

MacCD Stations

Starting with a CD-ROM drive, these multimedia upgrade packages add 9-watt amplified stereo speakers and several CD-ROM titles. The Station 28 features a double-speed, tray-loading drive with an average access time of 380ms and a data-transfer rate of 300 Kbps. The Station 3 has a triple-speed caddy drive with an average access time of 195ms, and a data-transfer rate of 450 Kbps. Bundled CD-ROM titles include Icon Simulations’ Sherlock Holmes, Consulting Detective; Compton’s Interactive Encyclopedia; and a music sampler. Station 28 $449; Station 3 $699. Procom Technology, 714/852-1000, 800/800-8600, fax 714/892-1221.

MacIRMATrac NuBus Coax Adapter

A 7-inch NuBus card that connects Macs to IBM 3270 mainframes via coax or unshielded twisted-pair wiring. The card can be upgraded via software download, and it ships with the company’s IRMA WorkStation for Macintosh connectivity software. $1195. Digital Communications Associates, 408/442-4000, 800/348-3221; fax 408/442-4366.

MacIRMATrac NuBus Token Ring Adapter

Replacing DCA’s existing LANWay and MacIRMATrac 4/16 Token Ring adapters, this 4-Mbps or 16-Mbps (software-selectable) adapter connects a Mac to a Token Ring network, automatically sensing whether the media is shielded or unshielded twisted-pair. The 7-inch, DMA NuBus card supports the company’s IRMA WorkStation for Macintosh and MacMiniFrame 802.2 host connectivity software, and features 512K of RAM for downloading microcode, including logical link control. $895. Digital Communications Associates, 408/442-4000, 800/348-3221; fax 408/442-4366.

RF-4000

With this SCSI CD recorder, you can cut ISO 9660, CD-ROM, CD Multi-session, CD-I, and CD-Audio formats. The recorder has average access times of 1 second, has sustained data-transfer rates of 352.8 Kbps, and uses CD-R recordable CDs. Comes with Corel’s SCSI Pro recording software and two CD-R discs. $9995. Plasmon Data Systems, 408/956-9400, 800/445-9400; fax 408/956-9444.

ROMWriter I

This external CD-ROM recording system uses the Ricoh CD-Recordable drive mechanism, which supports both multi-session and incremental writing. With the included software, users can produce ISO 9660, CD/AX, Mac, Unix Filesystem, and RockRidge formats. The package ships with everything you need to write your first disc, including software (Mac, DOS, Windows, NEC, HP-UX, and Sun O/S), SCSI cable, documentation, and a blank CD. $4295. Logical Engineering LC, 813/264-5236; fax 813/264-9140.

Sonnet BudgetBooster

Slide one of these cards into the PDS slot of your Mac LC, LC II, Color Classic, or Performa 400, 405, or 430, and you’ll increase your machine’s performance to near Mac LC III levels. All cards have a 25MHz 68030 chip, except the LC II version, which has a 25MHz 68020. All cards also include a math coprocessor. $39. Sonnet Technologies, 714/261-2800, 800/945-3668; fax 714/261-2461.
Vopex-8M
This video splitter box drives up to eight monitors from your Mac's video-out port. Monitors must be the same type, but since the unit has its own power supply, all eight monitors can be placed up to 200 feet away from the box, with the proper cables. Possible uses include classroom or trade-show environments, or anywhere you need multiple screens showing the same output. The Vopex-8M ships with a single 3-foot cable for plugging into your Mac. $865. Network Technologies, 216/562-7070, 800/742-8324; fax 216/562-1999.

SOFTWARE

Automap Road Atlas for Macintosh
No matter where you go, there you are. Automap's Atlas calculates the quickest, shortest routes, and alternative routes, between any two locations in North America chosen by the user. The package gives mileage, calculates the time the trip will take, and displays the route on color maps. Users also get driving instructions and geographical and road data, including state and city populations, land areas, and driving laws. 2MB min. memory; requires Mac Classic II. $99.95. Automap, 206/455-3552; fax 206/455-3667.

Cal
This calculator and calendar combination speaks to you. It repeats what you've input, whether by keyboard or mouse (or by voice with an AV Mac), so you can check your entries by ear as you work. The calculator sports an animated electronic tape that you can scroll, print, select, export, and import, plus scientific and programmer's functions, including an expression parser for nested algebraic equations. The calendar features time and date scheduling, reminders, search by text string, and recurring events. You can also customize the size of the calculator buttons, the software's voice, and the color of nearly every display item. $79.95. Thought I Could, 212/673-9724; fax 212/260-1194.

Deliverance
A four-way scrolling arcade adventure in a medieval castle. As the hero, Stormlord, you must battle mythical creatures and save imprisoned fairies. You encounter bats, fire-breathing dragons, mechanical spiders, poison gas machines, and other challenges too horrible to mention here. Be sure to look out for hidden keys and coins, which increase your endurance. 4MB min. memory; requires Mac LC, 3-bit color. $49.95. Inline Software, 203/435-4995, 800/453-7671; fax 203/435-1091.

DigiTrax
Here's a multitrack digital audio recorder and editor that puts the DSP chip in your AV Mac to work. You can capture up to six tracks of 16-bit audio at sample rates up to 48kHz and then edit them. The software includes a six-band equalizer to fine-tune your audio, and you can sync your mix to any MIDI Manager-compatible sequencer or to a QuickTime movie. While you work, DigiTrax plays the appropriate frames to keep you on track with your multimedia presentation. 8MB min. memory; requires Centris 660AV, Quadra 660AV, or Mac with ARTA-compatible NuBus card. $349. Alaska Software, 408/738-3320; fax 408/524-9699.

El-Fish
Sick of cleaning algae off the inside of your aquarium? With this software you can create and breed exotic fish, and then design an aquarium for them to live in. Your fish, whether relatively normal or relativistically altered, swim around castles, coral, miniature plants, even a cat's paw that swoops into the tank. 6MB min. memory; requires Mac LC, 8-bit color, System 7. $59.95. Maxis Software, 510/254-9700, 800/336-2947; fax 510/253-3736.

FlipBook
Before there was multimedia, kids watched pen-and-ink characters animate as they riffled through flip-books. This software opens QuickTime, PICS, or Scrapbook-based movies and prints them out as individual frames that users can cut out and assemble into flip-books. Scissor lines, cropmarks, and binding marks aid in the assembly, and the Better Thumb Control option allows authors to book books with sequentially increasing card size for users with limited dexterity. 2MB min. memory. $89. S. H. Pierce & Co., 617/338-2222; fax 617/338-4810.

Imaxis
Moving earnestly toward the futuristic promise of a paperless office, we present a document-management system. A paper document comes into the office, an employee enters it in the system with the company's scanning and OCR software (OCR sold separately), and files it on a central server. Other workers can then access documents using client software. Users control how continues...
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Under normal circumstances, the last thing you want to think about when you’re away from the office is the office. Then again, when was the last time you operated under normal circumstances?

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they arrange their documents, and three security levels control which users can see, move, or make changes to documents. The full text of each document is indexed and searchable, and users can place bookmarks to return to documents. Client requires 5MB min. memory, Mac II, System 7.1. Server requires 5MB min. memory, Mac II, System 7.1. Four-user pack (includes scanning and server software and four clients) $2695; OCR software $995. Systems Engineering Solutions, 703/573-4366, 800/462-9470; fax 703/207-9146.

Key Into Dictionaries

Based on Random House's foreign-language dictionaries, each of these bilingual, bidirectional dictionaries has over 50,000 entries. You type in three or four letters of a word, and the software starts bringing up possible entries. You can keep typing until you get the one you want, or stop and use the mouse to highlight the desired word. A translation then appears that you can copy and paste via the Clipboard. Spanish, Italian, German, and French versions are available, and each dictionary also includes a pronunciation guide plus tables of useful words and phrases, months, days of the week, numbers, signs, and food terms. $59.95. Exclercor Software Corp., 607/257-5634; fax 607/257-1665.

Koy Fractal Studio

From the world of mathematics comes a package that is designed to provide graphic artists with fresh ideas and textures. Instead of typing in formulas or studying up on the Julia set, you define polygons that the software then transforms and repeats on a smaller and smaller scale. The package saves documents in PICT format, and you can import PICT files to serve as templates for fractal designs. A library of more than 50 color fractals is included. $149.95. Koy Software, 314/878-9125; fax 314/878-9125.

LineWorker

Users can import and export Scitex Handshake Linework files with this Photoshop plug-in. After transferring a Scitex scan to a Mac as a Linework file (additional hardware and software required), users can now edit the scan in Photoshop, colorizing or tinting it or editing existing color tables. The finished work can then be exported back into Linework format for placement into a page-layout program, or transferred directly back to a Scitex system. Requires Adobe Photoshop 2.01. $295. In Software, 619/749-7502; fax 619/749-7503.

Logo SuperPower

With more than 2000 graphic elements to choose from, edit, and combine, you could be looking at your new business logo before you know it. The package includes Base Graphics, such as eagle heads, light bulb symbols, and lightning bolts. All design elements are in Adobe Illustrator file format. $279. Decathlon Corp., 513/421-1938, 800/648-5646; no fax.

MetaFl0'

Like the company's Fio' software, this package allows you to perform twisting, pulling, and stretching distortion on still and moving images (PICT, TIFF, PICS, and QuickTime supported). With MetaFl0', you get multiple maskable layers with transparency controls, and SMPTE time-code stamping on key frames. To save time and protect your original document, the software uses a subsampling algorithm to map your distortions, but doesn't actually change an image until you save it as a nonnative file format. 5MB min. memory; requires Mac II, math coprocessor. $595. Valis Group, 510/236-4124, 800/825-4704; fax 510/236-0388.

Pattern Manager

Choose and create desktop patterns with this post-resource-editing software. Users can import and export patterns either via the Clipboard or in PICT file format and can have multiple pattern files open, each with up to 30,000 patterns at sizes up to 256 by 256 pixels. Create a pattern within your favorite graphics application, and edit it in Pattern Manager and install it on the desktop with the Desktop Preview tool. Requires Mac Classic. $59.95. Mantis Development, 617/969-6434, 800/230-6434; fax 617/647-9636.

PixelPutty

After you fire up Pixel's Showplace with this plug-in installed, just select one of the four starting shapes (sphere, cylinder, cone, and plane) and drag it to the place on your desktop where you want the pattern to appear.

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AppleSearch turns a typical file server into a rather untypical knowledge server. It quickly explores your entire AppleTalk network in search of information on any topic you may select. And more important, finds in on precisely the pieces you need. It's incredibly easy to use. Even first-time users can start searches by creating “Reporters” with simple English queries like “Find all references to volcanic activity in the South Pacific.”

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A personal, electronic update is then delivered to you with a list of all the information you requested, ranking each entry based on how well it matched what you were looking for. Reporters can also deliver updated information to you on a scheduled basis — whether you're in the office or not. They can even be shared with other users. Or accessed remotely using Apple's Remote Access. So, for example, a marketing manager can easily track market announcements from on-line news feeds. Attorneys can access references to legal cases. And teachers and students can quickly research subjects and identify resources they might otherwise miss.

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der, cone, or mesh) and start pushing, pulling, and pinching it. This spline-based modeler mimics the reactive characteristics of clay or putty, allowing you to create organic shapes quickly. Models can also be imported for tweaking and refining. Requires Showplace 2.0. $129. Valis Group, 510/236-4124, 800/825-4704; fax 510/236-0388.

PlateMaker Normally, for special print applications such as spot-color or vanish masks, foil stamping, and embossing, you have to either duplicate the document to place each special effect (and worry about registration problems), or manually strip it in the film. But this Adobe Photoshop plug-in can create single or multiple PostScript plate separation plates according to the DCS 2.0 specification from Quark. Users can create additional channels and simply export them as fifth and sixth plates. Requires Photoshop 2.01, page-layout software that supports DCS 2.0. $295. Globalogic, 613/721-0240; fax 613/829-0314.

Running On Time 2.0 Time-management, time-billing, and expert-account software that tracks what you do and how much it's worth. The package manages projects, billing, and type of work done and who's doing it, and allows for multiple-currency expense accounts. Analysis features are available, including breakdowns of project activities, and comparisons of target hours and billing against actual hours and billing. Running On Time works as a module of Manzanita's Flexware accounting system. 2MB min. memory. $995. Flexware Job Cost Module. Five-user license. GlobalLogic, 613/721-0240; fax 613/829-0314.

ScanShare Any scanner that supports the Apple Scanner Interface (including the Apple-Scanner, Apple OneScanner, and some scanners from Agfa, Hewlett-Packard, and Umax) can now be a shared resource over an AppleTalk Network. This software runs as a Chooser extension and allows a networked Mac to receive from a scanner as if the two were directly connected. Transfers can occur at up to 10 Mbps, depending on network type and traffic. ScanShare supports password protection and arbitrates concurrent device requests. Ten-user license $89. Stalker Software, 415/927-1026, 800/262-4722; fax 415/927-1026.

Vision 2.0 You're jammin' and you need to get it down on your Mac. The latest version of this MIDI sequencing software features standard music notation, editing, and printing; a menu for navigating window variations; moveable tracks; unlimited sequences in a file; a 3-D-style interface; and a Groove Quantize option. With this last feature, your Macintosh uses a previously recorded track as a baseline in order to capture subtle shifts in the rhythmic phrasing of a current performance. 4MB min. memory; requires System 7, MIDI interface, MIDI instrument. $495. Opcode Systems, 415/856-3333, 800/557-2633; fax 415/856-3332.

CD-ROMS

Disc-To-Disk When you play an audio compact disc with your CD-ROM drive, this software digitizes the audio and shoots it straight onto your hard drive in 8-bit mono or 16-bit stereo at up to 44.1kHz. You choose what, where, and when you want to capture, down to 1/2-second accuracy, and the software grabs the sound; compresses it if you want to; and saves it as an AIFF/AIFC, QuickTime, Sound Designer II, SND, or Windows WAV file. 5MB min. memory; requires CD-ROM drive that transfers audio data over SCSI port. $199. Optical Media International, 408/376-3511; fax 408/376-3519.

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Volume 2 of the PhotoGear collection features more than 100 stock business photos ranging from contemporary to retro styles; Volume 3 consists of 30 industrial backgrounds and textures built from nails, circuit boards, light bulbs, vacuum tubes, and other images. All images are available in high-, medium-, and low-resolution formats, all stored in TIFF format. Volume 2 images are 1330 by 1995 pixels; Volume 3 images are 2390 by 3060 pixels. $59 per volume. Image Club Graphics, 403/262-8008, 800/661-9410; fax 403/261-7013.

Tetris Gold

Bet you never thought that you'd be reading about a disc of a computer game's greatest hits. Tetris Gold contains the entire line of Tetris games, including Tetris, Super Tetris, Wellbris, Faces ... Trin III, and Wordtris. There's also a ten-minute QuickTime interview with Alexey Pajintov, the Russian creator of Tetris. Estimated street price $48. Spectrum HoloByte, 510/522-3584, 800/699-4263; fax 510/522-3587.

ACCESSORIES

Note Book Survival Kit

How many times have you pulled out your PowerBook while on the road, only to discover that you needed this cable or that adapter? This kit contains such late-night lifesavers as clip-lead phone-tap connectors, a T adapter to double a hotel phone jack, AC power adapters, dual-blade screwdrivers, a pocket-size AC line filter/surge suppressor, and plenty of extra phone cable. $149.95. Electronic Specialists, 508/655-1532, 800/225-4876; fax 508/653-0266.

Sentinel

To help make sure that your PowerBook doesn't grow legs and walk away, this security system combines a disk drive lock with a vinyl-coated steel cable. The lock slides into the drive slot and fastens with a key. Loop the cable around the nearest immovable object, and a would-be thief will have a harder time appropriating your favorite portable Mac. $49.95. Secure-It, 413/525-7029, 800/451-7592; fax 413/525-8807.

New Products

Wilson cover marketing plans, layouts, headlines, logos, and color, and provide tips on using special effects. Readers also learn about creating flyers, exhibits, and sales materials. 426 pages. $24.95. Ventana Press, 919/942-0220, 800/743-5369; fax 919/942-1140.

Advertising from the Desktop

Dive into the seamy underbelly of Mac history and culture with Bob LeVitus and Michael Frase. This book covers such topics as Mac hypertext and cyberspace, virtual sex, and Mac customization; and it includes the all-important chapter, "How to Get Free Software." An irreverent look at the people, events, and products that have contributed to the growth of the Mac. 256 pages. $19.95. Hayden Books, 317/581-3500, 800/428-3531; fax 317/581-3550.

Premiere with a Passion

This book covers all of Adobe Premiere LE, 2.0, and 3.0—from capturing, assembling, and editing clips to adding effects and optimizing output. Author Micheal Freer offers a guide to transitions and filters, plus information on special-effects tricks, movie compression, project management, and editing decision lists. A disk with 16 new transitions and other plug-ins is included. 368 pages. $34.95. Peachpit Press, 510/646-3493, 800/283-9444; fax 510/548-5991.

The Quark XTensions Book

In writing about the Quark XTensions that graphic designers need and use most, author Sal Soghoian uses case studies to examine production situations. Readers will find step-by-step analyses of importing and formatting text and data, linking tables to spreadsheets, and drawing Bezier curves in QuarkXPress. An included disk contains demos and complete working copies of XTensions covered in the text. 208 pages. $29.95. Hayden Books, 317/581-3500, 800/428-3531; fax 317/581-3550.

Books

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.
A simple demonstration of PhotoFlash software.

(A complicated demonstration isn't possible.)

You used to have to learn a lot—and spend a lot—before you could work with photos on your computer. Now there's PhotoFlash. PhotoFlash is easy to use, right out of the box. It helps you organize pictures, enhance them and drop them into your work. It's fast. It's memory efficient. And it's just $279.* So if you want to make your work look great, get PhotoFlash. You'll get the picture right away.

Introducing PhotoFlash software from Apple. 🍎

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If you really want to do the cool stuff, climb aboard our newest version of the leading multimedia authoring software for the Macintosh®. Because even if you've never worked in multimedia, Director® 4.0 can help you develop the most persuasive presentations, most inspired CD-ROM titles, most entertaining kiosks, most enlightening demos, most realistic visualizations, and most anything else you have in mind.

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**PROS:** Automatic port and language switching; 4MB of RAM standard; automatic on/off; PostScript Level 2; sharp printing through Resolution Enhancement technology; draft mode saves toner; Memory Enhancement technology (MET). **CONS:** Pricey if you don’t need PC features; only expandable to 4MB of RAM; MET not available to Macs; slight paper curl. **COMPANY:** Hewlett-Packard (800/752-0900). **LIST PRICE:** $1279.

**Personal LaserWriter 320**

**PROS:** Low price; PostScript Level 2 support; good print speed; FinePrint and PhotoGrade resolution enhancement; RAM expandable to 8MB; automatic on/off. **CONS:** Awkward case shape; no way to restart without unplugging; skimpy, confusing documentation. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $959.

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I admit it. I’m one of those people who still print on a ten-year-old ImageWriter because I’d rather deal with its poor resolution, noise, and pokiness than sink another penny into a printer that’s anything less than perfect. Apple’s Personal LaserWriter 320 and Hewlett-Packard’s LaserJet 4ML may change that. Small, inexpensive, and energy-efficient, both PostScript Level 2 printers produce documents that aren’t just adequate, they’re actually impressive.

Based on the same 4-ppm Canon engine, these 300-dpi printers are in some ways identical. Both use microfine toner and their own resolution-enhancement methods to turn out documents that, despite any competitive claims, are indistinguishable. Apple’s technique is called FinePrint; HP’s is known as Resolution Enhancement Technology (RET). Both methods round out the jagged edges of a curve, so that, under magnification, what you see are bumps instead of stair steps. The practical result is that to the casual eye, the output looks as crisp, clean, and professional as anything you could get from a more expensive and memory-hungry 600-dpi printer.

Neither printer has an on/off button, however. When idling, the printers draw less than 10 watts of electricity and don’t need to warm up before starting to print. As a result, a document starts printing within a few seconds of being sent to the printer, provided the document doesn’t require a lot of rasterization.

But these printers differ greatly in price. If your primary machine is a PC, I recommend the more expensive 4ML over the 320. The 320, on the other hand, gets my enthusiastic approval as the perfect printer for one or a few Macs.

**HP LaserJet 4ML**

In a mixed marriage (“me Macintosh, you PC”) the HP LaserJet 4ML can promote peaceful coexistence. Even though advertised almost exclusively as a Macintosh printer, the LaserJet 4ML offers far more advanced features to PC users.

In addition to PostScript Level 2, the printer supports HP’s printing language, Enhanced PCL5. The 4ML comes with both a Bi-Tronics parallel port and a LocalTalk port neatly concealed in a back panel. Automatic port and language switching lets both Macs and PCs print...
The LaserWriter 320 is a personal printer for Macs; it can also be used by small Macintosh workgroups. Apple's printer supports only LocalTalk, so Macintosh users can add this feature to HP, when PCs send Enhanced PCL 5 print jobs to the 4ML, its Memory Enhancement technology effectively doubles printer memory through compression; but I wasn't able to test this feature.

The HP 4ML comes with 4MB of RAM. That extra RAM is probably why the printer completed many of Macworld Lab's print tests substantially faster than the LaserWriter 320 (see "LaserWriter Select 320 versus HP LaserJet 4ML."). But you can't expand the 4ML's memory beyond 4MB. That's not a problem for users who print mostly text with an occasional piece of clip art, but for a graphic artist or a small group of engineers who need to print complex documents, this is a real drawback. The lack of RAM expandability seems surprising since the 4ML is targeting small workgroups that always use more RAM, whether to print complex documents or to speed up the queue of a shared output device.

**Personal LaserWriter 320**

The LaserWriter 320 is a personal printer for Macs; it can also be used by small Macintosh workgroups.

Apple's printer supports only LocalTalk networks. And although you can connect both Macs and PCs to a LocalTalk network, the 320 doesn't ship with Windows or DOS drivers. Nor does the 320 support HP's PCL, a common page-description language for PC programs. Despite these drawbacks, my local computer store likes the design, economy, and expandability of the 320 and recommends the printer even to PC users.

The RISC-chip-based 320 ships with only 2MB of RAM, yet it printed single-font documents just a few seconds slower than the 4ML, which comes with 4MB. For individual users, 2MB should be plenty of RAM; the real difference in speed shows up when you print complex documents. Upgrading the 320's memory to 4MB should make it faster, but we were not able to test this. (2MB and 4MB memory-expansion kits are available from Apple.) With 8MB of memory, you can use the printer's built-in PhotoGrade option to print photos and graphics in a high-quality gray scale.

**Alike but Different**

With slim but adequate documentation it took 15 minutes to get both printers up and running. The flip-open panels, similar on both printers, hide the power and printer ports on the back of both printers; keep cords neatly in place; and make installation extremely simple. Both companies, however, fail to explain adequately the difference between PostScript and TrueType fonts or describe how to install and maintain the different fonts.

Practically the same dimensions and weight, both printers are lighter than my ImageWriter, and both fit in the same space on top of my filing cabinet. Their identical, 100-page trays (I accidentally switched them once) have a sliding guide that allows you to feed the same variety of paper sizes and types. Both printers also use the same awkward manual feed-er that jams easily if you don't push your envelope in correctly.

However, I prefer HP's compact square case to the oddly shaped Apple case, which flares out at the back. You can also restart the LaserJet 4ML or output test pages by pressing a button on the front panel, with the Personal LaserWriter you must unplug and restart.

If you've been holding out for a high-quality personal printer that's fast enough to share over LocalTalk, the small inconveniences of the Personal LaserWriter 320 are eclipsed by its low price, good speed, and PostScript Level 2 support. If you primarily use a PC or work in a small mixed environment, the HP LaserJet 4ML is a good value. But if you need a printer for a single Mac or a small LocalTalk network, you should pass the 4ML by, or you'll pay for a lot of features you can't use. Solo Macs and small workgroups can get the right features at the right price, straight out of the box, with the LaserWriter. If you need expandability, you might also be better off buying additional RAM for the LaserWriter 320 than sinking that money into an extra port, PC printer language, and the bigger but unexpandable RAM of the HP 4ML.—MARGIE WYLIE
AppleSearch 1.0

Text Archiving and Retrieval

**PROS:** Easy to administer; easy to use; presents retrieved information clearly; extracts text from documents in many formats.

**CONS:** No support for files or other structure in data; need to be connected to server to perform scheduled searches.

**COMPANY:** Apple Computer

**DIRECT PRICE:** Server and five clients $1799; ten additional clients $499.

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**AppleSearch Strengths**

*Macworld,* programmer/analyst Dave Barrows, who provided technical assistance for this review, was frankly amazed at the ease of installing AppleSearch and getting it online. He created an AppleShare volume (the AppleSearch server can run under AppleShare or file-sharing and requires its own 68040-based Mac), launched AppleSearch and designated the volume as an Info Source, copied into the Info Source folder the documents I wanted to archive, and clicked on the Index button to create the index—the search dictionary—and to add the documents' text to the database. (The indexing process requires more than double the disk space of the original documents; plan for a gigabyte or two.) Except for indexing, all this took only three minutes. Barrows also designated drop folders where my colleagues and I could add documents to the AppleSearch volume. AppleSearch uses XTND and comes with DataViz translators for extracting text from 14 applications, including most versions of Microsoft Word, Aldus PageMaker, WordPerfect, and MacWrite (but not QuarkXPress). The translators eliminate the onerous task of extracting text manually.

To locate documents, you first create queries, called Reporters, using search functions including the Boolean AND, OR, and NOT; several wild-card operators; and proximity and adjacency controls. Search terms such as Sculley NOT Apple can be nested. For example, ((Sculley OR Spindler) NOT Apple) would find documents containing either of the Apple presidents' names but not Apple.

AppleSearch identifies words that occur frequently in retrieved documents. You can then search using the new words to find documents that cover the same topic but that don't contain the original search words.

When performing an instant search, AppleSearch also ranks retrieved documents by how relevant they are to your query. Since this relevance ranking is based on word frequency, proximity, and other factors—and not on the documents' actual meaning—I wasn't expecting the rankings to be of much use. I was pleasantly surprised.

You can save Reporters on the server and schedule them to run at a certain time each day, or run them immediately. After running each scheduled Reporter, the AppleSearch server sends a document called an Update to your Mac. The Update document contains all new finds in a newspaper-like format, with headlines, the first paragraph or so of text, and a button to click to display the full text (see "Extra! Extra!"). There is also a floating window with a scrolling list of document titles that serves as a table of contents for the Update.

The AppleSearch engine can be incorporated into third-party applications using the AppleSearch Client Developer's Programmer's Toolkit. I did not evaluate the tool kit.

**AppleSearch Weaknesses**

AppleSearch has its share of flaws, and it lacks some common features available in other archiving-and-retrieval products. Because AppleSearch doesn't use fields to maintain the structure of the original document, you can't search by author, creation date, or other information commonly found in documents. For example, there is no way to retrieve documents that you wrote without also retrieving documents that simply include your name.

Since the search engine remains on the server, you cannot search Update documents. So to find what you are looking for, you have to read all the Update documents.

Even though the text of an instant search remains on the server, you have only minimal search capabilities. You can't, for example, search for a word that wasn't in your original query. And when you run a series of instant searches, there is no history of your search path, so it is difficult to return to a document you previously located.

Updates larger than 32K are split into 8K chunks, which means you have to click on a button to view each 8K chunk—this is not only annoying, but also slow if you're doing a live search, since the update is receiving the text from the server. Viewing 8K chunks in an Update article is much faster, since all the text has been transferred to your computer.

If you disconnect from the AppleSearch server—for example, if you turn off your machine at the end of the day or forget to reconnect to the server—scheduled Reporters will not be run while you are disconnected, even though they're stored on the server. Ideally, scheduled Reporters would always run and Updates would be stored for you on the server.

Finally, AppleSearch claims that you can use "natural-language" searching—that is, it interprets normal English sentences typed into the query box—but you might find that Apple's idea of "natural" is not the same as yours. For example, the query "Find articles about Spindler but about Sculley returned articles containing the following text, among other items (italics added): (1) "Kiosks in malls which will specialize in hard-to-find batteries"; (2) "John Sculley and other executives from Apple"; and (3) "Additionally, the article implies that our product is a poor value for customers."

Overall, AppleSearch is a highly useful product for archiving and retrieving text—a function destined to become as bread-and-butter as word processing. Unfortunately, it has some rough edges, and "natural language" is more a concept than a reality. But AppleSearch does indeed retrieve information, and it presents the results in a convenient way.

—DAN LITTMAN
Macromedia

3-D Modeling Software

PROS: Straightforward interface; spline-based profile editing; fast screen redraw. CONS: Global resolution settings only; tricky RenderMan interface; displays only one perspective at a time; changes from spline to mesh geometry are irreversible. COMPANY: Macromedia (415/252-2000). LIST PRICE: $1495.

SPLINE-BASED DRAWING TOOLS—revolutionary in their time for flexibly articulating two-dimensional curves with a minimum of mathematical description—produced a similar revolution when they were adapted for three-dimensional illustration and design. Spline-based modelers introduce a third axis, along which an outline can be lathed or extruded to establish volume. They dramatically improved on polygonal modelers, and enabled object modeling to become more efficient and fluid.

Macromedia's MacroModel—younger, stronger, smarter sibling of venerable Swivel 3D—incorporates many of the earlier program's features, beginning with an elegantly simple interface. It supports hierarchical and variable object linking—essential for creating compound objects and interactive object relationships like those found in moving mechanical parts. But unlike polygon-based Swivel 3D, MacroModel uses Bézier-splines, whose malleable control points define curve tension. Retaining the 2-D profile for editing is an important MacroModel advantage. It allows for graceful, flowing shapes and permits fast global changes to the model.

After creating a profile using the standard 2-D drawing tools, you can refine it using the key profile-editing tools: the trim tool for cutting up sections of an outline to be reshaped; the fillet tool for rounding corners; the offset tool for duplicating and nesting shapes (great for creating tube shapes and beveled text); and the add/delete-control-point tool. A single working plane guides orientation and alignment of objects. Construction points, lines, grids, and axis—enable you to build a scaffolding (which you can later hide or delete) to help you plot an object's shape, size, and structure.

Floating palettes called browsers let you control position, view, scale, lighting, and shading both numerically and graphically. Good dexterity with the view browser is particularly essential because MacroModel displays only one view at a time. Moreover, the rendering resolution is a property of the view and not the object; instead of allowing some parts of the model to render as wire frames and others smoothly shaded (as other modelers do), the user must toggle globally between resolutions. This inconvenience is partially alleviated by MacroModel's fast screen redrawing and the ability to hide objects. For large models, also try using coarser adaptive-smoothing settings, which you can modify independently for each object.

Beyond the basic profile-extrusion operations, MacroModel lets you nest profiles to extrude objects with holes. Note that these compound extrusions are not Boolean; that is, they do not employ the mathematics of constructive solid geometry (CSG). But these figures do work for most basic drilling needs.

Objects can also be swept along a path to construct elaborate extrusions, such as a coiled spring; can be lathed around an axis to make symmetrical shapes, as on a lathe or potter's wheel; can be skinned over a set of profile ribs to make complex terrain or irregular surfaces; or can be made from cross sections that combine both lathing and skinning to build non-uniform symmetrical shapes.

For more precise sculpting, MacroModel can also discard the original defining geometry and drop to a patchmesh description. This converts the entire surface of the object to a matrix of editable spline control points, enabling the user to define more localized characteristics such as ridges and indentations without globally affecting the shape of the object. Simplifying the geometry further gets you to a polygonal description of the object more akin to what you see with the polygonal modelers mentioned earlier. Patchmesh geometry retains a lot of rubbery elasticity and tension between control points, while polygon mesh geometry is more like clay, with very localized reshaping properties. This editing level gives you individual control over all polygonal vertices, but the spline relationships no longer apply. Macromedia recommends duplicating objects before you change the level of geometry, since you cannot undo these operations.

The ability to manipulate control points together or separately gives the user a remarkable degree of control over object deformation. MacroModel gives you highly interactive squash and stretch capabilities that let you bend, twist, and warp models as though they were made of soft wax. The deformations are also quite useful for creating helical or spiral shapes, such as the threads of a screw.

Impressive as it is, MacroModel is not a 3-D panacea. The product was designed for a wide variety of modeling functions and is not tailored for the exacting specifications of architectural or mechanical design. It will, however, import EPS, RIB, DXF, and ClarisCAD files produced in other programs; MacroModel exports RIB, DXF, TIFF, and PICT file formats. And though MacroModel does not itself display surface texture, it sports a decent MacRenderMan interface for calling out and adjusting surface and lighting shaders. Models can then be exported as RIB files and photo-realistically rendered. Also, if you can get the hang of editing RIB files directly, you can add operations, such as putting holes in a bowling ball, and RenderMan can interpret them for final rendering.

MacroModel is also available bundled with MacRenderMan for $1795, and with the animation package Three-D (which has its own rendering engine, Render-Works) for $2495.

What was once a void has been paved with polygonal. While the search for the ultimate Macintosh modeler continues, MacroModel deserves a lot of credit for making the Mac's inner space a more pleasant place to work. The potential of the MacroModel engine has not been fully tapped, and version 2.0 should see significant new controls not only for surface appearance but for physical attributes and behaviors as well (good news for animators). Despite some shortcomings, MacroModel is a solid resource to have along when you venture out into 3-D space.
Kai's Power Tools™ 2.0

Divine the Future of Imaging

Thirty-three fantastic filters and extensions for Photoshop, Painter, Canvas, SuperPaint, PhotoFlash and others that accept plug-ins. Radiant gradients. Gorgeous textures. Awesome fractals. As the highest rated program ever reviewed in MacWeek, Kai's Power Tools is unmatched. And now it's a standalone solution because it includes Color-It!, Micro Frontier's award-winning 32-bit image processing paint program—FREE!

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About the Image: Renowned digital artist/photographer Lee Varis of Los Angeles, Calif., filmed in the world of "The Hermit," one in his series of haunting tarot card images, using Kai's Power Tools. KPT's Gradient Designer produced the glowing orb and its cascading rays. KPT Texture Explorer created the card's border, while the KPT Sharpen Intensity filter brought out details in the rock. To build the dream-like landscape on the horizon, Varis used a beta version of the awesome KPT New World Explorer™ (codename "Bryce"), a powerful natural and supernatural 3-D landscape creation program—coming soon from HSC Software.
DesignWorkshop 1.0

3-D Modeling Software

PROS: Approachable 3-D interface; easy-to-use modeling tools. CONS: Intermittently slow.

LIST PRICE: $895.

DesignWorkshop 1.0 — CARLOS DOMINGO MARTINEZ

ARCHITECTS HAVE BEEN SLOW to adopt computer-aided 3-D design, but the complexity of much 3-D software has done little to entice them. Let’s face it — programs with steep learning curves require motivation. DesignWorkshop may help overcome this reticence.

A 3-D, floating-point accurate solids modeler tailored for architectural applications, DesignWorkshop offers a clear, straightforward interface that is exceptionally easy to learn and use. The overall look is reminiscent of the original MacDraw but expanded to encompass navigation in three dimensions. And DesignWorkshop offers a concise feature set that focuses on architectural functions and leaves out nonessentials.

DesignWorkshop’s interface revolves around a crosshair cursor that you move freely to any location in 3-D space by using the option key to toggle mouse inputs to the vertical (z) axis. As the cursor moves, color-coded guidelines extend from the crosshairs along each axis to assist in positioning. Tool-palette buttons let you realign the working plane to any orientation, or to match the surface of a specific object, expediting the construction of unconventional shapes.

Object-creation tools work similarly. The tool palette holds line, rectangle, circle, arc, and polyline tools that behave like 2-D drawing tools and extrude objects with the option-key modifier. For example, rectangles can be extruded into slabs. DesignWorkshop also offers a polywall tool, and a block tool that produces editable solid objects, similar to Architector’s building blocks.

The model can be displayed as a wireframe, with hidden lines removed, or as a shaded solid. Perspective view is the default, but axonometric, plan, and elevation views are also available. DesignWorkshop displays objects located above the horizontal axis with projection lines to the ground plane to better indicate their location in space. When you use an alternate working plane, such as the vertical, additional projection lines refer to both the ground and working planes.

You can examine the model from any location in 3-D space by dragging the eye and look tools. Using the eye tool to view a wire-frame model produces a fairly brisk response. Unfortunately, shaded models revert to wire-frame models during eye-tool dragging and incur surface-recalculation delays.

DesignWorkshop supports multiple view windows, but it does not dynamically update them. For example, changes wrought in an elevation-view window do not appear in a perspective-view window until it becomes active. And when you use multiple views, object handles sometimes get misplaced as you switch back and forth. Changing the eye point restores them and no model damage results, but it’s disconcerting nonetheless.

Space-Jump is an excellent 3-D navigation facility that recognizes the actual 3-D location of objects within the context of their visual 2-D on-screen position. Align the cursor over the handle of a selected object, press the spacebar key, and the cursor jumps to the location of the handle in 3-D space. To reposition that object, just click on it and drag it; to reshape it, tug on its control handles.

Other object-editing tools let you reshape solids, manipulate individual object faces, trim solids, and punch openings in walls or slabs. And menu commands expand the capabilities of the basic tools. For example, the Wallify command can transform a solid object into a room with walls of user-defined thickness. And the arc tool in conjunction with the circular-duplication function enables you to create domes, spires, and lathed details.

Using DesignWorkshop’s tools and functions requires awareness of the current view and working orientation. For instance, to build a dome, it helps to be in vertical-plane orientation when drawing the arc, but you need to change to a Plan view to define the center of rotation for the circular-duplication function. Unfortunately, accessing most editing functions and changing views requires the use of menus. Keyboard commands or a small floating palette to access these functions would be helpful.

DesignWorkshop offers an excellent daylight feature that produces shadows with reasonable efficiency, but its renderings are limited to flat shadings that are adequate for architectural illustrations but fall well short of photo-realism. Aside from the sun, no other light sources are available; to study interior lighting schemes, you must transfer the model to a more competent renderer.

Although not an animator per se, DesignWorkshop lets you create a walkthrough of a model by rendering a sequence of saved views as a QuickTime movie. Solar studies illustrating the movement of shadows over time are also possible. In either case, DesignWorkshop’s lack of a tweening capability results in choppy motion — OK for design analysis but not for cinematic presentation. However, rendering a QuickTime solar study is so painfully slow, you’d expect to see a ray tracing at the end. Worse, the process completely takes over the Mac, even locking out the Finder under System 7. This needs correcting.

DesignWorkshop imports DXF, PICT, ClarisCAD, and Architector files. It exports in DXF, PICT, the Unix-based program Radiance, and ClarisCAD formats. Artifice is currently negotiating links to other Mac drafting packages. Given DesignWorkshop’s visualization limitations, avenues to other rendering and animation packages should also be explored. RIB file support would be a good place to start.

The manual is adequate but suffers a bit from academic-style prose and a textbooklike organization that locates the quick-start tutorial after 100 pages of fundamentals. However, the techniques section, detailing the construction of architectural elements, is very useful.

Despite its weaknesses, DesignWorkshop is an excellent tool for architectural design conceptualization. (At press time, Artifice announced a 1.1 upgrade to DesignWorkshop.) Unfortunately, the program is priced several hundred dollars higher than Macromedia’s ModelShop II, Virtus WalkThrough, or Alias’s Upfront — modelers that may be less intuitive but aren’t that tough to learn, either. Still, architects who till now have balked at 3-D modeling may find DesignWorkshop’s accessible interface and versatile modeling environment worth the price.

—CARLOS DOMINGO MARTINEZ
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Circle 1 on reader service card
Paint Alchemy 1.0

Plug-in Graphic Effects

**PROS:** Powerful filters; many customizing options; plug-ins work with various graphics and animation applications. **CONS:** Calculation-intensive; large images slow to filter; hard to keep track of multiple parameter adjustments; no scaling. **COMPANY:** Xaos Tools (415/487-7000). **LIST PRICE:** $99; additional brush set $19.99.

Plug-in Architecture has been a real windfall for digital artists. Third-party plug-ins load into the main application (such as Adobe Photoshop and other image processors), providing filtering, file-format conversion, and other functions. Xaos Tools’ Paint Alchemy is virtually a super-plug-in, giving users the ability to create an infinite variety of looks.

When called up from the host application’s filter menu, Paint Alchemy resembles a small application with its own compact interface. It comes with 36 brushes and 75 preset styles such as vortex and threads, and you can purchase 50 additional brushes for $19.99. These presets, however, are only a point of departure for daring alchemists. Parameter-filing cards, which group settings categories such as color, stroke size, opacity, brush angle, and brush shape, let you numerically control via slider every variable in the brushing engine. The brushing engine lets you save any gray-scale PICT as a brushstroke and apply it across an image. Other parameter controls let you introduce randomness and variation into your brush to simulate the look of traditional painting.

You can set a brush to change angle or opacity according to hue, saturation, or brightness so that it appears to interact intelligently with a source image. For example, you can set the bright green grass of an image to receive long, angular strokes while the pale blue sky gets small, even strokes. Varying stroke density and the way the strokes layer enables you to create three-dimensional textures such as fur and bubbles. Users of Adobe Premiere and CoSA After Effects can take advantage of Paint Alchemy’s ability to randomize a brush’s behavior across time, using it to create dynamic animation effects.

The product is blotted by slow processing speed, the inability to automatically scale filters, and an overly complex interface. Because Paint Alchemy’s effects are calculation-intensive, large images can take a while to process; you might easily wait 45 minutes for a 10MB file to finish, though Macs with a floating-point unit will fare better than those without. By working intelligently you can cut down on a great deal of hang time. For example, lowering brush density as much as possible reduces the number of strokes needed to produce the effect. According to Xaos Tools, a patch that doubles processing speed (and adds a few other enhancements) will be available by the time you read this.

The absence of scaling is a significant hindrance to people who like to experiment using a low-resolution image and then operate on the full-resolution image when the look has been worked out. Because brush size is fixed, each stroke covers a larger area on a lower-resolution image. You can get around this by creating a higher-resolution brush for a high-resolution image. Finally, Paint Alchemy’s interface would benefit from a summary listing of all the parameter settings, so that users could easily keep track of their modifications.

Paint Alchemy’s phenomenal results outweigh a bit of CPU drag besides, the company promises to release a patch soon that significantly improves speed. Ultimately Paint Alchemy is a professional tool, but at a suggested retail price of $99, it’s a tremendous value that both casual users and professional artists can use to design a little chaos into their work.—AVI HOFFER

RAM Doubler 1.0.1

**PROS:** Inexpensive System extension doubles available RAM for most Macintosh users; transparent interface. **CONS:** Requires an MMU and at least 4MB of RAM; applications must be 32-bit clean; can’t allocate more than total physical RAM to any single application; can’t run with virtual memory. **COMPANY:** Connectix Corporation (415/571-5100). **LIST PRICE:** $99; for registered users of any Connectix product $49.

There’s an old saw, “never too rich or too thin.” And one might add, “never enough RAM.” A simple System extension that promises to double your RAM for less than $100 sounds too good to be true, right? Well, RAM Doubler from Connectix does just that for many Macintosh users.

Inevitably, there are restrictions. RAM Doubler requires a memory-management unit (MMU), so you must have at least a 68030 Mac, or a 68020 that’s been upgraded with a 68030 accelerator, a 68040 accelerator, or a 68851 PMMU. RAM Doubler’s magic also requires System 7 and 4MB or more of physical RAM. Owners of older Macs and those with less than 4MB of RAM may want to consider OptiMem from Jump Development Group (see Reviews, March 1994).

In addition, the applications run must be 32-bit clean; RAM Doubler does not work properly in 24-bit addressing mode. And don’t expect to dedicate all of this newfound RAM capacity to a single memory-hungry application such as Adobe Photoshop, Adobe Premiere, or a 3-D rendering program. You can’t allot more memory to any single application than is available as physical RAM. (Connectix recommends leaving applications at their suggested memory settings.) You can’t employ additional memory-management schemes such as Apple’s virtual memory or Connectix’s Virtual. Finally, RAM Doubler doesn’t work with more than 128MB of physical RAM. All this said, RAM Doubler does effectively double the available RAM for the many Macintosh users who fit the program’s profile.

Using RAM Doubler couldn’t be easier. The modest 45K program sports the ultimate interface; none—no control panel or menus. You simply open twice in the number of applications without incurring the dread “out of memory” message.

You pay a small price in overall speed.
No matter how well you've mastered technique, the wrong display can obscure the subtleties. That's why RasterOps makes display solutions for every style and budget.

Degas undoubtedly would’ve been impressed with the 20T Multiscan Color Display for picture-perfect accuracy, paired with the PaintBoard Professional™ and RasterOps DSP, a Photoshop™ accelerator daughtercard. On the other hand, Mondrian might have found the RasterOps 20/20 Multimode Color Display and PaintBoard Lightning™ accelerated graphics card a perfect fit for his straight lines and sparse color.

Both would be able to choose from the same 16.7 million color palette. And the competitive price means neither has to be a starving artist.

**Portrait of an industry leader**

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There’s an impressive display at a dealer near you. To find out where, call 1-800-SAY-COLOR.
Booting my 8MB Mac Iici with RAM Doubler installed takes about 5 percent (6 seconds) longer than usual. Most normal operations take a second or two longer, but if I run a suite of applications that uses more than 14MB, some operations—such as copying and pasting a large file—take up to 10 percent longer. For me, it’s worth waiting those extra seconds.

To accomplish its digital trick, RAM Doubler relies on several techniques. The most important involves a dynamic mapping of the RAM allocated to individual applications. An application allotted 4MB, say, is often using only half that amount. RAM Doubler takes charge of the unused memory and applies it where it is currently needed most.

RAM Doubler also compresses routines stored in RAM that are unlikely to be called again—code used to open an application, for instance. Finally, Connetix requires that users with only 4MB to 6MB of physical RAM have a hard disk, because in low-memory situations RAM Doubler may store some low-use routines to the much slower hard disk, à la traditional virtual-memory schemes.

RAM Doubler 1.0 was incompatible with a few applications—chief among them 4D, Frontier, and Now Startup Manager. Patches from the developers of these applications, together with the 1.0.1 version of RAM Doubler, seem to have solved these problems. However, RAM Doubler is still incompatible with the Radius Rocket and Fusion Data Systems’ TokaMac products, since they are not virtual-memory-friendly. To run applications that have a similar disaste for virtual-memory schemes—the popular CD-ROM game Myst, for example—you can disable RAM Doubler when booting by holding down the ~ (tilde) key.

RAM prices may head back down a bit, but meanwhile we’re all still looking for ways to make better use of our current investments in SIMMs. With a street price well below $100 and a 30-day money-back guarantee, RAM Doubler is worth checking out. —SUZANNE STEFANAC

Kai’s Power Tools 2.0a

Photoshop Plug-Ins

**PROS:** Revised documentation; previews in all dialog boxes; enhanced real-time options; allows you to temporarily protect textures; simplified fractal explorer; stunning range of visual capabilities; no more Einstein button.

**CONS:** Possible problem when pressing keys to adjust filter strength. **COMPANY:** HSC Software (310/392-8441). **LIST PRICE:** $199.

Kai’s Power Tools (KPT) was one of the most exciting graphics applications to debut last year. Inexpensive and unquestionably powerful, it broadened the capabilities of Photoshop and programs that support Photoshop’s plug-in specifications. But it had its problems. Its mesmerizing interface and reliance on unfamiliar controls made it a trial for new users; the documentation was sketchy at best and indecipherable at worst.

Kai’s Power Tools 2.0 is even more extraordinary than the first version, sporting several new filters as well as redesigned gradient, texture, and fractal explorers. And while the interface still looks like it belongs on the console of an alien spaceship, the documentation has been completely revised. I’ve always maintained that the interface makes sense once you come to terms with it.

KPT 2.0 includes four entirely new filters. Three of these—Page Curl, which adds a curled corner to an image; Selection Info, which measures the number of pixels in a selection; and Fade Contrast, which decreases the range of colors in an image—are among KPT’s least interesting functions. The fourth, Seamless Welder, is easily the most useful.

**Version 2.0** lets you modify the performance of just about any filter by pressing a number or letter key. For example, to apply the Sharpen Intensity filter at full strength, you press the 0 key while choosing the command. To lessen the impact of the filter, press 9 or lower. This is an intuitive solution and cuts down on steps and dialog boxes. Before applying a filter to a floating selection, however, be sure to select a neutral tool, such as the hand tool. If a selection tool is active, Photoshop intercepts the number key and changes the opacity of the floating selection as well as the strength of the filter.

The majority of KPT’s capabilities are packed into its gradient, texture, and fractal explorers. The gradient explorers now include several previewing options. A host of real-time controls allow you to change the center and angle of a gradation, blur neighboring colors, and move colors inside the gradient bar.

In the texture explorer, you can now choose between five tile sizes or simply enlarge a tile to fit the current selection. You can temporarily protect a texture from being randomized by option-clicking on a tile preview. And you can use the colors in any saved gradation as a starting point for a texture cycle.

KPT 2.0 has combined four separate fractal explorers into a single dialog box. And while creating and applying fractals is complicated, KPT’s designers have condensed a lot of power into remarkably few controls. (They’ve even labeled many of the controls.) You can zoom in on the fractal preview, adjust the amount of detail, change the spiral radius and radial wrapping, introduce colors from saved gradations, and navigate inside Mandelbrot and Julia spaces, all in real time and without entering a single numerical value.

Kai’s Power Tools is a phenomenally powerful suite of plug-ins with an addictive quality typically associated with arcade games. There’s no end to the automated effects you can generate, the ways in which you can apply them, and the artwork you can create. I’m not sure KPT is the best tool for getting work done on a deadline. But there’s nothing like it for experimenting and as we all know, without experimentation, art becomes dreadfully repetitive. —DEKE MCCLELLAND
IT'S GONE. AND YOU DIDN'T BACK IT UP.

FACE IT. YOU NEED to back up your files. Use Retrospect, the number one Macintosh backup software — backing up over one million Macs, at last count.

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"For backing up and archiving, there's nothing better." Macworld. And Retrospect Remote is a MacUser 1993 Editor's Choice Award winner.

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Timbuktu Pro

PROS: Adds TCP/IP support for Mac nodes; adds new controls over an observed or controlled computer. CONS: Some features not available with Windows systems; no file mapping during cross-platform transfers. COMPANY: Farallon Computing ($199 - $999). LIST PRICE: $199; 10 nodes $999; 30 nodes $1999.

TIMBUKTU HAS GONE FROM 5.0 TO 6.0.5 AND LATER, YOUTHEN CHANGES IF YOU USE THE OBSERVE OR CONTROL OPTION WITH OTHER MACS. THESE INCLUDE TWO NEW ICONS IN THE BORDER AROUND THE REMOTE MAC'S SCREEN. ONE LETS YOU SWITCH BETWEEN MONITORS ON A MAC THAT HAS MORE THAN ONE MONITOR CONNECTED; THE OTHER LETS YOU CAPTURE A SCREEN IMAGE OF THE OBSERVED OR CONTROLLED SYSTEM.

Timbuktu Pro also puts a small program called Timbuktu Sender on your desktop. It's essentially a shortcut for sending files to another system—you can even drag and drop files onto the Sender icon, rather than launching the program and then selecting the files to send. And with Pro's new group-send feature, you can configure Pro to send a file to multiple users at once. Other enhancements include support for Apple's PowerTalk mail extension and secure methods of restricting access to authorized users. While Timbuktu Pro supports System 6.0.5 and later, you'll need System 7 for these three enhancements.

Timbuktu Pro retains a few limitations from its earlier versions, mainly the limited connection document and the inability to assign appropriate file creators and types to Windows files transferred to the Mac. The connection document saves the path and connection type (such as control, exchange, or observe) that you establish for a particular system—even connections that use Apple Remote Access. But it can't do more than reopen that connection. I'd like connection documents to remember the path on the connected system so that I can quickly connect to that system and move to the desired disk or folder. The creator assignment has traditionally been weak in both Timbuktu and its PhoneNet software for PCs. And unfortunately, DOS-mounting utilities such as Dayna Communications' DOS Mounter Plus and Apple's Macintosh PC Exchange can't pick up the slack, since the former supports only Novell NetWare connections and the latter only floppies and removable media.

Timbuktu Pro also has some problems you should be aware of before you buy. One, Pro conflicts with On Technology's Meeting Maker, which is known to conflict with several other products as well. Two, a conflict with CE Software's QuickMail 2.5 client causes sporadic system lockups; you'll need to update to QuickMail 2.6 to run Timbuktu Pro. Also, on Macworld's network, using Timbuktu Pro resulted in the sporadic disappearance of the menu bar in many applications. This did not occur on remote computers, and we could not pinpoint the cause.

Timbuktu has improved in this new incarnation, even if the change of name and version number seems to promise a greater degree of change than is actually offered. But who cares? Farallon's Timbuktu Pro is a must-have for in-house technical-support staff and people who need direct connections to computer systems on a variety of networks.

—GALEN GRUMAN

Map II 1.5

GEOGRAPHICAL INFORMATION SYSTEM (GIS) IS A PROGRAM FOR HANDLING SPATIAL DATA QUICKLY AND EFFICIENTLY, AND NOWADAYS NOBODY DOESN'T DO GIS, IT SEEMS. A GIS ENABLES YOU TO COMBINE SEVERAL MAPS TO PRODUCE A NEW ONE THAT EXPLORIES SOME IMPORTANT RELATIONSHIP. URBAN MANAGERS, BUSINESS PLANNERS, ENVIRONMENTAL SCIENTISTS, ZONING BOARDS—ANYBODY WHO WORKS WITH MAPS WILL SOON BE CONVERSANT IN GIS, OR GET LEFT BEHIND.

Map II bills itself as a map processor. In Map II, all map data is raster-based; that is, every map is treated like a big grid with a numerical value in every cell to represent what's present at that spot on the map—a certain elevation, tax assessment, or crop, for example.

Getting your data into the program is probably the hardest part of the whole enterprise—typical of GIS. Map II works well with scanned images, spreadsheet data, and simple matrices in most any format. It also accepts the USGS digital elevation files, as long as their formatting is intact. This format sensitivity is unfortunate: these elevation files are wonderful and cheap, but it's easy to introduce formatting errors while extracting them from tape or network.

To make a new map that will contain the results of some mathematical treatment of the maps you started with, you view your maps in individual windows, in your choice of size and scale. Then you choose from a menu of operations that filter, combine, overlay, or regrid the

PROS: Inexpensive; simple tools for manipulating maps and images are easy to use. CONS: Bulky color controls; limited geographical precision. COMPANY: ThinkSpace ($399).
Virex 5.0

Virus-Protection Software

**PROS:** SpeedScan feature rapidly scans for viruses with no noticeable performance drag; scans for all known Mac viruses and Trojan horses.

**CONS:** Cannot scan StuffIt archives for viruses; costly automatic update service.

**COMPANY:** Datawatch Corporation (919/549-0711). **LIST PRICE:** $99.95; annual update service $75.

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**First Line of Protection**

Virex can be configured to provide automatic background detection of viruses.

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IF YOU BACK UP YOUR DATA, LOCK your master software disks, and get a good virus-protection program, you don't need to fear sometimes-harmful computer viruses. But running a full-featured virus-detection utility on your Mac is a trade-off. You pay the price in reduced performance when booting your Mac and launching applications, as well as every time you pop a floppy disk into the drive.

Datawatch's Virex 5.0 will seek out Macintosh viruses and Trojan horses and can even be configured to look for evidence of unknown virus strains. It also has a new feature, SpeedScan, that's designed to deal head-on with the slowdown that virus-protection software causes.

Virex 5.0 comes with a start-up disk in both 800K and high-density (1.4MB) versions. The disks include a ScanStaller application that scans and disinfects your mounted drives before it installs Virex.

The Virex control panel sets basic functions such as the type of protection, whether to scan floppy disks, and the kind of warning to give if a virus is detected. You can password-protect the Virex control panel, which prevents changes in preference settings, and even lock it, so no one can remove it from the System Folder (as long as extensions are not disabled).

The Virex application provides a Record/Scan feature, which makes a log of your software. Each time Virex scans your files, it reports any changes in code resources since the log was made. In theory, this function helps you locate programs that may have been modified by a virus. But some normal system operations (such as switching preferences) may change a program, and you're apt to get more false alarms than real ones.

Virex's protection options include an attempt to repair virus-infected files, but there's no guarantee that a repaired file will work as well as an uninfected one.

Datawatch claims (and my own tests with other commercial virus software largely confirm) that the new version of Virex can scan a disk up to 25 times faster than other programs due to its SpeedScan feature. The first time SpeedScan inspects a disk for viruses, it creates a setup file called Virex SpeedScan on your disk. Although the initial setup can take a couple of minutes, subsequent scans, even of a large hard drive, are a matter of seconds. Scanning several large hard drive partitions, ranging from 203MB to 235MB and with 2000 to 3000 files, took anywhere from 9 to 40 seconds each. By comparison, Symantec's SAM 3.5.9 took from 5 to 12 minutes to scan the same drives.

In normal use, Virex's SpeedScan feature is quite unobtrusive. I noticed little if any delay in booting my Mac or in launching applications. SpeedScan doesn't benefit floppy disk scans very much, but floppy disk inspection is also noticeably zipper than with SAM.

More important, SpeedScan doesn't seem to affect the ability of Virex 5.0 to seek out virus strains. I tried a couple of old virus-infected disks on it, and it caught every one. The only feature that appears to be missing is the ability to detect the presence of a virus in a compressed archive.

As new viruses are discovered, Datawatch will release new search strings and post them on various online services. But if you want to repair the new virus strains, you've got to subscribe to Datawatch's update service, at $75 per year. This entitles you to disks containing the new search and repair routines, plus any needed bug-fixes. When you buy the program, you receive one update for free.

In a product category where most of the software provides comparable protection, the new SpeedScan feature in Virex 5.0 puts it ahead of the pack. (At press time, Datawatch announced a 5.1 upgrade with network features.) Virex is extremely speedy, trouble-free performance makes the task of guarding against computer viruses almost painless.

—GENE STEINBERG
Point, shoot, plug it into your computer, and presto—you've discovered Apple digital photography. It's the fastest, easiest way to give everything from proposals to catalogs more impact. No film. No waiting. Just brilliant 24-bit color or sharp black-and-white photos that will make even a modest memo stand out.

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The New Apple QuickTake 100 Digital Camera
**Arrange 1.1**

**Personal Information Database**

**PROS:** Flexible viewing options and data structure, powerful search capabilities. **CONS:** Lacks some features found in dedicated PIM software; some functions relatively slow. **COMPANY:** Common Knowledge (415/325-9900). **LIST PRICE:** $349.

*Although it is billed as a PIM (personal information manager), it's easier to think of Arrange as a PIM construction set. Unlike PIMs that provide predefined templates for names, addresses, and other information, Arrange lets you organize data using an approach that combines the power of an outliner and the flexibility of a database manager.

In Arrange's hierarchical metaphor, the central units of data are called notes. The simplest notes store only unformatted text; more complex notes consist of up to 100 fields, including text, pictures, numbers, dates, and times. An unusual field called the Note Link holds copies of other notes—the copies are automatically linked, so any change in the original note is reflected in all of its clones. There are also four System fields that record when notes are created or modified, and by whom. Arrange ships with five note categories (memos, people, reminders, appointments, and to-dos), but you can define as many kinds as you need.

Topics, the next higher level in an Arrange document, are group-related items of information—for example, you might assign separate topics to store the personnel, inventory, and appointments for each department in a company. Topics, in turn, are organized into folders.

Arrange's main window is divided into three sections: the contents list at the top left displays the data file's structure, organized by folder. An area called the shelf, which is separated from the contents list by a movable divider, shows all the types of notes that have been defined for the current document. Clicking on a note icon in the shelf adds a blank note of that type to the current topic.

The largest portion of the window displays the selected topic's notes in an outline format. Like most outliners, Arrange lets you expand or collapse notes. Arrange also allows you to display topics in an abbreviated fashion, with each note represented by a single summary line that includes one or more fields.

Arrange lets you define views that present subsets of data. Arrange's view functions operate at the topic level; for example, the filter tool lets you display notes with fields that match certain criteria, and the sort tool sorts the data on up to four different fields. Arrange also includes a calendar view that displays notes in daily, weekly, or monthly format, and a table view that lists items in columns.

Moving data within Arrange is fast and intuitive. You can drag fields, notes, and topics from place to place, even between documents. In addition to a Find command that works like the search function of many word processors, Arrange includes a tool for gathering notes that match user-defined criteria and copying them to any specified location.

Arrange's merge feature lets you reconcile two copies of a document at the note level. Arrange lets you import data from other applications using an extension called the Grabber; when you select any text or graphic and press a predefined hot-key combination, Arrange automatically places the selection in a special topic in your default document. (If Arrange isn't running, the transfer occurs the next time you launch Arrange.)

Although Arrange can be used as a contact manager or scheduling program, it is less than ideal for this purpose. Arrange lacks the automatic text formatting and check boxes, for example, found in dedicated applications such as Aldus's TouchBase Pro and Portfolio Software's Dynodex, and Arrange doesn't support alarms or recurring events. It also is slow at some operations; in a head-to-head comparison, Arrange took 20 seconds to sort a list that Now Software's Now Contact handled in under 1 second (see *Reviews*, March 1994).

I like Arrange as a general-purpose information manager. Its flexible, intuitive approach to data handling makes it an excellent tool for storing all kinds of day-to-day information. With a speed boost and a few additional features, Arrange might even persuade me to throw away my contact manager and scheduler.

—Franklin N. Tessler

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**VIP-C 1.0.1**

**Programming-Code Generator**

**PROS:** Generates code for either MPW or Think C compilers; text and diagram modes both useful. **CONS:** Import of existing projects requires cleanup. **COMPANY:** Mainlay (805/584-9400). **LIST PRICE:** $495.

*Let's suppose you've decided to try your hand at writing a Macintosh application. Recognizing that C is the main application-programming language these days, you bought a copy of Think C and have dutifully worked through the first volume of Dave Mark's *Macintosh Programming Primer* ($24.95; Addison-Wesley, 1989). Now the fun begins. You notice that a modest application has a compiled size of half a megabyte, you translate that figure back into an estimated number of lines of source code, and conclude that writing a page of debugged code per night should give you a finished app when your toddler graduates from high school. What to do?

Buy VIP-C (for visual interactive programming), that's what. It's not the answer to every programming problem, but it provides a way around the daunting task of developing a proper Mac interface for your application. There are some good tools for this, notably Bowers Development's AppMaker and the Macintosh Programmer's Workshop's venerable MacApp. VIP-C competes with these: it's a code generator, not a compiler, but it's easier for beginners to use, since it represents a natural extension of first steps in programming rather than being a complete world of its own.

The heart of the VIP-C system is the dispatcher framework (a set of routines continue
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The Apple QuickTake 100 can hold up to 32 standard resolution images. It only weighs a pound. And at $749 you can show off your business in living color and still stay in the black.

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The New Apple QuickTake 100 Digital Camera
PrecisionColor™ Pro from Radius is the fastest 24-bit color graphics card available for under $1,800. Not in one category, not in just a few functions, but in overall performance. In fact, it’s up to 3000% faster than your unaccelerated Mac.

So now you’ll be able to really scream ahead with all the speed and elegance your Mac can deliver.

In addition to unmatched speed, PrecisionColor Pro gives you unrivaled flexibility. You get “on-the-fly” resolution switching. And you can quickly change between one-page and two-page views without rebooting.

This new card is the only high-performance graphics card that fits in all Macintosh® NuBus™ systems. And it’s fully compatible with a wide range of monitors, including our new IntelliColor™/20 display.

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Fully backed by our Lifetime Guarantee and Worry-Free Warranty, with overnight replacement. So now you can really scream through your color publishing work, because with PrecisionColor Pro your creativity doesn’t have to wait.

And to really accelerate Photoshop®, there’s our new PhotoBooster™ with the most advanced twin DSPs, to help you run your production functions up to 10 times faster than a Quadra™ 950, for only $999.

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that amount to a skeletal version of MacApp), which creates an event loop and monitors the set of possible Mac events. You add application code to this structure using browserlike windows that monitor source code, variables, constants, and macros (see “View from the Top”). You can either find routines and commands as text and paste them into program source code, or use VIP-C’s icon set to direct program flow. Because you deal with code blocks that often describe both data structures and operations on the structures, VIP-C resembles an object-oriented environment.

What makes VIP-C valuable is that Mainstay has actually done a good job of all this. It’s not just that prototypes for Toolbox calls and function templates ensure that you avoid trivial mistakes, but also that Mainstay has included canned chunks of code for creating menus and dialog boxes, and the product has its own resource editors. Since the program has a built-in interpreter and a competent debugger, you can do lots of tinkering before sending your code to be compiled.

VIP-C uses an Apple events link to MPW or Symantec compilers (it supports direct calls to Think Reference), or the code can be written out as a standard ANSI C file. You might want to write out the source-code file to add inline assembler calls, for example, or to perform special optimizations. You can distribute your VIP-C code with a royalty-free run-time module, although you probably wouldn’t do this in a big-time commercial product.

VIP-C organizes your work in a project file like that in Symantec products, and you can import existing projects into VIP-C (after some editing on features not supported). The real strength of the VIP-C system, however, is not in taking over projects with 300,000 lines of existing code but in rapidly assembling smaller projects. A surprising number of VIP-C developers use it to produce externals for HyperCard or 4D, claiming that having template-based access to function libraries means they don’t have to remember picky C-syntax details.

Mainstay has included a large assortment of useful examples—so useful, in fact, that you can do lots of work in “code by borrowing” mode—and the large shipping box is filled with well-written documentation (no blocks of styrofoam, as sometimes happens). You can learn VIP-C in 20 minutes, and if you’ve mastered the rudiments of C, VIP-C will let you code about 10 times faster than you can using only an editor. If you understand that the programming resource in shortest supply is your own time, you’ll want a copy of VIP-C.—Charles Seiter

**Two Duo Docks**

### Docking Stations

**EtherDock**

**PROS:** Provides full set of standard ports; directly supports Ethernet connection; supports VGA and SVGA as well as Mac-compatible monitors.

**CONS:** Wobbly connection; quirky display software.

**COMPANY:** E-Machines (408/541-6100).

**LIST PRICE:** $699.

**SCSI MicroDock**

**PROS:** Compact; inexpensive; supports both SCSI Disk mode and normal SCSI connections with a single cable.

**CONS:** Wobbly connection; provides only SCSI and ADB ports.

**COMPANY:** Newer Technology (316/685-4904).

**LIST PRICE:** $175.

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**As its name suggests, the MicroDock is one of the tiniest docking options available for the PowerBook Duo; it’s just under 4½ inches and barely 5 inches long. Adding the MicroDock to the Duo, you gain only two additional ports—but they are significant. First, you get an ADB port, so you can attach a keyboard and/or a mouse. Second, and more significant, you get a SCSI port so you can attach SCSI devices (scanners, hard drives, and so on) to the Duo. Or you can use the Duo in SCSI Disk mode, where the Duo acts as an external hard drive for another Mac.

With a single SCSI cable, the MicroDock allows you to connect SCSI devices to the PowerBook, and to use the Duo in SCSI Disk mode.

The MicroDock snaps easily onto the Duo’s 152-pin docking connector—though the connection feels wobbly, it’s fairly secure. Unlike some docking devices, the MicroDock doesn’t cover the entire back panel of the Duo, just the connector port itself, so you can still use the Duo’s own modem/printer port and power-adapter port to plug in the power supply and attach other peripherals.

Admittedly, for $175 the MicroDock costs less and provides almost the same capabilities as EtherTalk. And if video output isn’t a concern, the MicroDock is a logical, low-cost way to enhance your Duo.—Joseph Schorr
Since 1987, when Canon introduced the world's first Color Laser Copier, our copiers have made a whopping one billion, two hundred million color copies.

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So if you want the experience of Canon color copiers behind you, start pushing: 1-800-OK-CANON. We'll immediately rush you a free Color Solutions guide.
# Random House Unabridged Dictionary

**CD-ROM Reference**

**PROS:** Most comprehensive American-made dictionary on CD-ROM; works within any program; good at guessing misspelled words; clean, simple design.  
**CONS:** Modest search capabilities; cannot print definitions; some functions don't work reliably; no manual; occasionally crashes.  
**COMPANY:** Random House Electronic Publishing (212/572-2600).  
**LIST PRICE:** $179.

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Although not nearly as exhaustive as the Oxford English Dictionary (OED), the Random House Unabridged Dictionary, CD-ROM Version (RHUD), is its primary competitor on CD-ROM and the most comprehensive American-made dictionary currently available for the Macintosh. Unlike OED, RHUD is a desk accessory that adds its own menu and a quick look-up function to all running applications. You need only highlight a word and invoke a command to look up the selected word. RHUD knows to convert the plural to the singular and a conjugated verb to an infinitive before searching. If the word is misspelled, it offers a list of possibilities. Unlike OED, RHUD easily handles most transposed, missing, and extra letters, even when they occur at the beginning of a word. Should you wish to replace the word in your document with the correct spelling or a more appropriate word, RHUD can do that, too.

Graced with a lean design—a single window with one text-entry box, one list box, and one definition-display box—RHUD is considerably easier to use than OED. Triple-clicking on any word in the current definition puts its definition in the display box. With the Previous and Next buttons, you can flip through neighboring definitions one-by-one. (Unlike OED, RHUD cannot display a continuous alphabetical list of headwords that you can browse through.) As you look up words, RHUD maintains a list of the definitions it has displayed; selecting any word in this history list quickly returns you to a previous definition. A pop-up menu lets you switch among the history list, spelling-guess list, and other lists that appear in the list box.

In addition to standard word lookup, RHUD can conduct only three types of searches. (As with OED, some searches take a long time.) Anagram searches look for all valid words that can be formed from a set of letters. Wild-card searches look for valid words that match the entered wild-card letter combination. Definition searches look through all the definitions (but not etymologies or other parts of an entry, as in OED) for the given word or phrase. AND, OR, NOT, and parenthetical operators make it easy to refine a definition search.

Not everything works smoothly, however. Pause and Cancel buttons only erratically pause and cancel searches. Attempting to display the definition of a word appearing in a definition search list often causes the program to quit instead. There are two kinds of on-screen help, neither very satisfactory, and there is no manual. (Unlike for OED, however, tech support is available.) You cannot print definitions; you can copy a definition to your word processor, but as with OED, you lose all formatting. (RHUD's formatting is easier to reconstruct than that in OED.) The options that suppress display of the etymology and pronunciation in definitions do not work. The electronic edition also lacks many of the supplements found in the printed edition.

While RHUD's search options are much more modest, the quality, design, and reliability of the software are far superior to OED's. True, compared with OED, RHUD's entries tend to be quite concise with brief etymologies and few quotations. But unless you really need the kind of comprehensiveness OED offers (at $895), I recommend that you save a bundle and buy the Random House Unabridged.—ROBERT C. ECKHARDT

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**Wacom UD-1212R**

**Graphics Tablet**

**PROS:** Easy to use; highly customizable; supports input from two devices simultaneously.  
**CONS:** Incompatible with AppleTalk and AppleTalk Remote.  
**COMPANY:** Wacom Technology Corporation (206/750-8882).  
**LIST PRICE:** $749.

---

Mice and trackballs are fine up to a point, but they're clumsy tools for creating artwork. Using a mouse is akin to drawing with a brick, and using a trackball is like drawing with a marble. Pressure-sensitive systems close the gap between computer and pen or brush.

Like most digitizing tablets, the UD-1212R substitutes a pressure-sensitive stylus and graphics tablet for a mouse or trackball. But in addition to the cordless stylus, it comes with a four-button cordless puck with a set of crosshairs imbedded in a transparent window in front. But the UD-1212R is much more than a mouse replacement.

A single well-designed control panel allows you to set preferences for pressure, macros, and serial port, along with an astonishing number of performance parameters for tablet, puck, and stylus. You can also save custom settings files for individual applications as well as the Finder. Comprehensive, illustrated online help is available via the Wacom control panel.

The tablet itself measures about 16 inches square with a 12-by-12-inch active area. It connects to the Mac via either the modem or the printer serial port; an AC adapter attached to the serial cable plugs into an electrical outlet. Giving up a serial port can cause you some headaches, since you can't then connect simultaneously to a printer and modem. For about
New Delrina Fax PRO for Macintosh is the best fax software you can buy. Details below.

Tired of fax machines and fax software sending images like the one on the left?

Well, now you can get the phenomenal image quality shown on the fax on the right (actual unretouched image) every time — with new Delrina Fax PRO™ for Macintosh. With Delrina Fax, you can now send the sharpest, best defined images of any fax software, regardless of monitor resolution. And with Delrina Fax you can even view gray-scale faxes on-screen.

Sending with Delrina Fax is as easy as printing a document from your favorite application. And since it works in the background you can send and receive faxes without leaving the application you’re in. It also lets you easily track and manage your faxes, customize your own cover sheets, and use OCR to quickly convert faxes with text into documents that are ready for editing with your word processor.

Plus, Delrina Fax supports all fax modems, even the PowerBook Express Modem and the AV GeoPort Telecom Adapter. And unlike other fax software, you gain the reliability provided by Delrina’s Communications Toolbox fax drivers. So as you update your system software or hardware, Delrina Fax keeps on working. And it’s made by Delrina, the makers of the best-selling fax software in the world, WinFax PRO™.

For even more exquisite details, or to order Delrina Fax PRO, call us today.

1-800-268-6082

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Circle 137 on reader service card
Brother HJ-400

Ink-Jet Printer

PROS: Works with Mac and Intel-based computers; two-year warranty.
CONS: Slow; no background printing; some large files require additional application memory to print correctly.


THE BROTHER HJ-400 IS A COMPACT, 360-dpi ink-jet printer with a tray that holds 100 pages of letter-size paper, and a sheet-feeding vertical paper tray at the back that doubles as a receptacle for up to 20 printed pages. A large manual-feed slot lets you insert pages or envelopes by hand, although the lack of adjustable paper guides makes center loading a bit tricky. Buttons and status lights at the front let you control and monitor the printer's operation. Ink cartridges are rated for 700,000 characters in high-quality mode.

The HJ-400 connects to either of the Mac's serial ports using a standard RS-422 cable that must be purchased separately. You can also use the printer with IBM and compatible computers. (According to the manual, the HJ-400 switches between the two interfaces automatically, although I did not test this.) Brother's AC adapter is praiseworthy because its normal-size plug doesn't waste valuable space on an AC power strip.

The HJ-400 provides three settings for quality (best, normal, and faster) and two for print density (normal and economy). In my tests, the type of paper I used markedly affected output quality. For example, text and graphics that looked sharp on 24-pound paper appeared fuzzy on 20-pound copier stock, even at the best-quality setting. Still, the HJ-400 produced readable text at sizes down to 6-point. The printer ships with six TrueType fonts and works with Adobe Type 1 fonts if you have Adobe Type Manager installed. For rapid proofing, the HJ-400 prints with its own resident fonts.

Like most ink-jet printers, the Brother HJ-400 is not speedy. It took just under one minute to output one page of double-space text at normal quality, and best-quality printing took almost twice as long. Speed would be a lesser issue if the HJ-400 supported background printing, but it does not. Also, desktop publishers should know that some large files, such as multipage Aldus PageMaker documents, do not print correctly unless you allocate additional RAM to the application—a caveat not noted in the HJ-400's manual.

With prices for laser printers dropping, ink-jet printers are no longer the only option for bargain seekers. Even so, the most inexpensive lasers still sell for several hundred dollars more than the HJ-400. If you're in the market for an ink-jet printer, I'd recommend the Hewlett-Packard DeskWriter 310 over the HJ-400. It has greater portability, a smaller footprint, and optional color printing, for only about $100 more than the HJ-400.

—FRANKLIN N. TESSLER

$55 you can buy a mechanical A/B switch that will let you switch between two of these devices. Although the UD-1212R is compatible with many telecommunication programs, it is not compatible with Apple Talk or AppleTalk Remote.

A transparent overlay on the tablet facilitates tracing reference drawings. You can use the entire active tablet area or set up to six smaller custom active-area maps for comfort and speed. Cursor speed is determined by the ratio of the active area to the display area.

You can program F-keys at the top of the tablet to play any macros, independent of any keyboard F-keys; and memory buttons let you select from three preset and two custom tablet-command sets.

The stylus is a seemingly simple device, but both the switch on its barrel and the pressure-sensitive tip can be programmed in 13 ways—for example, to click, double-click, click-lock, shift, and so on. These settings make the stylus useful even in programs that aren't graphics oriented. The buttons on the puck can be assigned any of 12 functions. The puck is slightly smaller than an average mouse. In fact, it's so small and light that I found it somewhat difficult to hold steady. The UD-1212R is the only digitizing tablet to accept input from two devices simultaneously—letting you use the stylus to make menu selections while leaving the puck stationary during tracing, for example. For now, this advantage is theoretical for Macintosh users. The only program that supports two-cursor input is AutoCAD for DOS machines.

It used to be easy to spot computer-generated art by its razor-crisp lines. What was missing was expressive line quality. Pressure sensitivity solved that problem. The UD-1212R lets you customize pressure sensitivity and save those settings along with other application-specific settings. Depending on the application, you can further adjust the effects of pressure on various tool attributes such as line width and paint opacity. In Adobe Illustrator, for example, pressure can vary the line width of the brush tool, giving you an effect somewhat like an ink-soaked brush on dry paper. Fractal Design Painter and Adobe Photoshop use pressure sensitivity to emulate brushing or spraying paint. And the ability to adjust paint opacity as you retouch images is a tremendous asset.

With all these custom options, you might think mastering it would be difficult. Fear not—the UD-1212R is intuitive enough to be used successfully right out of the box, even by entrenched mousers. You may wonder how you ever got along without it.—MATTHEW NIELSEN

Reviews

Brother HJ-400 printer

Brother HJ-400 printer

Ink-Jet Printers Compared

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* Normal settings; PageMaker in grayscale. Best-mode and fastest-mode performance about the same.

Tested on a Mac Iid with 8MB of RAM, an 8GB hard drive, System 7.1, a 32K disk cache, 32-bit addressing, and no virtual memory. PageMaker memory partition set to GMB for HJ-400 only.

MACWORLD May 1994 77
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Circle 106 on reader service card

- $49/ea.
CD-ROM ToolKit 1.0.5

**CD-ROM Accelerator**

**PROS:** Speeds access to CD-ROM files; supports a wide variety of formats and CD-ROM drives; easy to customize.  
**CONS:** Playback of accelerated QuickTime movies is often uneven; games occasionally crash when played in accelerated mode; caching requires 1MB to 3MB contiguous hard drive space.  
**COMPANY:** FWB (415/474-8055).  
**LIST PRICE:** $79.

If you're tired of waiting for CD-ROM files to creep across your SCSI cable, you might consider taking up a new hobby such as knitting alpaca monitor covers or carving scale models of all the bones in the human body from bars of soap. Or you can install FWB's CD-ROM ToolKit.

Based on a SCSI device driver that supports a wide spectrum of CD-ROM drives, CD-ROM ToolKit can halve the time it takes to open files and search on a CD-ROM. Working in the background, CD-ROM ToolKit's driver-based caching utility speeds data transfer by storing file- and folder-directory information on your hard drive and by read-ahead caching (anticipating the next request for data and fetching it to memory, an operation sometimes called prefetching).

CD-ROM ToolKit's control panel lets you choose the size of both the RAM cache and the hard drive cache. The default RAM cache is 232K, but you can set it as high as 3MB. The default for file caching on a hard drive is 3MB; the maximum—IMB—increases speed slightly. The amount of space allotted to the file cache must be contiguous—no fragmentation allowed. Predictably, double-speed drives achieve lower speed gains than single-speed drives.

Compatibility is a real plus for CD-ROM ToolKit. Besides supporting Macintosh HFS, Kodak Photo CD, ISO 9660, High Sierra, and Apple ProDOS formats, the program is compatible with most CD-ROM players, including Sony, Toshiba, Chicon, Pioneer, NEC, and Phillips. CD-ROM ToolKit supports most double-speed and multisession drives and allows many drives that couldn't previously recognize Kodak's Photo CD format to read single-session files.

QuickTime movies are the main bugaboo in CD-ROM ToolKit. Syncing sound and video in any CD-ROM environment is tricky; adding acceleration invites more trouble (see "Opting for Acceleration"). You may have to turn off acceleration altogether with some QuickTime files.

For audio CDs, CD-ROM ToolKit includes the nifty CD-T Remote. Besides the usual options, this DA includes niceties such as fast-forward and shuffle play.

CD-ROM ToolKit's acceleration requires at least a Mac Plus with System 6.0.4, 1MB of RAM, 1MB to 3MB of contiguous space on a hard drive, and, of course, a CD-ROM player.—SUZANNE STEFANAC

Atticus Vista 1.0

**Disk-Cataloging Utility**

**PROS:** Quickly and automatically catalogs floppy and removable disks; quickly formats and prints disk labels in Avery label formats.  
**CONS:** Flawed disk-request feature; no label sorting; limited search options.  
**COMPANY:** Atticus Software Corporation (203/348-6100).  
**PRICE:** $69.95.

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**Labeling Your Disks**  
Atticus Vista's Label Monitor lets you search your disk catalogs and print labels in several Avery label formats.  

K. I ADMIT IT. MY FLOPPIES AND other removable disks are in a disorganized mess. Atticus Vista was designed for folks like me. It consists of a control panel and application that automatically catalogs the disks you mount on the Mac's desktop.

Each time it scans a drive, Vista puts up a small dialog box asking if you want to create a snapshot of the disk's directory. You can also have the program skip the request and simply display a warning hand when saving the directory, or display nothing.

Vista loads the disk information and stores it in a directory called a Vista. Each Vista directory has a full catalog of all the disks the program has scanned, and it displays an icon for each disk. When you click on an icon, you see that disk's directory, including program and document icons. If the contents of the disk have changed, because you've added or removed files, Vista automatically updates the entry when the disk is mounted.

Vista has additional capabilities. One feature allows you to easily capture the directories of multiple disks. Each disk ejects automatically to quickly make room for the next. A File Walkers option searches the contents of compressed archives created in Compact Pro or StuffIt. You can also collect directory snapshots in a single window, search their contents, and print them using the Label Monitor feature. The directories are automatically formatted for use with several types of Avery labels, and you can print either a single directory or the entire list.

When you double-click on a file name inside the Vista, the listing acts like an alias, and you get a message telling you to mount the disk. At least that's the theory; in practice, I found that it doesn't always work. Sometimes Vista would tell me that I wasn't using a proper alias, or it would launch the application that created the document without requesting the disk that the document was stored on. (Atticus's technical support is aware of these problems.)

Vista has a few other problems. For example, you can't view a disk directory from the application. Instead, you must go to the Vista and double-click on the disk icon. The only way to open a directory from inside the application is to add the directory to the Label Monitor directory. But if a directory contains more names than a label can hold, Vista lops off the end of the list, and the search feature can't find those names. Disks are displayed in the Label Monitor direc-
One of these is a color proof and one is output from our new printer. We forgot which is which.

We paid $70 and waited three days for one of these. The other popped out of our new Tektronix Phaser® 480 in minutes. Pull out your loupe and start guessing. And while you’re down there staring, note our output’s phenomenal color. PANTONE®-approved, it’s perfect for matching those tricky product colors, logos and skin tones. You might also notice the full 11" x 17" print area. Yes, Virginia, there are tabloid-sized full bleeds. And it shares easily: the Phaser 480 is a work group printer for Macs, PCs or workstations. Plus, it boasts a powerful RISC processor and true Adobe® PostScript® Level 2. Spread-sized bleeds? Reprint quality comps? Pre-film proofing right at your desk? Welcome to preproduction heaven. So head down to your nearest Tektronix dealer to see for yourself. And by the way, our guess is that the one on the bottom is our print. Well, then again ...

For a free print sample or dealer location call 800/835-6100, Dept. 32C.

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Circle 143 on reader service card
Cypress PhonePro 1.2

Telephony Software

**PROS:** Can easily develop customer-support, order-taking, and literature-distribution functions; particularly simple voice-mail-system construction. **CONS:** Needs icon-to-text conversion for larger scripts. **COMPANY:** Cypress Research Corporation (408/752-2700). **LIST PRICE:** $49.95; software and modem $950.

T**HE MAIN STRENGTH OF CYPRUS PhonePro is its easy-to-learn icon-based script-programming system. PhonePro has three classes of icons: mail (which includes log on/off, send/receive, and icons for navigating stored messages); database (for text records and stored sounds, words, and phrases); and main (telephonic logic and branching operations). Once you know the meaning of the 40-odd icons, you can put together simple scripts in minutes. To turn your Mac into a digital answering machine, for example, you would have a simple chain of six icons (Go, Pick Up Phone, Play Outgoing Message, Record Incoming Message, Hang Up, Return To Go). By putting branches in this simple script (on touch-tone 3 play message 21, and so forth), you could expand the basic script to manage a full voice-mail system.

For complex scripts, however, this visual script representation becomes confusing; a separate editing window in which the icons would be converted to equivalent text commands would speed development of larger projects.

Version 1.2 of PhonePro brings support for Apple System enhancements and simultaneous use with Cypress Research’s FaxPro II ($550 for the software-only version). The Apple Open Collaboration Environment, featuring PowerTalk and PowerShare for System 7 Pro users, extends the scope of PhonePro. A Mac connected by modem to a single outside phone line and a network can distribute PhonePro voice-mail messages to the desktop mailboxes of individual PowerTalk clients. Support for Apple events and AppleScript allows companywide installations of PhonePro-using Macs to call each other and update PhonePro scripts and databases. With FaxPro II support (you can use both Cypress products on a single Macintosh if you use the phone port for one and the printer port for the other), the response can now be a fax rather than a callback or simple voice message.

Both tests yielded similar results, transferring the file across the network in about nine seconds.

Our tests demonstrate the convenience to administrators of both small and large networks of adding nodes to an Ethernet network without the hassle and added cost of pulling wiring from a wiring closet or adding additional hubs. In addition, our test results show that performance is not an issue.

The only real drawback to using an EtherWave is that some Ethernet hubs can track only a single node address per hub port. A hub is normally meant to work with only one device attached to each port. Adding devices to a port can cause problems if the hub-management firmware or software is meant to track only a single network address, rather than the multiple addresses created using an EtherWave. (Farallon claims that hub vendors are working on this situation.)

Both PhonePro and FaxPro II are available in software-only versions, which are designed to work with Supra Corporation’s SupraFaxModem V.32 and V.32bis fax modems. PhonePro 1.2, simply by better integration with Apple’s advanced operation features and with other Cypress products, has greatly extended the business scope of this already powerful product.

—CHARLES SEITER

EtherWave

Ethernet Transceiver

**PROS:** Low cost; extends hub investment; transportable and modular. **CONS:** Minor IS-management issues. **COMPANY:** Farallon Computing (510/814-5000). **LIST PRICE:** $129.

**REMEMBER BACK IN 1984 WHEN you discovered how easy it was to connect two or more Macs directly? That was the Mac’s first implementation—AppleTalk over a LocalTalk connection—of easy-to-use, no-fuss networking. Then remember pulling your hair out waiting for a 1MB to 2MB file to transfer between those Macs? Well, it’s 1994 now, and Farallon’s new EtherWave transceiver enables users to have this connectivity magic in the speedy, 10BaseT Ethernet world.

The EtherWave transceiver functions much like any other 10BaseT transceiver. It attaches to the Mac’s internal Ethernet port and connects to your network hub via whatever wiring scheme you have installed in your office. The principal difference between the EtherWave and standard transceivers is that, instead of providing one 10BaseT twisted-pair jack, the EtherWave includes an additional jack that allows you to daisy-chain to another Mac, PC, or printer through an additional 10BaseT line. Status lights on the transceiver indicate traffic information as well as collision and jabber occurrences.

The EtherWave can be used to create a small, isolated workgroup or to daisy-chain more than one device from a single hub or star port (more commonly reserved for a single device). The rule is that you can have no more than eight devices daisy-chained by an EtherWave in an isolated network, and no more than seven devices can be attached to a hub port or router. The physical distance from end to end is limited to 100 meters.

Macworld Lab tested the EtherWave transceiver by setting up a network using an Ethernet hub. From one port we connected seven Centris 650s using an EtherWave. On another port we connected a Centris 650 running a packet generator to create network traffic. Finally, we attached a Mac Iici to yet another port on the hub as a target server to receive the data, and measured the time it took to send a 1024K file from the last Macintosh on the EtherWave chain to the target Mac Iici. For comparison, we then attached all nine Macs directly to the hub, using nine ports rather than three, and performed the same operation.

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With a higher street price, the EtherWave costs more than standard Ethernet transceivers such as Asante Technologies’ FrendlyNet and Dayna Communications’ DaynaPort TRX-T. But the added cost is minor compared with the cost of pulling wire or purchasing additional hubs.

If you need to expand your network at a reasonable price with minimal fuss, get an EtherWave.—MATT CLARK
So you finally get your hands on the hottest new Mac and what happens? Somebody insists that you run Microsoft Windows' applications.

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stalled, you don't have to put up with tedious installations.

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Windows Compatibility for the Power Macintosh.

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**4D First 1.0**

**Entry-Level Relational Database**

**PROS:** Plenty of relational functionality; compatible with existing 4D applications; works with 4D Server. **CONS:** Not much easier than real 4D; inadequate documentation and help.

**COMPANY:** ACI US (408/252-4444). **LIST PRICE:** $295.

Several years ago ACI US introduced File Force, which was intended to lure the users of flat-file databases (Claris's FileMaker, ProVue Development's Panorama) into the relational world. 4D First is a second attempt at an entry-level product, and although it's an improvement on File Force, it's easier than the actual 4th Dimension only in the sense that it's easier to cover the first 15 chapters of a textbook than the whole book. You can do interesting applications in 4D First, but you are unlikely to be doing them in your first week.

4D First is a good news, however, for companies with a significant 4D investment, and also for developers. 4D First can be used as a replacement for 4D in a client-server setting using 4D Server. 4D First can open and modify applications created in 4D, and vice versa. Developers can use it as a run-time module replacing 4D's run-time version, with the extra benefit that users can make simple modifications of database models themselves, if necessary. Essentially, 4D First is 4D with most of the programming capabilities removed.

For first-time database users, that is both 4D First's strength and its weakness. You can easily set up database files, draw relations (one-to-one, one-to-many—in fact, all valid types) between files using easy graphics tools, and design report or data entry layouts using relatively straightforward tool palettes. 4D First supports various types of compression for image files. If you are familiar with 4D, or for that matter such now-defunct products as Borland Reflex or Ashton-Tate’s dBase Mac, the tools and methods will be just what you expected—the only difference is that 4D First is less expensive.

The weakness is that ACI US's main concession to beginners is simply to leave out some advanced elements of 4D. The tiny (4-by-7-inch) manuals offer a subset of the usual 4D manuals—there's no equivalent of a 4D for Dummies pamphlet. There are no specifics on troubleshooting. There's no online help; the only reference to Help in the manuals tells you how to add balloon help to your own applications. The Quick-

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**MacWrite Pro 1.5**

**Word Processor**

**PROS:** Can automatically generate table of contents; supports QuickTime, PowerTalk, EGO objects, AppleScript. **CONS:** Table-of-contents and AppleScript functions are limited.

**COMPANY:** Claris Corporation (408/727-8227). **LIST PRICE:** $249.

With MacWrite Pro 1.0, Claris beefed up its classic, low-end word processor with style sheets, text wrap around graphics, variable-width columns, independently formattable sections, and other advanced features, without sacrificing MacWrite's uncluttered interface. MacWrite Pro 1.5 has also added a handful of new features, the most significant of which is a table-of-contents function. You use styles to designate headings and subheadings in a document, to flow the text, or hide them to speed up scrolling; on paper, MacWrite prints the currently displayed movie image.

If you use PowerTalk (part of System 7 Pro), you can add a mailer to any MacWrite document and E-mail it (in MacWrite or one of the Dojo other formats) or reply to or forward MacWrite Pro documents that you've received. If you are using a program that supports EGO (Edit Graphic Object) objects—only MathType (from Design Science) and microExpressionist (from PreScence) do so far—MacWrite’s Edit command automatically launches the program that created the graphic and, when you are finished editing, updates the graphic back in MacWrite.

Finally, many MacWrite functions can be automated with AppleScript (another part of System 7 Pro). You can use available AppleScript commands to create scripts that apply styles; search and replace; run mail merge; and insert text, graphics, or movies. More-complex operations, such as adding headers and footers or working with tables, are not supported, and there's no create-by-example watch-me mode. Also, only AppleScript commands are defined in the MacWrite OSA (Open Scripting Architecture) Dictionary.

Overall, MacWrite Pro has kept its clean, uncluttered interface, not to mention its other positive attributes (see Reviews, Macworld, July 1993). Although still not as powerful as Microsoft Word (which does not support AppleScript, but can generate up to 18 different contents lists) or WordPerfect, MacWrite Pro remains an excellent choice for a low- to middle-level word processor.—ROBERT C. ECKHARDT
**BaseMap 1.0.1**

**Mapmaking Program**

**PROS:**
- Relatively easy to use.
- Only one profile, poor program design.

**CONS:**
- Maps lack detail; very limited data-display abilities.
- Cannot add text or fill areas.

**COMPANY:** GeoPoint (415/957-1560).

**LIST PRICE:** $149.

---

**Open Sesame 1.02**

**Finder Automation Utility**

**PROS:**
- Automates common Finder tasks with an elegant interface.
- Limited automation of third-party applications may be superfluous for experienced users.

**CONS:**
- Limited automation of third-party applications may be superfluous for experienced users.

**COMPANY:** Charles River Analytics (617/491-3474).

**LIST PRICE:** $99.

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**What Becomes a Legend?**

BaseMap creates a map legend (containing all data categories and their symbols) on demand. You can move the legend around, but you can’t change its title or formatting. It is not as powerful as MapArt (Cartesia Software), which has more detail and display more rivers and internal political boundaries than do BaseMap maps. (If you need only a few geographic regions, you can save money by purchasing individual MapArt modules.)

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**At Your Service**

When Open Sesame makes a new observation, you can automate the instruction, ignore it, or edit it.
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**PowerBook/Newton**

- **Targus Cases** ...
- **11207 Latch Pll Case 599, 1305 Universal 569**
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- **4582 Panorama 249.**
- **17109 Alos ... 30 day MBG**
- **11458 Impact 249.**
- **11458 Value Pak 1 EPS 64.95**
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**Graphics & Design**

- **Abrasca... 30 day MBG**
- **12083 Design Your Own Railroad**

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**Graphsoft**

- **11275 MiniCad 5** - Provides powerful, integrated 2D and 3D design tools with an easy-to-use, customizable interface. MiniCad modules provide tools tailored to specific application areas.

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**Paradigm Concepts**

15011 Home.Works 2.2 for Claris Works - A complete set of forms, documents, spreadsheets, and database files for use with Claris Works 2.0. Includes 75+ files and timesaving shortcuts. **$379**

14989 Home.Works 2.0 for MS Works... **37.95**
**MOBIUS TECHNOLOGIES**

18.19 Spectroscopy Accelerator, 33.1 MHz

fe FPU - Core's need for higher processor speed?

The Spectroscopy Accelerator gives you 4x Clarity performance on your current Mac. Plug FPU and get an immense speed increase of up to 70x in performance, depending on processor-intensive applications like PageMaker, PageMill, QuarkXPress, Adobe Illustrator, Adobe Photoshop, and more. You also get a FREE cache for even faster acceleration! Supports Mac II, IIx, IIc, and IIci.

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12.62 A-Style - A simple but powerful faxing solution for up to 10 networked Macs. Schedule automatic faxing, transmit multiple documents to multiple locations, and much more. Includes FaxModem.

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**SOFTWARE VENTURES**

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11419 ACCURA 144+Fax144 ................. 169.95

10822 ACCURA 2400 74.95 11422


14545 Timbuk1u Pro 135. 4866 Remote 129.

11696 Ethorthln Mac/PB ............................ 309.

10080 FaxPRO for Macintosh

FaxModem VFX V.32bls ............... 164.95

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Claire, The Personal Music Coach 1.0.1

Musicianship Program


Solfège, the system of assigning Italian syllables (do, re, mi, and so on) to musical notes, is the method commonly used to teach musicianship—that is, pitch and interval recognition, sight singing, and intonation. It's the bane of many a freshman music major, a profit center for the grad students who tutor them, and an essential part of a musician's training.

Claire could forever change the way musicianship is taught. The program designs a 500-exercise curriculum based on your age and level of musical knowledge. A warm voice steps you through the process of determining your vocal range and a comfortable key, then introduces the exercises, providing encouraging words throughout. You sing into the Macintosh's microphone, and Claire's pitch-recognition algorithm determines the note and how accurately you have sung it, within a tenth of a half-step.

The interface, while nonstandard for the Mac, is logical and easy to learn. Claire tracks each user's progress and charts pitch accuracy. The exercises flow logically and build a solid foundation of musicianship. Claire even suggests you don't overdo it, prompting you to take regular breaks.

The initial release of Claire had its share of glitches. At the start of my tour of the program, the required New User Registration screen was off my monitor, somewhere in cyberspace. I quit the program, reloaded it, and selected New User from the File menu, and the registration screen appeared in position. Other bugs ranged from mildly annoying—the program sometimes galloped at double speed, accusing me of singing in an octave I can't begin to reach—to amusing, such as when Claire echoed the last bit of speech (often "Good" or "Excellent") when I stopped in the middle of an exercise. None of the problems were fatal, and Opcode has since cleaned them up; version 1.0.1, now shipping, is going out to all registered owners.

Nested under Claire's Edit menu is an item called Modules, which now contains only Solfège. Other modules are being developed with sound files and intonation profiles for instrumental musicians. Opcode will sell these modules separately.

Opcode, marketing for developer Arpeggio Software, will find a large and receptive educational market for Claire. With its reliance on repetition and accuracy of pitch, teaching musicianship lends itself to automation, and many of the educational markets already have a large Macintosh presence.—RICHARD FENNO

CRAIG BROWN'S

OVERHEAD PRESENTATION

WAS SO IMPRESSIVE

NO ONE NOTICED THE

GUACAMOLE ON HIS TIE.
It's easy to create labels on the Mac, but printing them can be a chore. The Smart Label Printer Pro is an attempt by Seiko Instruments to address the Macintosh user's label-printing dilemma.

The SLP Pro is a small, black-and-white thermal printer that comes with a desk accessory for designing labels. Measuring about 4 by 9 by 6 inches, the printer is also lightweight and simply designed. It prints quickly, and the output quality is very good. Still, the SLP Pro's usefulness is limited by its restrictive label requirements, its inadequate software, and its high price.

The SLP Pro lets you print labels up to 2 1/8 by 4 inches, but Seiko's thermal printing technology requires using Seiko's own thermal labels. Forget about using premade labels or labels from a stationery store.

The SLP Pro desk accessory allows you to customize label templates, add POSTNET codes and graphics, and import and export data files. It comes with eight predefined templates. You print labels from mail lists, which can contain multiple names. You can choose to put personal messages on labels you specify.

The software also lets you create bar codes — though the product's manual admits that infrared scanners can't generally read thermal printing, so anyone who wants scannable bar codes should look elsewhere.

Labels can only be printed from the SLP Pro DA; at press time, Seiko was working on a Chooser-level driver before importing. That's hardly an acceptable solution for users needing to print many labels from imported data, especially since printing labels on a standard inkjet or laser printer isn't that hard.

I don't think the SLP's high price and limited abilities make it a worthy product for printing lots of labels. Consumers may find their standard office printer a cheaper, more efficient solution. But if you need to print only a few labels at a time, the SLP Pro, which prints quickly and well, may be an expensive but good choice. Now if I could only find something that would stick the labels on the envelopes, too.

—JOANNA PEARLSTEIN

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THE POWER MACINTOSH ARRIVES

See, touch, and smell one of the three new computers that Apple introduced on March 14 and you know they're Macs, yet they are also obviously a decidedly new breed of Macintosh.

THREE NEW MODELS REDEFINE MACINTOSH PERFORMANCE WITHOUT SACRIFICING COMPATIBILITY

You hear a subtle difference at start-up, when instead of a chime you hear a guitar chord strummed by jazz guitarist Stanley Jordan. (There's also a scary car-crash sound if there's a major problem at start-up.) Decidedly more prominent is the new machines' sensation of speed. Macworld Lab tests proved these Power Macintosh computers capable of performing two to six times as fast as a Quadra 800. To put that performance in perspective, it's been seven years since a new Mac has tripled the speed of the previously fastest Mac. (The Mac II, in 1987, tripled the speed of the Mac Plus.)

The new business-class Macs get their performance boost not from a faster Motorola 680X0 CPU but from a completely different CPU, IBM's PowerPC 601. The 601 is faster because its RISC (reduced instruction set computer) architecture processes instructions much faster than the 680X0's CISC (complex instruction set computer) architecture.

There are three models of the Power Macintosh: the 6100, 7100, and 8100. To a casual observer, they look pretty much like a Quadra 610, 650, and 800, respectively. Although it's the PowerPC 601 inside that largely sets them apart, there are some other notable differences: all have built-in Ethernet circuitry, all have AV configurations via an expansion card.

BY LON POOLE & GALEN GRUMAN
The Power Macintosh 6100/60AV, 7100/66, and 8100/80 (clockwise from left).
(and even the non-AV configurations include telephony, speech, and hi-fi stereo capabilities), all support multisync monitors and on-the-fly resolution switching, all support an optional cache, and all configurations but the non-AV Mac 6100 have two video ports.

Apple has also taken a step toward making its product names more meaningful. Many people have difficulty remembering how the CPU speed of a Quadra 650 compares with, say, a Centris 650, Quadra 800, or Quadra 700 (33MHz, 25MHz, 33MHz, and 25MHz, respectively)—and their names don't help. The Power Macs will include the CPU speed as part of their names. Thus, the Power Mac 6100/60 uses a 60MHz PowerPC 601 CPU, while the 7100/66 and 8100/80 use 66MHz and 80MHz CPUs, respectively. If Apple were to come out with a 66MHz Macintosh 6100, it could be called a 6100/66 rather than have a whole new name.

You might expect to pay a premium for these fast new machines. But the clearest evidence so far that Apple is targeting the mass market is the fact that Apple expects dealers to sell the Power Macs for, and the prices in its own direct-sales catalog will be, about $2000 for a complete 6100 system, $3000 for a 7100 system, and $4000 for an 8100 system. That's just $200 to $400 more than the equivalently configured Quadra 610, 650, or 800.

**Looks Like a Mac, Acts Like a Mac**

A new CPU architecture could bring big compatibility problems, but Apple has made sure the new computers are Macs in more than name and case dimensions. The Power Macs look and act just like all other Macs. Almost all the software you already have works with them as is, and so does most of your add-on hardware.

Macworld Lab’s tests on prototype Power Macs found just three incompatibilities in the more than 100 applications and system extensions tested: only Kent Marsh’s CryptoMatic file-encryption program, Aldus’s PageMaker 4.2 (PageMaker version 5.0 is fine), Jump Development Group’s OptiMem 1.5.X, and Kiwi Software’s Power Menus 1.0 Finder enhancement did not work (Power Windows is fine). Neither do the system extensions that make accelerated 24-bit video cards function in accelerated mode; SuperMac and Radius have promised free updates and low-priced ROM updates (see PowerPC News, Macworld, April 1994), but other companies had not detailed their upgrade plans at press time.

In some other cases, an application works only with the Power Mac’s version of the Memory Manager turned off (this turns on the 680X0 Memory Manager, at the expense of about a 10 percent drop in performance). The only example we found was Symantec’s Think C 5.0.

The one catch—a big one—is that this degree of software compatibility incurs a significant performance penalty. When running existing software written for 680X0 CPUs, the Power Macs deliver performance at speeds between those of a iMac and Centris 650, according to Macworld Lab tests. Most run at 11% to 15% of the Centris 610 speeds. Even the top-of-the-line 8100 has only about 80 percent of the speed of a Centris 610 or Quadra 605 when running 680X0 software. Clearly, no one will buy a Power Mac just to run emulated programs. (The benchmarks in “How Fast Is 680X0 Emulation?” show how typical business programs fare in 680X0 emulation.)

The performance you see on a Power Mac when running 680X0 software will depend greatly on the programs that you use and the functions within them that you use, since how they interact with the Power Macs’ partially emulated operating system plays a large role in determining actual performance.

Only new or upgraded software written specifically for the PowerPC CPUs
achieves the full speed potential. Software that performs lots of floating-point calculations benefits the most from being revised for the PowerPC—two to six times, according to Macworld Lab tests of beta native-PowerPC software. (See the feature “Power Mac Software,” in this issue, for more details on native PowerPC software performance.)

For hardware, Macworld Lab also found extremely few incompatibilities. For example, we tried several NuBus cards in prototype Power Macs and found only a few problems, all apparently related to the cards’ ROM or INITs, not to the PowerMac’s NuBus architecture. The SuperMac Thunder II GX•1360 video card wouldn’t work, apparently because its software needs an FPU (floating-point unit) but can’t use the 601’s internal FPU. (Several companies did say privately that a flaw in the Power Mac’s NuBus controller required fixes to some third-party boards or drivers.)

Asante Ethernet cards didn’t work when used to connect multiple Power Macs together, but an Asante card in a single Power Mac did work fine when connected to a different Power Mac’s built-in Ethernet circuitry. All the Power Macs have built-in Ethernet, so it’s unlikely you’d want to add an Ethernet card.

Color Options for All

Apple made major changes to the Power Mac’s video-display support. The two most significant changes are the inclusion of two video ports in all models but the non-AV 6100, and the adoption of multisyncing support—even on-the-fly resolution switching—in the Power Macs’ ROMs. After years of bypassing PCs’ VGA and SuperVGA video standards, Apple has adopted them in the core of its new-generation Macs. Many Macs support multiple monitors with the addition of NuBus video cards, but the Power Macs (except the standard 6100) are the first Macs ever to support two monitors without additional hardware.

One video port is on the Macs’ back panel, where it has been on Macs since the IIci. The second video port is on a card that plugs into the PDS (Processor Direct Slot). All AV Power Macs have an AV card in the PDS, and that card includes the video port and 2MB of video RAM, plus the TV-signal input and output connectors. The PDS in the non-AV 7100s and 8100s has a video card in place of the AV card; the 7100’s card has 1MB of VRAM, expandable to 2MB, while the 8100’s card has 2MB expandable to 4MB. (The non-AV 6100 has no second video port, and there is no option to add one; you’d have to buy a 7-inch NuBus video card from another company and attach it via a $99 PDS-to-NuBus adapter similar to that in the Centris and Quadra 610. However, the adapter for the 610 will not work in a 6100.)

The port on the Power Macs’ back panel is an AV-style video port, which has pins for the video, ADB (Apple Desktop Bus), and sound signals that an Apple AudioVision 14 or compatible monitor accepts. If you want to plug a standard Apple monitor or a VGA monitor with an adapter cable into this port, you’ll need an AV-to-standard-Mac video adapter. Fortunately, the second video port on the Power Mac is a standard Mac video port, so you really only need this adapter on the non-AV 6100, which comes with one.

The back panel’s video circuitry handles standard Apple monitors as large as 16 inches, as well as 13-inch VGA monitors. Instead of using dedicated VRAM for video, the back-panel video uses part of the ordinary system RAM to provide up to 16-bit color depth (32,768 colors) on 12-, 13-, and 14-inch monitors, and up to 8-bit depth (256 colors or gray shades) on 15-inch-portrait and 16-inch monitors. The amount of RAM used depends on the screen size and color depth; a 16-bit, 14-inch (640 by 480 pixels) screen uses the most: 0.65MB.

RAM-based video has a checkered past. It hampers video and system performance on the Mac IIci and IIls, the most recent business models to use the technique. But Apple claims that by taking advantage of the 601’s internal 32K cache and the system’s high-volume, multiprobe architecture, the built-in video uses no more than half the bandwidth (carrying capacity) of the system bus and thus performs well on the Power Macs.

Macworld Lab tests confirm that the Power Macs’ video-display speed is fairly fast—but only with native PowerPC software. Our tests with 680X0 applications running in emulation show that both the RAM-based video and the PDS cards’ video is two-thirds the speed of a Quadra’s or Centris’s video. This surprising result seems to be due to overhead incurred by 680X0 emulation, although Apple could not be certain.

The PDS card’s video circuitry can handle any standard Mac monitor from 12 to 21 inches, as well as any VGA or SuperVGA multisync monitor at the equivalent pixel resolutions. Most multisync monitors need a special adapter for each pixel resolution to tell the Mac what their resolution is; electronics stores carry these for 14-inch (640-by-480-pixel resolution) monitors, and most monitor makers have adapters for higher resolutions.

The AV cards and the 7100’s and 8100’s bundled video cards all support up to 24-bit color on monitors up to 14 inches, and 8-bit grayscale on a 15-inch portrait monitor. Beyond that, color depth depends on the amount of VRAM available. A 16-inch monitor can display 16-bit color with 1MB of VRAM or 24-bit color with 2MB or more. A 19- or 21-inch monitor can display 8-bit color with 1MB, 16-bit color with 2MB, or 24-bit color with 4MB of VRAM. (The amount of VRAM available on an AV card is 1MB if the TV-video ports are active and 2MB if they are not.)

Unlike previous Macs, the Power Macs let you switch the resolution of a
MAKING AV TECHNOLOGY MAINSTREAM

Think again, if you thought the audio and video technologies of the Quadra 840AV and 660AV were only for multimedia enthusiasts. Audio and video technologies require both a 68040 CPU and a DSP coprocessor on the Quadra 840AV and 660AV, but the PowerPC 601 CPU handles them unassisted on the Power Macs. All Power Macs can send and receive faxes and data over the phone lines without a modem. They can play and record stereo sound with CD fidelity. They can recognize voice commands and synthesize speech. Additionally, any Power Mac equipped with an AV card can record QuickTime movies from a camcorder or other video source, and can show screen images on a TV or send them to a video recorder.

Telephony Connecting a telephone line to either of the Power Mac’s two GeoPorts requires an adapter box, called a pod, such as the GeoPort Telecom Adapter that Apple developed for the 840AV and 660AV Macs. This device, a box about the size of a paperback book, works with ordinary analog phone lines. Other companies are still working on pods for PBX (private branch exchange) and digital phone lines. Once connected to a phone line, the Express Modem software included with all Power Macs provides all the capabilities of a 9600-bps fax modem. Applications that turn a Power Mac into a telephone or answering machine won’t be available until software developers get some missing pieces of the operating system from Apple later this year.

Audio The audio circuitry on every Power Mac motherboard records and plays back stereo sound with a 16-bit sampling resolution at sampling rates of up to 44.1kHz, the standard for compact discs. This sampling rate and resolution provides far higher fidelity than other Macs’ 8-bit, 22kHz best, but it uses lots more disk space as well: 10MB per minute. The signal-to-noise ratio is 82dB for input and 85dB for output, the same as the 840AV and nearly as good as an audio CD’s 90dB.

Speech The PlainTalk technology built into every Power Mac can recognize voice commands of most North American English speakers without any training, Apple says. The Power Mac’s high-fidelity audio circuitry digitizes spoken commands, and the PlainTalk software compares the digitized sound with its database of almost 1000 voice samples. This processing happens faster in the floating-point unit of a Power Mac’s 601 CPU than in the Quadra 840AV’s 3210 DSP, according to Apple. Furthermore, the 3210 cannot process PlainTalk and GeoPort tasks concurrently, but the 601 can. As a result, Apple says, the Power Macs can recognize speech during a 9600-bps data-communications or faxing session—a feat the 840AV Mac cannot perform.

Besides recognizing speech, PlainTalk can generate speech from text with more realistic voices than the Mac’s original speech-generator, MacinTalk. But PlainTalk uses lots of memory—2MB for speech recognition and 700K to 2.6MB (depending on quality) for speech synthesis.

TV video The AV Power Mac configurations include a separate circuit card—the AV card—that inputs television video and outputs ordinary Macintosh video or television video. Essentially, this card contains the video subsystem of a Quadra 840AV, stuffed with 2MB of VRAM.

The AV Card plugs into the PDS slot on the Power Mac motherboard and adds three ports to the back panel. One port is an ordinary Mac video monitor port (not an AV display port with sound, ADB, and video input like the one on the motherboard). The other two ports are for S-Video input and output. There are no composite (RCA-style) video-input and -output ports, but the AV card includes adapter cables for the S-Video ports. The AV card also has a 40-pin DAV (Digital Audio Video) slot like the one on the Quadra 840AV and 660AV. The DAV slot gives NuBus cards access to the computer’s digital-audio and TV-video-input signals. On an 8100AV or 7100AV, an accessory card in the DAV slot could compress digital video and audio and send it to a NuBus card over a flat-ribbon cable. (A 6100AV can’t use the DAV slot because it can’t have both an AV card and a NuBus card installed.)

Apple does not claim the AV card produces broadcast-quality TV video, but its NTSC video output (the TV standard for North America and Japan) has a convolution filter to reduce flicker. The AV card can also output PAL video (for most of Western Europe), but SECAM (for France, Eastern Europe, and Russia) requires an external adapter.

Apple claims the AV card can digitize a QuickTime movie in 16-bit color at about 28 frames per second on a 6100/60AV, 31 fps on a 7100/66AV, and 37 fps on an 8100/80AV. Standard SCSI performance (5MB per second maximum) theoretically limits frame size to 320 by 120 pixels when recording digitized video to a hard drive, in real time, without compression. In theory, an 8100/80AV could record a color monitor screen video on a SCSI-2 Fast internal hard drive. The AV card can also grab a single video frame and save it as a 24-bit PICT file, and it can display continuous full-screen video at the standard broadcast frame rate. The AV card accepts TV video in three formats: NTSC, PAL, and SECAM.

Although the AV card can digitize movies in 16-bit color, it must be set to display only 8-bit color while digitizing. After recording a movie, you can set the Monitors control panel to display more colors while you view or edit the movie. The 2MB of VRAM (not expandable) are enough for 24-bit color on a 16-inch monitor (832 by 642 pixels) and 16-bit color on a 19- or 21-inch monitor.

BY LON POOLE
The Power Macs come with System 7.1.2, serve power, as part of the Environment scripts, and a new Graphing Calculator and show the results visually. The AV Express Modem software to simulate a Mac's 4MB ROM Mac's basic graphics, typography, and Apple, while QuickDraw GX remains in Apple Remote Access.

Software Selections
The Power Macs come with System 7.1.2, a minor variant of System 7.1. In addition to Power Mac enablers, 7.1.2 has the Express Modem software to simulate a 9600-bps fax modem, Macintosh PC Exchange to mount PC disks, QuickTime to play back movies and decompress graphics, AppleScript to create application scripts, and a new Graphing Calculator to perform complex scientific calculations and show the results visually. The AV configurations come with VideoRecorder for viewing TV-video input in a window. Apple also offers a configuration that includes 16MB of RAM and Insignia Solutions' SoftWindows Windows emulator installed on the hard disk.

All the Power Macs include control panels to schedule automatic shutdown of the Power Mac and monitor to conserve power, as part of the Environmental Protection Agency's Energy Star program to reduce power consumption. (A monitor must be Energy Star-compliant for the automatic shutdown to work with it.) The Power Mac 6100 is not Energy Star-compliant because the system cannot be powered down via software, although attached Energy Star-compliant monitors can. The 6100—like the Centris and Quadra 610, Quadra 605, and LC III—has no circuitry to support the keyboard's restart switch, which is why the system-shutdown software does not work with it.

Notable software omissions include the PowerTalk extensions for network communications and collaboration (available in System 7 Pro) and the long-awaited QuickDraw GX enhancements to the Mac's basic graphics, typography, and printing capabilities. PowerTalk should be available this summer, according to Apple, while QuickDraw GX remains in development. Also missing is ApplePhone, which creates a telephone and answering machine in software on a 660AV or 840AV but requires the DSP chip in those Macs.

 Rather than rewrite all of System 7 with native PowerPC code, Apple put a 580K emulator program in the Power Mac's 4MB ROM to translate 680X0 instructions to PowerPC instructions on the fly. (For more details on how Apple's 680X0 emulation works, see “PowerPC Preview,” Macworld, February 1994.) The emulator does not translate MMU (memory management unit) or FPU instructions. Almost no programs communicate directly to the MMU, but several high-end programs—notably modeling, rendering, and scientific-analysis software, but also some Photoshop image filters such as Lens Flare—do require an FPU. 680X0 programs that require an FPU will not launch, or will crash, if you use them on a Power Mac.

For 680X0 programs that require an FPU, John Neil's $10 shareware control-panel SoftwareFPU 2.43 (available on CompuServe and America Online) successfully emulates a 68040 FPU on Power Macs. While it's not very fast, Software FPU does let you keep using 680X0 programs that require an FPU until you can upgrade them to native PowerPC versions. For example, SoftwareFPU lets Macworld Lab use Specular International's Infini-D to render an image, but what takes about 11 minutes on a Centris 650 took more than 19 hours on a Power Mac 7100, since Infini-D had to use the emulated FPU instead of a real one. For smaller tasks, like using the Lens Flare image filter in Photoshop, the performance is acceptable, taking 30 seconds rather than 12. (Ironically the Quadra 605 and other Macs with 68LC040 CPUs, which lack FPUs, can't use SoftwareFPU due to a bug in the LC040 CPU; see Quick Tips, Macworld, March 1994.)

Apple has also revised the Memory Manager portion of the Macintosh Operating System to include dynamic file swapping so the memory sizes you set in Get Info windows would be equivalent for native PowerPC applications and emulated 680X0 applications. For the applications that are incompatible with the new Modern Memory Manager, you can set a new option in the Memory control panel to use the old Memory Manager.

System 7.1.2 also adds built-in support for shared libraries, which are software modules that extend application capabilities. Several applications already have private or semiprivate modular extensions (Photoshop filters, for example), but shared libraries are a systemwide standard supervised by the Shared Library Manager portion of the operating system (a separate system extension before System 7.1.2). Shared libraries on Macintoshes are similar to the popular DLLs (dynamic linked libraries) on Windows PCs. A software library module can be designed to work with one application or many, and applications can link to modules on the fly. For example, word processor and database applications might link to the same public spelling checker and thesaurus library modules, while a graphics program links to a set of private graphics-effect modules.

Inside the Power Macs
From the outside, the Power Mac looks almost identical to their Quadra counterparts. Look closely and you'll notice the word PowerPC on the case, as well as the Quadra 605—like styling for the floppy drive panel. Internally, too, there are more similarities than differences.

CPU
The biggest difference is the use of the PowerPC 601 CPU. Open the case and you'll see a science-fiction—like heat sink fanning out from the CPU (see the photos in “Hardware Differences”).

System memory
The Power Macs all have 8MB of RAM soldered on the motherboard. You can expand the memory with the same type of 72-pin SIMMs as used on Centris and Quadra models introduced last year. But unlike with the Quadras and Centrisxes, you need to add SIMMs two at a time, not one at a time. (The PowerPC 601 uses 64-bit addressing for memory, and one 72-pin SIMM has just 32 bits of addresses.) But unlike such Macs as the IIsi, which had confusing rules about what kinds of SIMMs to put in which banks, a Power Mac requires only that the two SIMMs be in contiguous slots and that the two SIMMs be the same capacity and speed.
The 6100 has a maximum memory capacity of 72MB using hard-to-find 32MB SIMMs in both of its SIMM slots. The 7100 has four SIMM slots, for a maximum memory capacity of 136MB with 32MB SIMMs. Filling an 8100’s eight SIMM slots with 32MB SIMMs gives it 264MB. If you don’t need that much RAM, the Power Macs also work with 2MB, 4MB, 8MB, and 16MB SIMMs.

The 601’s internal 32K primary RAM cache lets Apple use relatively slow 80ns RAM for the Power Macs’ main system memory. Faster 70ns and 60ns SIMMs, which some Quadra and Centris models require, also work on the Power Macs but do not improve performance.

Cache For better memory subsystem performance, the Power Mac 8100 comes with a 256K secondary RAM cache on a 160-pin SIMM. On the 7100 and 6100, users can add a secondary cache by plugging in a 160-pin, 256K SIMM (not a standard RAM SIMM). On the 8100, you can replace the 256K SIMM with a 512K cache SIMM. The secondary cache does not approach the blistering transfer rates of the CPU’s internal 32K primary cache (640MB per second for data and 2.5GB per second for instructions), but

DOES POWERPC BEAT INTEL’S BEST CPUs?

You’d think that Intel’s Pentium CPU is an overbaked, dead-end fire hazard, from the claims that Apple, Motorola, and IBM have made about the rival Intel CPU. The PowerPC represents the first generation of a new type of CPU that will move the Macintosh and some IBM PCs ever higher in performance at very low prices. By contrast, the three companies say, Intel’s family of chips is at the end of its line, doomed to obsolescence soon.

But the powerPC is a great advancement over the previous CPUs in the Apple lineup. Motorola’s 680X0 series has essentially hit the end of its life, which is why Apple dropped the 680X0 CPU and switched to IBM’s Power architecture, from which the PowerPC was derived. Macworld Lab tests have consistently shown that even with Windows, a 486-based PC is faster than a comparable 040-based Mac. In low-level tests, an 040 CPU may beat out a 486, but most real-world tasks don’t exercise a CPU in the same way.

Future Pentiums It’s also true that the PowerPC is at the beginning of its life; and that fact, combined with its RISC design, gives it a lot of flexibility for future growth. The Pentium, however, has at least two more generations to come (one, dubbed the P6, is expected next year, and the P7, still under development, should follow a couple of years later), not counting a lower-power, lower-cost, 100MHz version dubbed the P54C, due out by June.

Contrary to the impressions that Motorola, IBM, and Apple are giving, the Pentium itself uses many of the RISC technologies that the PowerPC does, but it also contains all the circuitry needed to be completely compatible with the 80X86 line. That means you don’t need to buy new software when you switch from 486 to Pentium, as you must when switching from 040 to PowerPC 601.

And the Pentium’s problems of large size, power usage, and heat should be taken care of with the P54C. The Pentium’s transistor circuits are 0.8 microns (millionths of an inch) wide. Multiply that by 3.1 million (the number of transistors in the CPU) and you can see what causes its large size and thus its power consumption and heat. The P54C version will use 0.6-micron circuits, which will make its size and power consumption roughly equal to that of a 486 or 040. The PowerPC 601, because it was designed after the Pentium, already used smaller (0.65-micron) circuits, so its 2.8 million transistors take just 41.4 percent of the Pentium’s area. (The P6 and PowerPC 603 will use 0.5-micron circuits.)

For these reasons, you can expect the next several generations of the Pentium and PowerPC to trade in terms of speed, size, and power consumption—especially when you factor in other system components, such as the system bus and video controller, that play a significant part in determining a computer’s overall performance.

The 486 isn’t dead, either. The 486 also has at least a couple more years of life in it, with the new IntelDX4 (486 is no longer part of the name) CPU that runs at 75MHz, 83MHz, and 100MHz internally on motherboards running at 25MHz, 33MHz, and 50MHz. (The first DX4 PCs are expected by summer.) A DX4 can be two, two and a half, or three times as fast as the motherboard, so 150MHz DX4s are possible, although 50MHz buses and the superfast RAM they require are expensive and difficult to manufacture today. (The PowerPCs run at twice the motherboard speed, so a 66MHz PowerPC works on a 33MHz motherboard. Intel’s 486DX2 CPUs follow the same approach. Little known is that so do Motorola’s 68040s, which work internally at twice their rated speed: a 33MHz 040 works at 66MHz internally.)

The DX4 has the added advantage of taking less power than previous 486 and 486DX2 CPUs (4 watts versus 6w), so the DX4 is designed to be used in notebooks as well as desktop computers. (Apple has said it will use the 3w PowerPC 603 for its notebooks, since the 601 takes 9w and an 040 takes 6w.) The DX4 also uses 3.3-volt circuitry, which means it has longer battery life than other CPUs that use 5V circuitry; similarly, the PowerPC 601 uses 3.6V circuits.

The DX4 marks the first time that notebooks can take advantage of the fastest CPUs that desktops can. It’s too soon to know what performance Apple’s PowerPC 603-based notebooks will have, since the 603 needs a large, power-consuming cache to have 601-like speed. At least, it’s reasonable to expect both DX4...
at 200MB per second, the secondary cache more than doubles the transfer rate between CPU and RAM or ROM. On a prototype Power Mac 7100/66, Macworld Lab saw a 14 percent difference with the optional cache installed for typical processing, and we saw 44 percent for floating-point operations, both with 680X0 programs. The additional throughput benefits the emulator and emulated 680X0 software more than native PowerPC software.

**SCSI** The SCSI port is compatible with the SCSI-2 protocol (but not the Fast or Wide protocols), and theoretically transfers data at 5MB per second. Under optimal conditions with Apple's internal drive, Macworld Lab measured transfer rates of 2.3MB to 2.6MB per second to and from the prototype Power Mac. The 8100 has a second SCSI channel with an internal connector; this channel is compatible with the SCSI-2 Fast protocol and transfers data at up to 10MB per second. Actual throughput depends on the speed of your SCSI devices and the quality and condition of your cables. Dual-channel SCSI lets the 8100 keep speed up on the internal channel even if the external channel gets bogged down.

**PowerPC's long-term pros**

Despite the medium-term growth potential for Intel's CPUs, the PowerPC does have a better long-term advantage. Although the Pentium uses RISC technology to gain high speeds, it does get weighed down by the baggage of its backward compatibility with the 80X86 line (that's one reason the Pentium has more transistors than the 601). Although the Pentium has some superior implementations of RISC technology compared with the 601 (such as being able to handle integer calculations in its floating-point unit), its performance is about the same.

To stay even with a PowerPC, Intel has to use better technology in the Pentium than Motorola and IBM have to use in a PowerPC. If both CPUs were to use the same advanced techniques, the PowerPC should have an advantage. Plus the 60MHz PowerPC 601 costs less to make than a 60MHz Pentium or the 100MHz DX4, which helps Apple and other PowerPC adopters save money and better compete on price, or they can reinvest the savings in new technologies. Also, 66MHz and 80MHz 601s are now available, while few 66MHz Pentiums are—and no faster versions are (yet).

**Performance where it counts**

But how do the CPU's abilities translate to the performance on your computer? Right now, the Pentium is fast when it is used in an optimized system, like a 60MHz Compaq Deskpro 5/60M. In Macworld Lab's standard tests, the Pentium-based machine was so fast that what takes 20 seconds on a 33MHz O40-based Quadra 650 takes less than half a second on the Pentium. Because the native PowerPC versions of these programs are not available, we can't use them to compare the PowerPC 601 with the Pentium, but by using other software, we found that the 60MHz Pentium is slightly slower than a 60MHz 601. (The 601's faster FPU accounts for much of the difference.)

Having an optimized system is key. Apple, because it controls the design of its hardware and doesn't need to worry about getting a product to market before a competitor, has long taken advantage of optimizing a system to get the most out of its components. That's how Apple narrowed the performance gap between the O30 and 386, and between the O40 and the 486. For PC users, it's different. The first Pentium-based PCs actually ran slower than their 486DX2 counterparts, since companies just put a Pentium inside a 486 system, without taking advantage of the Pentium's memory and instruction handling. Also, while optimized Pentium PCs do run existing Windows software faster, once developers recompile their applications for optimal Pentium performance, there should be another 10 percent boost. (And these recompiled versions will continue to work at current speeds on 80X86 systems.)

Expect that to start happening by the end of the year.

Behind all the hype over whose technology is better lies a welcome reality for customers: Apple's Macs at the least stay even with their PC competitors. And often, Macs will surpass PCs. Intel has been shaken by the PowerPC and has moved quickly to compete with it. That will keep PC customers happy as their systems get more powerful, and Apple will have to respond aggressively so it can keep Mac customers equally happy. If so, we all win.

**Who's Faster: Power Macs or Top PCs?**

Macworld Lab compared Power Macs against Windows PCs using the top Intel CPUs: a 60MHz Pentium in a Compaq Deskpro 5/60M and a 66MHz 80486DX2 in a Gateway 2000 4DX2-66V. The Power Macs were prototypes. All systems had 16MB of RAM, and we ran them in 16-bit color (the PCs used a Diamond Computer Systems SpeedStar Pro video card). We used beta versions of native PowerPC software for the Power Macs and current versions of Windows software for the PCs. (When PowerPC software and the final Power Macs ship, Power Mac performance should be somewhat higher.)

**APPLICATION TESTS**

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<td>Mathematica 2.2.1</td>
<td>227.3</td>
<td>283.4</td>
<td>425.0</td>
<td>395.0**</td>
<td>574.8**</td>
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</tbody>
</table>

*The Power Mac 7100/66 used a 256K cache card.

**Because of memory-handling errors that interfered with testing, this number is a composite of several tests; actual performance may differ by as much as 2 percent.
THE POWER MACINTOSH ARRIVES

with slow external devices or poor cables.

Direct memory access In the Power Macs, data passes through the SCSI, serial, Ethernet, and sound ports directly to the CPU of this chore. The same controller chip provides DMA for the internal floppy drive port. DMA leaves the CPU free to perform other tasks uninterrupted, resulting in faster data transfer through the ports and faster processing of other tasks. Although the CPU and RAM controller may contend for access to RAM, causing one to have to wait for access, the CPU's large 32K internal cache reduces the likelihood of this conflict.

DMA works hand in glove with the Power Macs' ability to conduct asynchronous SCSI operations, keeping multiple SCSI devices busy simultaneously. While one SCSI device stores received data, for example, it can relinquish the SCSI bus so another device can send other previously requested data. Dantz Development's Retrospect 2.0 uses this technique to greatly improve backup performance by writing backup data to tape while reading more data to be backed up from disk. The operating system—specifically the portion known as SCSI Manager 4.3—enables asynchronous SCSI operations, but to realize its full potential, developers must update driver software for hard drives and other SCSI devices. Many device drivers have been upgraded and most others are in progress.

NuBus Apple says that the Power Macs' NuBus slots—there are three in the 7100 and 8100 and an optional 7-inch slot in the non-AV 6100—can transfer data two to four times as fast as other Macs except the 660AV and 840AV, thanks to a NuBus controller chip that Apple designed for the Power Macs. Theoretically, data-transfer rates can reach 40MB per second between a NuBus card and the CPU, and 80MB between NuBus cards. Apple says it has measured data transfers at 35MB per second from the CPU to a NuBus card, 20MB per second the other direction, and 80MB per second between NuBus cards.

The changeover from NuBus to the much faster PCI expansion slots, which some PCs already use and Apple has announced it will eventually adopt, appears to be 9 to 12 months away.

Sound The back-panel ports have more in common with an AV Mac than any other model. The sound-in and sound-out ports handle 16-bit stereo sound for speech recognition and compact-disc audio fidelity. None of the Power Macs include a microphone.

Communication Both the modem port and the printer port are high-speed GeoPorts, like the modem port in the 660AV and 840AV Macs. You can also connect a LocalTalk network or any serial device (like a fax modem) to either GeoPort.

Storage Internal storage space is the same on the Power Macs as on the equivalent Centris and Quadra Macs. The 6100 and 7100 have room for a floppy drive, a 3.5-inch third-height hard drive, and a 5.25-inch half-height device with removable media, such as a CD-ROM or SyQuest drive. The 8100 has space for the same devices plus space for one full-height or two half-height 3.5-inch drives (not accessible for removable media). Many of today's 1GB and larger drives are half-height and will fit in an 8100 but not in the third-height space in a 6100 or 7100. (You may be able to buy a bracket for installing a half-height 3.5-inch hard drive in the 5.25-inch drive bay on a 6100 or 7100. APS Technologies [816/483-6100] and Proline Distribution [415/461-2227], for example, sell such brackets for the Quadra 610 and 650.)

A CD-ROM bundle is also available, and it includes a new type of CD-ROM drive that does not use bothersome CD caddies. Instead, there's a built-in tray to hold the CD, as in a stereo CD player. With the CD-ROM configurations, you get a CD that works as a start-up disk and can install System 7 on a hard drive whose system has become corrupted. The CD bundle is standard equipment with a 250MB hard drive on a 6100 or a 500MB hard drive on a 7100, as well as on every AV Power Mac. The CD-ROM bundle is optional with a 160MB hard drive on a 6100, a 250MB hard drive on a 7100, and a 500MB hard drive on an 8100. Apple does not include a CD-ROM drive with a 250MB or a 1GB hard drive on an 8100, but you can buy one separately.

What's the Real Price? At an estimated dealer price of $1750 for a base model 6100/60, Apple is making PowerPC performance inexpensive. For a few hundred dollars more than a Quadra 610, 650, or 800 (which Apple says it will discontinue when product demand disappears—that means soon), you can get a Mac with PowerPC 601 performance and all AV technologies except TV video.

But Apple's low street-price estimates for the Power Mac 6100 and 7100 assume that you will also buy an Apple Color Plus display (the medium-quality tridot monitor, not the high-quality, Trinitron-based Macintosh Color Display) and a standard Apple Keyboard II. The 8100's price estimates include the Trinitron monitor and Apple Extended Keyboard II. (Apple does not sell a monitor or a keyboard as part of the system; the company quotes a complete system cost so customers can more readily compare pricing with PC bundles.)

Chances are you'll want to spend a couple hundred dollars more on the keyboard and monitor than Apple has figured

Power Mac Options

<table>
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<tr>
<th>Power Macintosh</th>
<th>Apple's Estimated Base-Model Price</th>
<th>CPU Speed</th>
<th>Base-Model RAM</th>
<th>Maximum RAM</th>
<th>Base-Model Cache</th>
<th>Maximum Cache</th>
<th>NuBus Slots</th>
<th>Base-Model Hard-Drive Capacity</th>
<th>Hard-Drive Options (price*)</th>
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<tbody>
<tr>
<td>Power Macintosh 6100/60</td>
<td>$1750</td>
<td>60MHz</td>
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<td>72MB</td>
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<td>256K</td>
<td>3</td>
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<td>8MB</td>
<td>72MB</td>
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<td>3</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

* Not including monitor or keyboard. * With 22MB SIMMs. * Using the bundled video card on non-AV Power Macs; using the bundled AV card on the AV Power Macs.
into its estimates—for example, you may want a 16-inch monitor. Other options—such as larger hard drives, CD-ROM drives, AV cards, and SoftWindows—will all cost extra, roughly $300 to $500 each. Then there’s the price of cache and extra memory, although chances are you won’t need to get much more memory, since all the models come with 8MB soldered onto the motherboard.

Apple claims that a Power Mac costs as much as a comparable Windows PC. Apple’s claims are accurate, whether you buy a basic system or a fully loaded one. That’s a real achievement.

The PowerPC in Your Future

Apple plans to move all Mac lines to PowerPC CPUs over the next couple of years. When you move to a Power Mac depends on the type of Mac you’re buying and on the software you use.

Certainly you can rule out a Power Mac if you need a portable computer. The PowerPC 603 CPUs that Apple has said will be in future PowerBooks won’t be shipping in volume until the third quarter of this year, according to Motorola, so it’s reasonable to assume that portable Power Macs are probably 9 to 12 months away. The 603 uses less than one-third the power of a 601 and features three reduced-power sleep states ideal for portable computers. The 603 is compatible with the 601 but can perform at the same level only with a large 1MB cache on the motherboard, which may use as much power as the 603 saves and would increase system cost. Apple must solve the performance-power-cost equation before it can make a portable Power Mac.

You can also ignore Power Macintoshes if you need a home or entry-level business computer, since Power Macs designed for these needs will not be available for about a year, when the 604 CPU is available in large quantities. The 604 will be significantly faster than the 601, according to Motorola. When the 604 succeeds the 601 in midrange and high-end desktop Macs during 1995, the 601 or the 603 may show up in home and entry-level-business Macs. In the meantime, consider the Quadra 605, a Performa, or the Color Classic, which are cheap and fast enough.

The first Power Macs are midrange and high-end-business computers, essentially replacements for all the Quads except the 605. The Power Macs are better hardware values and their performance with native PowerPC software is compelling. However, the Quads today offer better performance and compatibility with 680X0 software overall than the Power Macs, and the Quads can be upgraded to Power Macs (see “PowerPC Upgrade Strategies,” in this issue). If you need that compatibility or performance in a new computer, buy a Quadra now (quickly, before they’re gone), but be prepared to pay again when the time comes to upgrade to PowerPC. You’ll have less reason to want a Quadra as more software becomes available in native PowerPC versions.

When the applications you could not bear to use at emulated speeds are available in native PowerPC versions, it’ll be time to make your move to a Power Mac. It’s not a question of if, but of when. After all, Apple is working hard to make sure there are no Macs except Power Macs.

BEHIND OUR TESTS

To test the new Power Macs, Macworld Lab used prototype models from Apple and our standard Business-Systems Tasks suite. These tests are based on running real-world tasks on shipping applications—Microsoft Excel 4.0 and Word 5.1a, Adobe Photoshop 2.0, and QuarkXPress 3.2 (we had to drop Aldus PageMaker 4.2 this time because it would not run on the Power Macs) —which meant that we were actually testing the performance of the Power Macs’ 680X0 emulations. That’s fair, since initially only a few native PowerPC programs will be available, and most of those will not be standard business-productivity programs. Results for Apple’s upgrade boards for some Centris, Quadra, and II-series Macs are presented in the feature “PowerPC Upgrade Strategies,” in this issue.

To gauge the long-term performance potential of the Power Macs, we tested 15 native applications provided to us in prerelease form, using a mix of real-world tasks for each program. We compared the native programs on a Power Mac 7100/66 with a 256K cache against their 680X0 versions on a Centris 650 and in emulation on the 7100/66. This shows not only the speedup you get by switching to PowerPC with native applications, but also the trade-offs you’ll have to make when you have some programs running native and others in emulation. Those results are covered in the feature “Power Mac Software,” in this issue.

Given Apple’s strong push to make Macs Windows-compatible, we also measured the performance of Insignia Solutions’ SoftWindows Windows emulator, which Apple has cited as the preferred method for making a Mac Windows-compatible. In addition to our standard Core-Performance Index tests, we benchmarked four representative Windows-only applications, since that’s the whole reason for getting Windows running on a Mac. Those results also appear in “Power Mac Software.”

One promise of the Power Macs is to surpass Windows PCs in terms of both price and performance, as the latest Q40s come close to doing. Using real-world tests with shipping Windows programs and beta versions of their Power Mac counterparts, we compared Windows PCs using today’s fastest Intel CPUs against the Power Macs.

Note that the native PowerPC software was beta, which means performance is likely to be slower than in the shipping versions. The Power Macs were also prototypes, with a close-to-final version of the system software and hardware. We expect few system-level performance differences between the prototypes Apple loaned us and the final shipping versions. It is possible, however, that some of the few software incompatibilities we found will have been fixed.—Macworld Lab testing supervised by Lauren Black and Danny Lee, with additional testing by Matthew Clark, Galen Gruman, Mark Hurlow, and Tim Warner

LON POOLE is a Macworld contributing editor who regularly covers new Macintosh technology. GALEN GRUMAN is a Macworld senior associate features editor who closely follows PowerPC technology.
It always comes back to speed. That's the fundamental promise of the Power Macs. And that's what the first native PowerPC programs offer: lots and lots of speed—for the applica-

tions that can take advantage of it.

While the Power Macintosh won't make most Microsoft Word users more productive, it will make a significant difference to users of Adobe Photoshop, QuarkXPress, ACI US 4D, or Aldus FreeHand, for example.

Several types of programs will reap the benefits of PowerPC. One type includes programs that do constant or highly repetitive calculations, such as rendering, spreadsheet recalculation, and animation. Another type includes programs that do involved calculations, such as image editing and database sorting. Of course, PowerPC will also benefit power users of such programs as Word—those who have highly formatted documents, use extensive exception dictionaries with their spelling checkers, or replace text frequently in very large documents.

Macworld Lab looked at 15 programs still under development in early February and tested their speed against their 680X0 counterparts on a Centris 650 (which uses a 25MHz 608040 CPU that operates internally at 50MHz), as well as against their 680X0 counterparts running in emulation on a prototype Power Macintosh 7100/66 (which uses a 66MHz PowerPC 601 CPU). The 7100 also had a 256K cache card, which makes the machine about 10 percent faster than one without. The speedup is dramatic: func-
tions are accelerated so much that they take between one-fifth and one-half the time they take to run on a Centris 650.

For example, some Photoshop filters, such as Gaussian blur, take about one-third as much time on a 7100/66 as on a Centris 650; on average, Photoshop operations take less than half as much time on the 7100/66. Computations in Wolfram Research’s Mathematica take a little more than one-fourth as much time, and font changes in Aldus PageMaker take only about a fifth as much time.

When you realize that a Centris 650 is two and a half times as fast as the Mac IICl, the mainstay of the Mac line just over a year ago, you’ll see that Macintosh computing has entered a new plane. The benchmarks “Native PowerPC Software Performance” show the kind of performance you can expect. And keep in mind that we were testing prerelease versions; the shipping versions should be even faster.

But not all functions will see such dramatic speedup. At the extreme, a standard blur filter in Photoshop has almost the same speed on a 7100/66 as on a Centris 650. More often, these less-accelerated operations will take between half and four-fifths as much time on a 7100/66 as on a Centris 650—respectable but not dramatic improvements.

These varying amounts of speedup among operations in native PowerPC software usually derive from the type of computation the operation uses. For disk access and video display, the hardware limits the speedup, since the speed of the system bus and many other hardware components is about the same as on an equivalent Quadra. For processing, the PowerPC CPU does best with floating-point operations, which many programs don’t use. The PowerPC also does best when it gets a steady stream of data and commands from a program, so programs that pause (perhaps because they are waiting for the hardware or for user input) won’t see the maximum speedup.

Of course, to get the kind of speedup we saw, you will need to upgrade your current software to native PowerPC versions. Under 680X0 emulation on a Power Mac, your current software is likely to run slower than on a business-level Quadra or Centris. Macworld Lab tests show that the performance of a Power Mac 7100/66 running just 680X0 software ranges from slightly faster than a IICl to as fast as a Centris 650, with Centris 610-level performance being typical.

The variance in the speed of 680X0 software is caused mainly by the interplay between the programs and the Power Mac operating system. On a Power Mac, some components run in native PowerPC mode and others run in 680X0 emulation. A program operation that uses 680X0 components of the system will be slower than an operation that uses PowerPC components.

Focus on Speed, Not Innovation

While Apple has also positioned the PowerPC chip as a catalyst for whole new genres of functionality and interfaces, you won’t see that for quite some time, since developers have had little time to discover what new capabilities the PowerPC will let them create.

Another factor is that developers—especially those that have huge customer bases, like Aldus, Adobe Systems, Microsoft, and WordPerfect—are largely unwilling to have different capabilities between, say, Windows and Macintosh users or 680X0 Mac and Power Mac users. Developers say they can’t afford to shut off the millions of 680X0 Mac or Windows PC customers for the few hundred thousand likely first-year Power Mac buyers. None of the 43 companies we contacted has yet made plans to add new, PowerPC-specific capabilities.

Ironically, with the prices of Intel Pentium CPUs falling and the recent
introduction of the clock-tripled Intel-DX4 CPUs, Windows PCs will have power comparable to PowerPC-based Macs (see the sidebar "Does PowerPC Beat Intel's Best CPUs?" in "The Power Macintosh Arrives," in this issue). That means Apple's hoped-for speed advantage probably won't be dramatic, at least not initially. But it also means that developers will have sufficient power on Windows PCs to add the kinds of features that the Power Macs can take great advantage of—if there were a great mismatch, many developers would be tempted to simply leave the features out of both platforms.

**PowerPC-Specific Features**

Although native PowerPC applications for now typically are identical to their 680X0 counterparts, you can get a taste of what PowerPC will let developers offer by looking at the Graphing Calculator utility that Apple bundles with the Power Macs. This is not the standard Mac Calculator (although that's bundled, too)—it's a full scientific-calculation device that even graphics the result as you enter a calculation (see the screen image, "Next-Generation Calculator"). This small program takes advantage of the PowerPC 601's fast floating-point unit (FPU) to speedily handle difficult calculations, such as sines and integrals. The 601's faster overall computation ability lets the calculator display the equation in WYSIWYG format as you enter it. And Graphing Calculator takes advantage of the native PowerPC version of QuickDraw to display and modify graphical views of that calculation at the same time. Think of how this could change the interfaces of everything from 3-D modeling to page layout to business charting to network diagramming, and you'll understand what PowerPC can do for software.

Some programs won't have PowerPC-specific features but will take advantage of the PowerPC to enhance features. For example, Gryphon Software Corporation's Morph 2.5 will have two pieces of code inside the software to handle the morphing: one for PowerPC and one for 680X0. The PowerPC piece is written specifically to use the PowerPC's fast FPU, so the software runs much faster. Similarly, Light Software is using the same dual-code technique to optimize encryption and decryption in its Light Protect, image filters in Light Paint, and compression in Light Compress.

**Mixed Mac Universe**

Apple has said very clearly that the 680X0 CPU is soon to be a thing of the Mac's past. Apple will continue to offer 680-based Macs in its consumer and portable lines for the next 9 to 12 months, since the low-power, lower-price PowerPC 603 CPU it plans to use in those models is not yet in production. But once the 603 is available in sufficient quantities, the 040, like the rest of the 680X0 line, is history.

Still, millions of 680X0 Macs are in use, including many 040-based systems that have enough processing power to be useful in business for several years. Thus, developers can't just drop 680X0 Macs from their plans. That means developers must find ways to offer versions for both types of Macs.

Developers are also faced with the dilemma of packaging two versions of software on retail shelves already bursting with products, so expect most applications to have both PowerPC and 680X0 versions in the same box.

Most will use a smart installer, which can extract a PowerPC version or a 680X0 version from the installation disks and install just the appropriate code on your Mac. A few companies—including Microsoft, Adobe Systems, Fractal Design, Now Software, Dichel Graphsoft, and National Instruments—recognize that many people need to install a product on two Macs (their office and home Macs, for example) and thus let customers install two copies, with the restriction that only one copy may be run at a time.

Some smart installers give you the third option of installing a fat binary, a format that lets you run a program on either a Power Mac or a 680X0-based Mac—this is handy for people using external hard disks that move between, say, a Power Mac at the office and a Centris 610 at home, or for companies seeking to install just one version on all the Macs in its office.

None of the companies we surveyed planned to include two sets of disks (one for PowerPC and one for 680X0) in the box. Developers would like to use inexpensive CDs instead of floppies as their standard installation medium, but only about a third of the Macs in use today have CD-ROM drives. QuarkXPress 3.3 for Power Macs is an exception, since most of Quark's customers are power users who already own CD-ROM drives.

For programs that are not large, like many utilities, developers can just deliver a fat binary and not worry about smart installers or having two sets of install disks. The fat binaries do come with a price: as the name implies, they're larger than a standard program. Developers report sizes anywhere from 1.2 to 1.7 times as large as a standard program, with most in the 1.4 to 1.6 range.

But PowerPC code is usually bigger than 680X0 code (the processing efficiency in the PowerPC's RISC architecture is paid for by requiring more instructions in the code, thus the larger size)—about 1.2 times as large, developers say.

The actual code growth depends on the developer's coding practice. WordPerfect, for example, saw a lot of code growth because the 680X0 Mac version was written in assembly language, which is very compact but specific to a type of CPU. Because the PowerPC does not support assembly code, the rewritten WordPerfect had to be done in a less-compact language. In contrast, the PowerPC version of FrameMaker 4.0 is almost the same size as the 680X0 version, since the 680X0 version was actually a port from a version designed for Unix workstations based on IBM's Power CPU—the forebear of the PowerPC.

**PowerPC Software Plans**

By the end of the year, almost every major program should have a native PowerPC version. The table, "Native PowerPC Software Timetable," shows the planned availability of software from developers who have announced PowerPC efforts. If a product is not listed, its developer was...
ARE POWER MACS GOOD WINDOWS PCs?

For years, Apple has criticized and pooh-pooed Windows as a poor imitation at best. But it's clear that whatever its technical failings, Windows is the interface of choice for most PC users. So Apple has decided to make it easy for Windows users to buy Macs, basically selling them a Windows PC—and promising a good one, at that—and throwing the Mac in for free.

Apple is doing this mainly by promoting Insignia Solutions' SoftWindows, which runs Windows and DOS software via emulation in a window on the Power Mac and supports networks, printers, and other standard external PC devices. Apple will even bundle SoftWindows with any two Power Macs at a price of $565 for a 6100, $825 for a 7100, and $1080 for an 8100. Apple also sells its Quadra 610, DOS Compatible, a 68040-based Mac that includes a 25MHz 486SX-based PC coprocessor card. (The card cannot be used in a Power Mac.)

Another hardware option is Orange Micro's OrangePC line of DOS coprocessor cards, which work in any NuBus-based Mac (both 680XX and PowerPC except the Centris and Quadra 610). A new model, due in March, uses a 66MHz 486DX2 CPU. Macworld Lab tests on a prototype show that this board performs two business tasks like a 33MHz 486DX-based PC, since Windows can't take advantage of video and drive acceleration on the OrangePC card as it can on a PC.

Even the 040 Macs didn't have the horsepower to run Windows in emulation on the Mac, as users of Insignia Solutions' earlier SoftPC can attest. But the PowerPC Macs do. Macworld Lab tests show that SoftWindows runs on a Power Mac 7100/66 with a 256K cache card is about as fast as a 25MHz Intel 486SX-based or 40MHz Cyrix 386-based Windows PC. In Mac terms, its performance falls between a 040 and a Quadra 605. This is the same performance that the 7100/66 offers for 680XX software.

In SoftWindows, calculation- and disk-based functions, such as find and replace and file loading, are fairly speedy, while video-based functions such as scrolling are fairly slow. For example, a Lotus 1-2-3 calculation takes six times as long with SoftWindows as it does on a 33MHz 486DX-based PC, a 1-2-3 scroll takes eight times as long, and a file open in Aldus InfoPublisher takes just twice as long. The video slowdown is caused by the many translations involved in interpreting Windows GDI (the Windows equivalent of QuickDraw) commands into the Mac's QuickDraw commands.

SoftWindows gained its speed boost not just from running on a faster CPU but by changing its underlying architecture. SoftPC emulated an Intel 80286 CPU, essentially making the Mac simulate a 286 and then running PC software in that simulation. SoftWindows uses the actual Microsoft Windows 3.1 code and translates its Intel-specific commands into PowerPC-specific commands. This faster on-the-fly translation is similar to the Power Macs' method for handling 680XX software.

SoftWindows clearly offers Macintosh users a basic Windows business system's capabilities right on their Macs. Note, however, that to run SoftWindows, you need 16MB of system RAM on the Mac and need to set aside enough hard disk space for your Windows programs and data—60MB to 120MB would be reasonable to run three to six Windows programs. The cost of this disk space and RAM makes the real price for adding Windows more like $1000 (about $250 for a 170MB hard drive, $250 for 8MB of RAM, and $500 for SoftWindows) and $385 to $825 if you buy Apple's bundle—but that is still less than the $1500 cost of buying a separate 486DX PC. Plus, it's much more convenient than having two computers.

SoftWindows is based on the Windows Standard mode, which was designed for 286 compatibility. Most Windows users now own PCs based on 386 or 486 CPUs, and these CPUs have special circuits that improve memory handling, increase computation speed, and let multiple applications work simultaneously while minimizing the potential for system crashes. Programs written for Windows 386 Enhanced mode can take advantage of these features, while programs that support only Standard mode cannot.

Until recently, this was not a problem for SoftWindows, since few programs required that Windows be in 386 Enhanced mode. But that's rapidly changing: already WordPerfect 6.0 and FrameMaker 4.0 require 386 Enhanced mode. To address this need, Insignia plans to have a new version of SoftWindows later this year that supports 386 Enhanced mode. It may also add support for the popular SoundBlaster audio boards, which would give users full access to Windows multimedia.

BY GALEN GRUMAN

How SoftWindows Stacks Up

We compared Insignia Solutions' SoftWindows 1.0 and an earlier version (SoftPC 3.1) against Orange Micro's DOS coprocessor card and several Windows PCs using Macworld's Core-Performance Index tests plus four programs available only on Windows. All systems had 16MB of RAM and ran in 8-bit color. (The PCs' performance benefited from inexpensive accelerated G3SS and video cards.)

<table>
<thead>
<tr>
<th>MACINTOSH CORE-PERFORMANCE INDEX</th>
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</thead>
<tbody>
<tr>
<td><strong>Times as fast as a Classic.</strong> (Classic = 1.0)</td>
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<tr>
<td><strong>Windows-Application Index</strong></td>
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<tr>
<td><strong>Times as fast as a 33MHz 486DX PC.</strong> (33MHz 486DX PC = 1.0)</td>
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<td>Macworld Excel and Word</td>
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<tr>
<td>Lotus Ami Pro 3.01</td>
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<tr>
<td>Lotus 1-2-3 4.01</td>
</tr>
<tr>
<td>Microsoft Access 1.1</td>
</tr>
<tr>
<td>Aldus InfoPublisher 2.0</td>
</tr>
</tbody>
</table>

| Compaq Deskpro 5/60M (60MHz Pentium) | 3.12 |
| Gateway 2000 4DX2-60V (66MHz 486DX2) | 3.18 |
| Orange Micro OrangePC 390* (66MHz 486DX2) | 3.12 |
| AMI 486/33 (33MHz 486DX) | 1.23 |
| Power Mac 7100/66 with SoftWindows 1.0* | 1.23 |
| Centris 605 with SoftPC 3.1 | 1.2 |

**Software and hardware were prototypes. The Power Mac 7100/66 used a 256K cache card.**
Native PowerPC Software Timetable
List Price/

Upgrade Price from

Pred icted

Current/Previous

Availability

680XO Ve rsi on

Fo rmat '

Phone

Toll-Free

Company

Product

Abacus Concepts

StatView 4

S595/by Oct.

T8A/T8A

TBA

510/540-1949

800/666-7828

ACI US

4D Server 2.0

TBA/by July

TBA/TBA

TBA

40B/2 52·4444

800/384-0010

Ad obe Sys tems

Acrobat Exchange

$195/by Jan .

TBA/TBA

smart install'

41 5/961-4400

800/833·66B7

Dimensions

$199/by Oct.

TBA/TBA

smart install'

Illustrator

S595/by July

TBA/TBA

smart install '

Photoshop

SB95/by Oct. '

TBA/TBA

smart install '

Premiere

$695/by July

TBA/TBA

smart Install '

4081761-6200

none

Pho ne

Type Manager

$99/by Oct.

TBA/TBA

smart install'

Stuffit Lite

$25/by July

TBA/TBA

fat binary

Stufflt SpaceSaver

$59.95/by July

TBA/TBA

fat binary

FreeHand 4.0

$595/by June

TBA/TBA

PowerPC

206/ 622 -5500

none

PageMaker 5.0

$895/by June

TBA/TBA

PowerPC

206 /622-5500

none

Alias Research

Alias Sketch 2.0

S995/by July

TBA/TBA

smart Install

416/362-91B1

B00/447-254 2

Apple Computer

PhotoFlash 1.1

$279/now

NA '/ $49

fat binary

408/996-1010

none

autodessys

formZ 2.5

$1 495 / now

565 / $190

PowerPC

614/4B8·8828

none

Canto Software

Cirrus 2.0

$395/by May

TBA/TBA

fat binary

415/431-6871

800/ 332-2686

Cumulus 1.2

$295/now

TBA/TBA

fat binary

Central Point Software

MacTools 3 .0

TBA/now

TB A/ TBA

PowerPC

503/690·B090

B00/937 ·9842

Claris

ClarisWorks 2.1

$299/now

TBA/ $99

smart install

40B/727·8227

800/325 -2747

Connecti x

RAM Doubler 1.0

$99/by Oct.

TBA/NA

fat binary

415/571 -5100

800/950-5880

Dantz Development

Retrospect Remote

$449/May

$19.95/NA

smart install

51 0/ 253-3000

800/225·4B80

Aladdin Systems

Ald us

Retrospect

$249/May

$20/ NA

smart install

Dayna Communications

ProFiles 1.0

5129/April

free/free

PowerPC

801 /269-72 00

800/531-0600

DeltaPoint

DeltaGraph Pro 3.0

S195/by April

$29 .95/$80

smart install '

408/648-4000

non e

Diehl Graphsoft

MiniCad 5.0

S795/now

5150/ fre e

fat binary

410/ 290 -5 114

800/ 455-0888

Electric Image

El ectric Image 2.0

TBA/by Oct.

TBA/ TBA

PowerPC

818/577- 1627

non e

Dabbler 1.0

$99/ now

free/NA

smart Install

408/688-8800

800/297-2665

Painter 2.0b

$399/now

s15/$79

smart install

800/843-7263

Fractal Design

Painter X2 1.0

$149/ now

$15/NA

smart install

Frame Technology

FrameMaker 4.0 .2

$895/by M ay

TBA/TBA

TBA

408/4 33-3311

Graphisoft

ArchiCAD 4 .5

$4450/April

free/free

PowerPC

415/737 -8665

none

Great Plains Software

Dynamics 2.0

' !by July

'I'

TBA

7011281 -0550

800/456-0025

Gryphon Software

Morph 2.5

$239/now

NA '/TBA

fat binary

619/536-8815

800/795-0981

Hi Resolution

M acVisa

TBA/now

NA '/ NA

TBA

none

800/455-0888

HSC Software

Kai's Power Tools

S199/by July

S79/S79

fat binary

310/392-8441

none

Insignia Solutions

SoftWindows 1.0

$499/now

NA ' / TBA

PowerPC

415/694- 7600

800/848-7677

lntcrcon

TCP/Connec t ii 1.2.1

5495 / now

TBA/ TBA

PowerPC

703/709-5500

800/468-3726

ltedo Software

lsoDraw 3.0

$2700/now

$100/5100

PowerPC

3 13/995-2200

none
800/766-6615

Knowledge Revolution

Workin g Model 1.0

$995/by Oct.

TBA/TBA

PowerPC

415/553-8153

Language Engineering

LogoVista E to J

$1995/now

TBA/TBA

smart Install

617/489-4000

none

Light Software

Light Compress 1.0

$49/May

NA/NA

fat binary

408/ 253- 4277

none

Light Paint 1.0

$79/May

NA/NA

fat binary

Light Protect 1.0

$49/May

NA/ NA

fat binary

Macromedia

MacroModel 1.5

51495 / now

$49/ $149

smart install

415/252-2000

800/288· 4 797

Microsoft

Excel 5.0

$495/by July

free/S129

smart install

none

800/4 26-9400

Word 6.0

$495/by July

free / $129

smart install

HiQ2 .1

$695 /April

NA ' /$ 195

smart install '

5121794 -0100

800/433-3488

LabView 3.1

$1995 / by Oct .

$495 / $495

smart install

LANsurveyor 1.1

$395 /April

NA '/free

smart install'

51 0/ 283-0771

800/334·6~66

NetMind er Ethern et 3.1

$695/by M ay

NA '/ $50

smart install
800/922 -2993

National Instruments

Neon Software

Nisus Software

Writer4.0

TBA/ by May

TBA/ TBA

TBA

619/481-1477

Now Software

Contact 1.1

$99 / now

$1 9 .95 / $19 .95

smart Install

503/274-2800

none

Quark

QuarkXPress 3.3

5995 /by July

$195/ $195

PowerPC

303/344-3491

800/788·7835

Ray Dream

Ray Dream Designer 3.0

$349/ by July

S&H/ $99

TBA

415/960-0768

none

Specular International

lnfini- D 2.6

$695/now

TBA/TBA

smart install

413/253 -31 00

none

VldeoFusion

QuickFli x 1.1

$1 49/by June

S&H / S&H

fat binary

419/891 -1090

800/638-1090

VideoFusion 1.6

$649/by June

529 / $29

fat binary

Wolfram Research

Mathematica 2.3

TBA/by May

TBA/TBA

TBA

2171398-0700

800/441-6284

WordPerfect

WordPerfect 3.0

$495 / now

$24 .95/$59 .95

fat binary

801 / 22 5-5000

800/451-5151

Zedcor

FutureBasic

$299/by Jan.

TBA/TBA

PowerPC

602/B81 · 8101

800/482 -4567

TBA = to be announced; NA = not applicab le; S&H = cost of shipping and ha ndling, usually less than 525.

' Smart mstall allows installa tion of 680XO or PowerPC versions from

one set of insli!.11 disks; fat binary lets the program work on both 680XO and PowerPC Macs; PowerPC means that the PowerPC version is packaged separately from U1e 680XO ver­
sion.

' Also supp orts inslilllation of a fat binary for use in both 680XO and PowerPC Macs.

are ava ilable free fro m online services or for 510 from Adobe.

4

1

Adobe will provide native PowerPC versions of its Photoshop filters in March; they

PowerPC version is a revision to the previous 680XO version.

~ Varies

by module.


not ready to announce PowerPC plans, but it’s safe to assume that popular business and graphics programs will have a PowerPC version at some point. The table also lists expected upgrade prices. It may be surprising that major Mac programs like Microsoft Word and Excel, Adobe Photoshop, and Claris FileMaker Pro won’t be ready soon after the Power Macs begin shipping, while smaller players like WordPerfect, Fractal Design Painter, Frame Technology FrameMaker, and Wolfram Research Mathematica will be available.

For major applications, developers give two primary reasons. One is that the programs are massive, and developers can’t change or port them quickly. Thus, Microsoft and Adobe decided to wait until they release new versions of their programs to port the code to PowerPC. Developers also typically try to use the same core set of code for cross-platform applications, and the release schedules for such programs are usually independent of actions by any one hardware company.

Smaller Mac developers are often more flexible and seek ways of breaking into markets dominated by the larger developers. Thus, WordPerfect saw the opportunity to make inroads into the Word-dominated word processing market by offering a PowerPC version of WordPerfect 3.0 before Microsoft releases Word 6.0 for PowerPC. The customers of a second type of developer—like Frame or Wolfram—have specialized needs for which speedup is important, and so they demand improvement more frequently than, say, a spreadsheet user.

**When to Buy In**

To decide when to get a Power Mac, look at the performance of your current software under emulation (see “Native PowerPC Software Performance”) and then check the planned availability dates for the PowerPC versions. When your critical software is available in native form—and assuming the slowdown on your other 680X0 software is acceptable—you’ll know it’s time to jump up to the Power Macs.

For graphic artists or serious desktop publishers, a Power Macintosh upgrade makes sense this fall, since most major applications should be ported by then. Computer-aided designers and technical publishers will not have to wait that long, since much of the software that they rely on will be available in PowerPC versions this spring.

If your work is done mainly in business programs like Excel, Word, Aldus Persuasion, or FileMaker Pro, there are fewer benefits if you upgrade soon, especially if you already use an 040 Mac.

**The Best Is Yet to Come**

As developers buy their own Power Macs and as the development tools they need to write PowerPC software become widely available, expect to see even more PowerPC programs. At some point (probably in the next 18 months), developers will start orphaning the 680X0-based Macs and offering unique PowerPC features that are not feasible on earlier Macs or PCs. Expert assistance while you work, 3-D interfaces, graphical status indicators, videoconferencing, integrated fax and voice mail, and dynamic data exchange and cooperation among multiple active programs—these are what the PowerPC will let Mac developers offer to all business-level customers, not just the highest-end users.

Speed is fine, but that’s just half the battle. Using speed effectively to make work easier and better suited to your needs and style—that’s the ultimate promise of Power Mac software. Computer companies have long claimed that such software was just around the corner. Today, it actually seems to be in sight.

**GALEN GRUMAN** is a Macworld senior associate editor who focuses on PowerPC. He also edits Macworld’s PowerPC News section.

Research assistance by MATTHEW HAWN.
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Circle 163 on reader service card
PowerPC Upgrade Strategies

Longing to cash in on Power Macintosh speed, but find yourself a little short on the green stuff to make it a reality? Three hardware upgrade options that should be available at the same time as the new Power Macs will enable many older Macs with 68040 CPUs (as well as the 030-based II/i and IIvx) to use PowerPC 601 CPUs and run Power Mac software.

A replacement motherboard from Apple works in all older Macs that have the same cases as the new Power Macs. The other two upgrade options, one from Apple and one that should be available from DayStar Digital, will work in Macs that have a 68040 CPU and an 040 PDS slot; the DayStar upgrade also requires a NuBus slot. Other upgrades are in the works. To see at a glance if your Mac can use one of the upgrades available now and to check for upgrade features, see the table “Power Mac Upgrade Essentials.”

An older Mac whose case is similar to one of the Power Mac models (the Quadra and Centris 610, 650, 660AV, 800, and 840AV models, as well as the II/i, IIvx, and Performa 600) can become a true Power Mac for about half the cost of the new computer—from about $1000 to $2000, depending on the Power Mac model. Any of those older Macs can acquire a Power Mac AV motherboard (at a higher cost, which had not been set at press time) with the audio and video capabilities of a Quadra 840AV. An Apple dealer performs the transformation by replacing the Mac’s motherboard and back panel. You also get all the software...
that comes with a Power Mac computer, including System 7.1.2, QuickTime 1.6.2, Macintosh PC Exchange, AppleScript, and Express Modem.

This motherboard upgrade makes economic sense if you need a full-featured Power Mac but want to protect your investment in a high-quality hard drive, and you need a CD-ROM drive and keyboard.

If you're looking to save even more money, consider Apple's user-installed Power Macintosh Upgrade Card, which should sell for about $700. Such cards will work in all Quadra and Centris models with a PDS slot (except the Quadra 605, which uses an LC III-style PDS slot). Working in conjunction with the host Mac's motherboard, the upgrade card makes it possible to run PowerPC native software on the older Macs.

While Apple's Power Mac upgrade card appeals to people on a tight budget, it also suits those who need a reversible upgrade, ensuring full 68040 performance and compatibility with 680X0 software (including the driver and ROM software of NuBus cards). While the upgrade card can run 680X0 applications in emulation, this can cause a significant slowdown in performance. Alternately, many users will take advantage of the option of shutting off the upgrade card (without removing it), restarting the Mac, and enjoying true—and faster—68040 on the motherboard for running 680X0 applications.

The upgrade card comes with its costs, however; you lose the option of Power Mac AV features, including 16-bit sound, speech recognition, and GeoPort—critical elements of future Mac computing. If you're torn about which upgrade fits your needs, read on.

**Motherboard Upgrades**

The replacement motherboard is identical to the motherboard in the equivalent Power Mac, from the CPU to the ports (as described in the feature “The Power Macintosh Arrives,” in this issue). The model number (6100/60, 7100/66, or 8100/80) reveals the speed at which the PowerPC 601 CPU operates: 60MHz, 66MHz, or 80MHz. The Power Mac motherboard has 8MB of RAM soldered to it, a 4MB bonus for 610 and 660AV upgrades. Also, all the RAM SIMMs from a Centris or Quadra (but not a IIvx, IIvx, or Performa 600) can be moved to a Power Mac motherboard.

The 6100 has one slot for internal expansion, and with an adapter it accepts either a PDS card or a 7-inch NuBus card. The 7100 and 8100 accept one PDS card and three NuBus cards. PDS cards made for a 68030 or 68040 PDS slot do not work in the PowerPC 601 PDS slot, but most NuBus cards worked in Macworld Lab trials with prototype Power Macs. The few problems—notably video acceleration—appear to be software related. (For NuBus compatibility details, see “The Power Macintosh Arrives.”)

Each Power Mac motherboard has a complete set of Power Mac ports and direct memory access (DMA) from the EtherTalk, sound, SCSI, and serial ports. These ports provide access to many audio-visual functions once unique to the 660AV and 840AV Macs—16-bit stereo audio, speech recognition, and GeoPort telephony. The AV display port drives an AudioVision display, or with an adapter cable, any ordinary 12- to 16-inch Mac monitor or 13-inch VGA monitor. The 6100 upgrade includes that monitor adapter cable; the 7100 and 8100 upgrades include a VRAM video card whose standard video port attaches directly to a 12- to 21-inch Mac monitor or, with an adapter, 13-inch VGA monitor. All three Power Mac upgrade packages are also available with TV-video input and output ports on a plug-in card, the Power Mac AV card (price not available at press time). Besides TV video ports, the AV card has a standard Mac video port just like the VRAM video card it replaces on the 7100 and 8100. By using both the motherboard's AV display port and the AV or VRAM card's Mac video port you can connect two monitors simultaneously.

The new back panel accommodates the ports on the AV card or VRAM card as well as the ports on the Power Mac motherboard. A separate internal CD-ROM upgrade includes a replacement front panel and the new tray-loading CD-ROM drive (price not available at press time). To take full advantage of PowerPC performance, plan on replacing your internal hard drive if it's smaller than 230MB (160MB for a 6100/60).

Apple estimates that street prices will be about $1000 to $2000 for motherboard upgrades, with the 6100/60 at the low end of the range, the 7100/66 in the middle, and the 8100/80 at the high end. At press time, Apple had no price estimates on the AV motherboard upgrades.

**Power Macintosh Upgrade Card**

The PowerPC 601 CPU on the Power Macintosh Upgrade Card runs at twice the speed of the 68040 on the motherboard using a technique called clock doubling. Thus the PowerPC 601 runs at 50MHz on a Centris 650 or a Quadra 610, 700, or 900; and at 66MHz on a Quadra 650, 800, or 950. The card runs at 40MHz on a Centris 610, which calls into question the value of the Centris 610 card upgrade; the 610 requires a PDS
Power Mac Upgrade Essentials

<table>
<thead>
<tr>
<th>Company, Phone</th>
<th>Product</th>
<th>Estimated Street Price</th>
<th>Macs That Can Use Upgrade</th>
<th>Speed</th>
<th>On-Board RAM</th>
<th>Cache</th>
<th>Includes Power Mac Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Computer, 408/996-1010</td>
<td>6100/60</td>
<td>$1000</td>
<td>Q660AV, C610, Q610</td>
<td>60MHz</td>
<td>8MB-72MB</td>
<td>optional</td>
<td>yes</td>
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<tr>
<td></td>
<td>6100/60AV</td>
<td></td>
<td>Q660AV, C610, Q610</td>
<td>60MHz</td>
<td>8MB-72MB</td>
<td>optional</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>7100/66</td>
<td>$1500</td>
<td>C650, Q650, Ilvi, Ilvy, P600</td>
<td>66MHz</td>
<td>8MB-136MB</td>
<td>optional</td>
<td>yes</td>
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<tr>
<td></td>
<td>7100/66AV</td>
<td></td>
<td>C650, Q650, Ilvi, Ilvy, P600</td>
<td>66MHz</td>
<td>8MB-136MB</td>
<td>optional</td>
<td>yes</td>
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<tr>
<td></td>
<td>8100/80</td>
<td>$2000</td>
<td>Q840AV, Q800</td>
<td>80MHz</td>
<td>8MB-264MB</td>
<td>256K</td>
<td>yes</td>
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<tr>
<td></td>
<td>8100/80AV</td>
<td></td>
<td>Q840AV, Q800</td>
<td>80MHz</td>
<td>8MB-264MB</td>
<td>256K</td>
<td>yes</td>
</tr>
</tbody>
</table>

Upgrade Cards

<table>
<thead>
<tr>
<th>Company, Phone</th>
<th>Product</th>
<th>Estimated Street Price</th>
<th>Macs That Can Use Upgrade</th>
<th>Speed</th>
<th>On-Board RAM</th>
<th>Cache</th>
<th>Includes Power Mac Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Computer, 408/996-1010</td>
<td>Power Macintosh</td>
<td>$700</td>
<td>Q950, Q900, Q800, Q700, Q700, Q700, Q700, Q700</td>
<td>40MHz, 50MHz, 66MHz</td>
<td>0MB</td>
<td>1MB</td>
<td>no</td>
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<tr>
<td>DayStar Digital, 800/962-2077</td>
<td>PowerPro 601</td>
<td>$1200-$1700</td>
<td>Q950, Q900, Q800, Q700, Q700, Q700, Q700, Q700</td>
<td>66MHz or 80MHz</td>
<td>0MB-128MB</td>
<td>undetermined</td>
<td>no</td>
</tr>
</tbody>
</table>

How Fast Does Apple's Upgrade Card Emulate 680X0?

These results reflect the performance of 680X0 software under emulation on a Power Mac. Macworld Lab tested prototype Power Macs, so actual performance may differ slightly. Native PowerPC software should be much faster (see "Power Mac Software," in this issue).

<table>
<thead>
<tr>
<th>SOFTWARE PERFORMANCE</th>
<th>HARDWARE PERFORMANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Floating Point</td>
</tr>
<tr>
<td>Indicates raw processing power, which affects almost all aspects of performance.</td>
<td>Indicates performance for tasks that rely heavily on a math coprocessor (FPU).</td>
</tr>
<tr>
<td>Power Mac 810/60 (1GB drive)</td>
<td>256</td>
</tr>
<tr>
<td>Power Mac 7100/66 (500MB drive)</td>
<td>383</td>
</tr>
<tr>
<td>Power Mac 6100/60 (250MB drive)</td>
<td>380</td>
</tr>
<tr>
<td>Quadra 800/Power Mac upgrade card</td>
<td>334</td>
</tr>
<tr>
<td>Centris 650/Power Mac upgrade card</td>
<td>425</td>
</tr>
<tr>
<td>Quadra 800 (external 230MB drive)</td>
<td>129</td>
</tr>
</tbody>
</table>

TESTING NOTES: The floating-point tests were conducted without Specular International’s Infini-D, since it requires a 680X0 FPU not emulated on a Power Mac. The video tests show performance for typical business programs under 680X0 emulation. According to tests with beta native PowerPC versions of graphics software, a Power Mac's back-panel video should be about 15 percent faster than a comparable Quadra's, while a Power Mac's AV-card video should be about 20 percent slower.

NA = PDS-card video not available for these Macs. *On Power Mac, this is RAM-based video; on other Macs, it is VRAM-based.
software tests (of course, in native 680X0 mode) in about one-third the time it took to run those tests in emulated mode with the upgrade card. The Quadra 800 ran the video tests in about half the time, and the drive tests in slightly more than two-thirds the time it took the same machine using an upgrade card. The message is clear: the upgrade card is not much good in emulating 680X0 software.

In Macworld Lab tests with prerelease, native PowerPC versions of Adobe Photoshop, Aldus PageMaker, Wolfram Research's Mathematica, and Fractal Design Painter, however, the upgrade card did much better. A Centris 650 running the Apple upgrade card (at 50MHz) needed only about one-fifth more time than was required by a 6100/60 for the same tasks—surprisingly fast performance, given the lower speed of the Centris 650 motherboard.

**DayStar PowerPro 601**

A third upgrade option, expected by the time you read this, is DayStar Digital's PowerPro 601 for the Centris 650 and the Quadra 650, 700, 800, 900, and 950. This card should come in two versions—66MHz and 80MHz—and at DayStar's estimated prices of $1200 to $1700, would not be cost-effective for most users. It would appeal, primarily, to a fairly narrow band of users who rely on two kinds of programs simultaneously: native PowerPC versions of high-end graphics and publishing programs, which should be available when or soon after the Power Macs ship, and specialized, high-performance 680X0 programs—say, custom statistical, engineering, or scientific programs—that are unlikely to migrate to native PowerPC versions immediately.

Such users would not buy a Power Mac or a motherboard upgrade, because of the degraded performance with emulated 040 applications. The PowerPro, if it meets DayStar's predictions, could offer the best of both worlds: blazing performance for native PowerPC applications; and no performance hit to 040 applications, which would run off the 040 motherboard (after you restart the Mac).

DayStar anticipates that its PowerPro card will be speedier than Apple's upgrade card because PowerPro cards will run at 66MHz or 80MHz, independent of the host Mac's speed, and can use Quadra-style SIMMs, increasing the total RAM available. The PowerPro will have faster access to its own RAM than it has to RAM on the host motherboard. The PowerPro also has a slot for an extra RAM cache.

The burning question is whether the PowerPro can justify its $500 to $1000 premium with significantly better performance than Apple's upgrade card. Unfortunately, DayStar did not have a prototype ready for Macworld Lab to test.

The PowerPro 601 will come with the software necessary to run native PowerPC and emulated 680X0 applications, including ROM software licensed from Apple. The DayStar upgrade card, like the Apple card, will use the host motherboard's NuBus slots, back-panel ports, built-in video, and RAM.

Other upgrade options should be out later this year. Applied Engineering is negotiating a license for the Power Mac ROM from Apple and plans to make upgrade cards for Macs that have a 68040 CPU and a PDS slot. Apple will provide upgrades for the LC 520, 550, and 575, and the Performa 550, although the company has not said whether the upgrades will be a replacement motherboard or a plug-in card. Apple also plans an upgrade for the Quadra 605, Performa 475 and 476, and the LC 475. DayStar plans to migrate the PowerPro upgrade cards to other color Macs, but has not announced which models it will release first.

**Recommendations**

No matter which Mac you have, you can always sell it and buy a new one. Depending on the price you get for your old Mac, a replacement may cost less than a retrofit. A good reason to keep a Quadra 900 or 950: they have more expansion slots than any Power Mac, even if you fill one with a PowerPC upgrade card.

If you decide not to buy a new Mac, consider these options:

- **Centris and Quadra 610** owners can choose Apple's motherboard upgrade or a Power Mac Upgrade Card. At $1000, a 6100/60 motherboard costs only $300 more than the upgrade card, and its greater performance and functionality are well worth it unless you need to run 680X0 software on a real 68040 CPU. Moreover, the new motherboard increases your total RAM by 4MB—eliminating about $120 of the price differential.

- **Quadra 700, 900, and 950** owners can choose either upgrade card. If top performance when running native PowerPC applications and the ability to run 040 applications in native mode are both vital, and price is no object, consider DayStar's PowerPro 601; but check the most current reviews to make sure they verify DayStar's expectations. If moderate performance is acceptable, save $500 to $1000 and get Apple's upgrade card.

- **Centris 650, Quadra 650, and Quadra 800** owners can choose a motherboard upgrade or either upgrade card based on the advice in the preceding paragraphs. Apple's upgrade card is much cheaper than the motherboard upgrades for these Macs (unlike for the 610), making the upgrade card a worthy choice if you want to spend as little as possible to run native PowerPC software.

- **Ivx, livi, Performa 600, Quadra 660AV, and Quadra 840AV** owners have only one choice, an Apple motherboard upgrade.

An Apple motherboard upgrade turns your old Mac into a full-fledged Power Mac, while Apple's Power Mac Upgrade Card and DayStar's expected PowerPro 601 let you hedge your bets by running PowerPC software on the upgrade card and 680X0 software on your Centris or Quadra motherboard. Either way you get Power Mac performance without buying a new computer.

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LON POOLE is a Macworld contributing editor who regularly covers new Macintosh technology.
This is Bob, the new employee. Whether Bob works at home or is part of your office network, PowerShare software makes it easy for him to collaborate with colleagues—without wasting his energy on lots of complex procedures or training. Plus, PowerShare makes network expansion easy for you. So easy, you can add 200 or 3000 more Babes by simply adding more PowerShare Collaboration Servers.

It takes a lot of effort to physically route paper documents between different departments. With PowerTalk and DigSign software, however, people can now approve things electronically—saving time and money (and, of course, trees).

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PowerTalk, when used with any personal gateway, combines your voice mail, e-mail and faxes into a single universal mailbox. So you can check all your messages in one place (instead of going to the trouble of checking them separately, like you're used to doing).

You can spend your time and energy learning five different communications programs. Or you can use PowerTalk, which lets you send faxes, e-mail or any other kind of message, all with one simple procedure—right from the program you're already working in.
In a world of immovable deadlines and shrinking bottom lines, you've got better ways to spend your energy than fiddling with passwords, enclosures and multiple interfaces. Recognizing this, the engineers at Apple created two of the most helpful networking innovations in the history of personal computing: PowerTalk and PowerShare Collaboration Servers software. With these improvements, your Macintosh now automatically does many of the tasks you used to do manually — so you can focus on working with your colleagues, instead of focusing on getting your computers to connect. PowerTalk is the first piece of software designed to make collaboration easier for individual users. Instead of bothering with separate voice mails, faxes and e-mails, all communications now reside in a single mailbox. And all messages are sent and received with the mere click of a mouse — no separate programs, no separate passwords. Plus, a catalog feature even lets people keep detailed information on their colleagues: numbers, addresses and instructions on how to send them information. PowerShare makes setting up a network equally simple. The software is easy to install and easy to maintain. Keeping track of people is easy, and adding new people is easy. To see how PowerTalk and PowerShare can help your company, call 800-732-3131, ext. 200, for the name of the authorized dealer nearest you. And discover the power that takes the work out of working together. The power of Macintosh. The power to be your best.
VivaPress Combines DTP and Drawing

BEEN DREAMING OF AN APPLICATION that combines the features of QuarkXPress, Aldus PageMaker, Adobe Illustrator, and Aldus FreeHand in a single package? VivaPress Professional could be just what you’ve been waiting for.

In VivaPress Professional, text and picture boxes can be any shape, including polygons and editable Bézier curves (as in Adobe Illustrator 5.0, any item can be used as a snap-to guide). The program also promises robust typographic controls (word spacing, letter-spacing, and hyphenation), word processing (including search-and-replace and a spelling checker), index and table-of-contents generation, and support for documents up to 2000 pages and spot- and process-color separations.

VivaPress Professional’s Alias items represent a revolutionary approach to master pages. You can create multiple aliases of any item, and when you change the original, all the aliases change. There are text styles (for both paragraphs and characters) and object styles (for text and picture boxes) as well. In addition to rotating, mirroring, grouping, and aligning, you can also lock items in a flexible manner, which lets you control how individual users can modify any item. The program also allows you to import and edit Aldus FreeHand documents.

VivaPress Professional was developed by TechWare Computer GmbH, a German software publisher. A U.S. version of the program will cost $895 and should be available in April. TechWare’s VivaPress ($299) includes many of the same features as VivaPress Professional but does not offer text mirroring, style sheets, guidelines and objects, production statistics, and long-document support. It will be available in May. TechWare’s U.S. distributor is Interpress/MPG, 212/245-2700.—STEVE ROTH

Kodak’s Portfolio for Multimedia

WITH EASTMAN KODAK’S PHOTO CD Portfolio format and software—previously announced but now available—illustrators, photographers, business executives, and others can create a multimedia portfolio or presentation on a Mac and have it published on compact disc within a few days.

A photographer, for instance, could produce on the Mac a digital portfolio of his or her work with text and vocal annotations, copy the resulting Portfolio script onto a SyQuest cartridge or other removable media, and hand over the cartridge to a photofinisher or print-output bureau that offers Kodak Portfolio services.

The service bureau can then master the artist’s presentation onto compact disc and produce anywhere from one to several hundred copies of the disc. A Portfolio Photo CD can be played back on a Mac’s or Windows-based PC’s CD-ROM drive (with Kodak’s Photo CD Player software utility), or on a 3DO, CD-I, or other Photo CD-compatible player connected to a television monitor. A Portfolio CD supports up to 700
Tektronix Sharpens Thermal Color

Thermal-wax color output just got sharper, thanks to two new Tektronix printers that are reportedly the first thermal-wax devices to offer 600-by-300-dpi color output.

Tektronix is now shipping the Phaser 220i and Phaser 220e, both of which offer PostScript Level 2, plain-paper, letter-size output at 2 pages per minute. The printers employ the TekColor SuperCell 600 technology, which improves image and text quality by doubling the number of dots printed on a page in one direction. The two new Phaser models also include dithering algorithms for generating deeper colors and smoother color transitions, as well as tables for simulating SWOP (Specifications for Web Offset Publications) press colors.

Both printers come with parallel, serial, and AppleTalk ports. The 220i also offers support for Novell NetWare and Apple EtherTalk with a $695 Ethernet option (TCP/IP support is an additional option for $295). All network ports are simultaneously active. In addition, the 220i and 220e support Hewlett-Packard's Graphics Language (HPGL) and Printer Control Language (PCL5).

The Phaser 220i ($5995) comes with 10MB of memory (expandable to 14MB), 39 Adobe Type 1 fonts, a SCSI port for a hard drive, and a 24MHz AMD 29000 RISC processor. The 220e ($3995) ships with 8MB of memory (not expandable), 17 Adobe Type 1 fonts, and a 16MHz AMD 29000 RISC chip. Tektronix, 503/682-7377, 800/242-2424, ext. 36.—J.A.M.

Real-Time Imaging Card

The strategy Imagician is billed as a high-speed, object-oriented imaging system for graphics and prepress professionals who must routinely manipulate a high volume of images quickly and effortlessly. Developed by MacEurope Information Systems of Great Britain, the Imagician consists of a NuBus card with 16MB of on-board memory and an application program called Imagician Workshop that runs in 500K, although 1MB is recommended. A Mac with 24-bit color and a minimum of 4MB of memory is required. The Imagician complements paint and image-editing software such as Adobe Photoshop and Fractal Design Painter; it enables users to perform—in real time—a wide range of time-intensive operations, including rotate, scale, clone, color balance, sharpen, bend, mask, and filter.

Rather than improve performance by substituting a proxy image on which to perform manipulations, as does HSC Software's Live Picture program, Working Software's Imagician works on the actual image through a sampling process that's transparent to the user. The first version of the Imagician, which is expected to be available by the time you read this, will handle TIFF and CMYK files up to 16MB. The next version (a free upgrade, due in March) will use MacEurope's proprietary object-oriented architecture (Pixel Placement Technology) to boost that limit to 64MB and will add support for EPS and Scitex CT formats. It will also include a batch-processing mode.


IN BRIEF

- Dabbling and Drawing Fractal Design's new 16-bit, bit-mapped natural-media program, Dabbler ($99), is aimed at novices of drawing and painting. The program's simple interface includes brushes and 20 paper effects. 408/688-8800, 800/647-7443.
- Big Color Output LaserMaster's new BigColor workstation consists of a Mac Quadra or a 486-based PC; a customized selection of software and hardware; and LaserMaster's DisplayMaker large-format, ink-jet color printer. DisplayMaker can produce photographic-quality color output up to 36 inches wide and 18 feet long. Workstations begin at $25,000, 612/944-9330, 800/688-8342.
- Typosphere Update Pixar's Typosphere 2.0 ($299; upgrade $99) converts fonts and Adobe Illustrator files into 3-D objects. The new version includes two new build methods: one warps text onto spheres or flags, and the other creates neon tubes. You can edit bevels, create custom Looks from PICT and TIFF files, and perforate objects. Version 2.0 has a controllable animation time line and a hierarchical score window. 510/236-4000, 800/888-9856.
Can HP give you affordable color PostScript

You’re looking for a place for color in your communications? To take a look at the front of your enterprise. Color is the spider's web of the most successful correspondence of those in your field.

Software Development Update

PBL

If you thought of color as a conservative way to communicate, you need to take a look at the front of your enterprise. Color is the spider's web of the most successful correspondence of those in your field.
PostScript software is now available for three HP DeskWriter printers.

Take a good look, because you've probably never seen PostScript® color printing this affordable before. But here it is, right before your very eyes.

Hewlett-Packard now offers PostScript software for the HP DeskWriter 520, 550C and 560C printers, providing Mac users with true Adobe® PostScript language capability and color output like you've never seen before.

For a list price of under $250, PostScript Software for the HP DeskWriter Family gives you support for black & white printing at 600 x 300-dpi resolution. Along with 35 standard PostScript fonts, support for Adobe Type 1 and TrueType® fonts, PostScript language file portability and background printing. All that on a printer that uses HP's own inkjet technology, works with your software, and comes with a three-year warranty, the longest in the industry.

For a closer look at a truly affordable way to get true Adobe PostScript printing, look in your local Yellow Pages for the name of the HP authorized dealer nearest you.

DeskJet Printers
Make it happen.
Expert Graphics

by Cathy Abes

Artist: Stuart Bradford, a San Francisco-based illustrator, designer, and photographer, has been creating Macintosh graphics since 1991. His illustrations have appeared in such magazines as Success and Publish.

How It Was Done: For the illustration that opens our feature article on PowerPC Macintosh applications, Bradford began by creating the background. First he scanned a crumpled piece of graph paper to create a texture. After drawing a checkerboard pattern in Illustrator, he imported that file into Photoshop and copied it into an alpha channel of the scanned texture file, then loaded the selection into the RGB channel.

After applying the Andromeda Series 2 3D Filter (a third-party Photoshop plug-in) to give the image perspective, he changed to RGB mode and inverted the file to change the background color from yellow to blue.

The rocket began as a pencil sketch, which Bradford scanned, saved in EPS format, and opened in Illustrator. There he used it as a template for drawing a partial outline, from which he created a three-dimensional object in Sculpt 3D. After mapping the texture onto the object's surface, he imported it into Photoshop. Because Sculpt 3D lets you make a mask file of the 3-D objects it creates, Bradford was able to bring that mask into an alpha channel in Photoshop.

Next, he focused on the fins of the rocket, which he had previously drawn in Illustrator. After pasting them into an alpha channel in Photoshop, he positioned them so they would be on either side of the rocket cylinder. Saving the fins as a separate mask enabled Bradford to apply the surface texture to them.

To create the light-to-dark gradation on the rocket, Bradford used the blend tool's Darken mode. Then he loaded the selection into the RGB channel, which made a graduated mask of the whole rocket with the back part of the rocket selected. Finally, he used the Levels command to darken the selection.

THE TOOLS

Hardware: Mac Quadra 800 with 56MB of RAM and a 240MB internal hard drive; RasterOps 24XLI color card; Seiko Trinitron 19" color monitor; 525MB external hard drive; Mirror CD-ROM drive; 44MB SyQuest removable-cartridge drive; Wacom 12-inch graphics tablet; Mirror 600 color scanner.

Software: Adobe Photoshop 2.5.1; Adobe Illustrator 3.2; Sculpt 3D 3.11; Andromeda Series 2 3D Filter for Photoshop; Adobe Dimensions 1.0; PhotoDisc Volume III, Backgrounds and Textures; CADD-Mover 3.4.
3 The scanned pencil sketch of the rocket (left) Bradford used as a template for drawing a partial outline (middle), which he brought into Sculpt 3D via Kandu Software's CAD-Mover. In Sculpt 3D, he revolved the outline to create a three-dimensional rocket cylinder and then mapped the texture onto it (right).

4 Bradford pasted the mask of the 3-D rocket into a Photoshop alpha channel (top left). After pasting the surface texture into the fins selection (which was loaded into RGB from a separate alpha channel), he loaded the rocket selection into the fins alpha channel to combine the two masks (bottom left). The completed rocket is shown on the right.

5 Bradford dragged over the alpha channel with the blend tool in Darken mode to make the front of the rocket black, the middle gray, and the tail white (above). After loading the selection into the RGB channel, he adjusted the rocket's color levels to darken the back of the rocket (left).
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The Mirror Color Scanners

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The Mirror Coolscan is the same size as a standard hard drive and includes everything you need to start scanning right away. The Coolscan application and Photoshop Plug-in module incorporate sophisticated image controls for top notch results every time.

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Are You Breaking the
You have an assignment to create a conceptual illustration for a national magazine, and the deadline is imminent. After working for hours on your Mac trying to get the desired effect, you realize what your image needs is a touch of blue sky. So you pick up a recent coffee-table book of aerial photography, find a photo with blue sky in it, scan the photo into an image-editing program, import a portion of the sky into your drawing program, and use it as a texture in your illustration.

It's an easy solution; your image looks great, and you've finished the assignment on schedule. There's only one problem: you have just broken the law. According to current copyright statutes, your appropriation of the sky is a derivative use of the original photograph. Unless you received permission from the copyright owner for such use, you've violated the owner's copyright. In this case—as in practically any situation involving computers and copyrighted materials—the situation is not black or white. In fact, there are several mitigating shades of gray to consider. For example, in the original photo, how distinctive, or representative of the originator's work, is the sky? How important is the sky to the original image—is it simply part of the background, or is it the focal point? How much of the sky did you use for your image? Did you change the color or otherwise alter the sky? And perhaps most important, how likely is it that your use of the sky has damaged the photographer's ability to sell his or her original work again?

With the costs of computers and scanners dropping on what seems like a daily basis, and with the plethora of digital images available from online services, CD-ROMs, and electronic documents, it's easier than ever before to "borrow" some blue sky here, some green grass there—or to copy an entire image. The technology has advanced so rapidly that the boundaries between right and wrong, between inspiration and infringement, are becoming increasingly blurred.

To sort through some of the many gray areas of copyright law, Macworld interviewed a variety of Mac graphics professionals about their copyright concerns. What follows are some of their most frequently asked questions, along with responses from attorneys and experts who specialize in the areas of publishing, graphics, computers, and copyright protection. Though we've highlighted some situations visual artists have been in, it's important to remember that copyright law is extremely technical, and its application can vary greatly from one situation to another. In other words, better play it safe and get permission—paying a licensing fee is almost always cheaper than hiring an attorney.

Q. In the example already mentioned, how likely is it that the artist who scanned a bit of blue sky would be challenged by the copyright owner?

A. In this particular case, it's probably unlikely—with emphasis on probably. Borrowing a small portion of someone else's image and using it in your own represents what is "the ultimate gray area" in copyright law, says Tom Smedinghoff, an attorney specializing in computer and copyright issues for the Chicago law firm McBride, Baker, & Coles.

"When you scan that photo [from the aerial-photography book], you are, in effect, infringing the copyright of that image," Smedinghoff explains. "Then, when you lift a portion of the photo, you're adapting or modifying that image without permission. That constitutes another act of infringement, because the copyright owner has the sole right to adapt or modify his or her own work. Once you've incorporated the sky, or whatever, into a new image, every time a copy of that image is made, the original owner's copyright is infringed again."

But if the portion of the photo you've appropriated is minimal and insignificant to the original image as a whole, then "maybe what you've done doesn't really rise to the level of infringement," Smedinghoff adds. Again, that's a big if: current copyright law does not offer guidelines regarding how much of a work can be copied without infringing (see the fair-use section in "Copyright Basics").

Recent decisions in the popular-music industry offer some guidelines for artists and desktop publishers, Smedinghoff says. In a 1991 lawsuit, singer Gilbert O'Sullivan sued rap performer Biz Markie and eight other defendants for sampling, or includ-
COPYRIGHT BASICS

- **What copyright is** A copyright is a protection under Title 17 of the U.S. Code offered to the authors of literary, dramatic, musical, artistic, and other intellectual properties, whether published or unpublished.
  
  A copyright protects the particular manner in which a work's contents and ideas are expressed. You cannot copyright ideas, facts, titles, short phrases, slogans, or names, among other things.

- **Trademarks** Trademark and unfair competition laws allow you to protect words, names, short phrases, symbols, and other devices that identify and distinguish goods or services. The Apple Computer logo, for example, is protected by trademark, not copyright.

- **What copyright does** A copyright gives the author limited exclusive rights to reproduce the work, create derivative works based on the original, distribute copies of the work, and perform or display the work in public.

- **Work for hire** The author usually owns the copyright automatically, unless he or she prepared the work as a work for hire, in which case the artist's employer presumably owns the copyright. The authors of a collaborative work own its copyright jointly.

- **Fair use** The fair-use doctrine allows for copying, without permission, for such purposes as criticism, commentary, news reporting, teaching, scholarship, and research. There are four main factors that determine fair use: (1) the purpose of the use (whether the copying is intended for commercial or nonprofit purposes); (2) the nature of the original (whether it was published or unpublished is one consideration here); (3) the amount and importance of the portion used in relation to the original work as a whole; and (4) the impact of the use on the original work's commercial value.

- **Copyright duration** Copyrights are not eternal. When a copyright expires, the work falls into the public domain, and anyone is free to use it without permission. Any work created on or after January 1, 1978, is automatically protected by copyright from the moment it was created. For these works, the copyright expires 50 years after the author's death. Works created before but not published or registered until after January 1, 1978, receive the same protection as works created on or after that date. Works created and published or registered before January 1, 1978, and that were still under copyright protection on that date, are now copyrighted for a total of 75 years from the date they were created, published, or registered.

  To register a work, you must fill out an application form, pay $20 per application, and send one or more copies of the work to the copyright office. For more information, write to The Copyright Office, Information and Publication Section LM-455, Library of Congress, Washington, D.C. 20559, or call 202/707-3000.

Here are a few examples of works that are copyrighted:

- A copyright protects the particular manner in which a work's contents and ideas are expressed. You cannot copyright ideas, facts, titles, short phrases, slogans, or names, among other things.

- Work for hire: The author usually owns the copyright automatically, unless he or she prepared the work as a work for hire, in which case the artist's employer presumably owns the copyright. The authors of a collaborative work own its copyright jointly.

- Fair use: The fair-use doctrine allows for copying, without permission, for such purposes as criticism, commentary, news reporting, teaching, scholarship, and research. There are four main factors that determine fair use: (1) the purpose of the use (whether the copying is intended for commercial or nonprofit purposes); (2) the nature of the original (whether it was published or unpublished is one consideration here); (3) the amount and importance of the portion used in relation to the original work as a whole; and (4) the impact of the use on the original work's commercial value.

- Copyright duration: Copyrights are not eternal. When a copyright expires, the work falls into the public domain, and anyone is free to use it without permission. Any work created on or after January 1, 1978, is automatically protected by copyright from the moment it was created. For these works, the copyright expires 50 years after the author's death. Works created before but not published or registered until after January 1, 1978, receive the same protection as works created on or after that date. Works created and published or registered before January 1, 1978, and that were still under copyright protection on that date, are now copyrighted for a total of 75 years from the date they were created, published, or registered.

To register a work, you must fill out an application form, pay $20 per application, and send one or more copies of the work to the copyright office. For more information, write to The Copyright Office, Information and Publication Section LM-455, Library of Congress, Washington, D.C. 20559, or call 202/707-3000.
paintings other works of art, even without getting permission? 

Also, works published before March 1, 1989, were required to carry a copyright notice in order to be protected, says Bernard Burk, Macworld's intellectual property attorney and a partner in the San Francisco firm Howard, Rice et al. Notice requirements were particularly stringent prior to 1978, he adds. Therefore, if the 1930s and 1940s magazines did not carry a proper copyright notice, Burk says, then they have lost their right to protection.

Depending on how an image from an old magazine is used, the likelihood that someone would recognize the original work and contest its reuse today is probably low, according to Bunnin. “Someone would have to see the new image and remember the magazine it originally appeared in,” Bunnin says. “Then there’s the question of damages—what are those original images really worth now? The answer is probably not much. Even if someone does challenge your use, unless it’s a recognizable, keystone image you’ve used, the odds are you would end up paying only a permissions fee.”

Q. Do you need permission to publish photos of famous paintings or other works of art, even if, because of their age, they’re in the public domain?

A. Yes, though it’s not because of copyright. The world’s great works of art are generally owned by museums or collectors, and under ordinary private-property laws, everyone has the right to restrict or grant access to their possessions, says Burk. For instance, if you live in New York and you’d like to snap a photo of one of Monet’s water lily paintings for your presentation, you must ask the Museum of Modern Art, which owns the paintings, for permission to bring in your camera to take the picture. If the museum doesn’t agree, you’d need to obtain a photo or transparency of the water lilies from the museum or from a stock-photo agency. That photo is most likely copyrighted, and you’d need to pay a licensing fee for its use.

Q. Is it OK to copy images from foreign publications without getting permission?

A. Definitely not. The United States is a member of several international copyright conventions, such as the Berne Convention and the Universal Copyright Convention. Under these treaties, American copyright laws protect, within the United States, publications and works produced in any foreign countries that are members of these conventions (most industrialized countries are). This means that a copy of British Vogue enjoys the same copyright protections in the United States as the American version of Vogue; conversely, American Vogue is protected in Britain by British copyright laws.
HOW TO AVOID COPYRIGHT CONUNDRUMS

1. **Get permission.** This is often easier said than done, of course—especially when you don’t know how to reach the copyright owner or don’t have an attorney who can help you. In those cases, you can contact rights and permissions agencies. BZ/Rights & Permissions (212/580-0615, fax 212/769-9224) charges $195 for the first hour, $125 per subsequent hour, and will help you negotiate rights as well. Thomson & Thomson (202/835-0240, 800/356-8630) performs searches only; flat-fee rates are $60 and up, and rush services are available.


2. **Buy royalty-free stock photos, background textures, and clip art.** There are many collections of high-resolution photos and other images available on CD-ROM (floppies, updated to 1993) and digitally. Make sure to read the licensing agreements before you buy, though—royalty-free doesn’t always apply to every situation. Contact Educorp (619/536-9999, 800/843-9497) for a catalog of CD titles.

3. **Create your own stock-image library.** The next time you need a photographic image as a source for your illustration, take the picture yourself with a 35mm camera. Using Eastman Kodak’s Photo CD format, you can easily and inexpensively amass your own collection of stock images. Contact Kodak, 716/724-4000 or 800/242-2424.

4. **Educate yourself.** Contact the Copyright Office for its printed information, which is, for the most part, easy to read and understand (see “Copyright Basics” for the address). The Graphic Artists Guild (212/463-7730) publishes Graphic Artists Guild Handbook: Pricing and Ethical Guidelines ($24.95; 1991), which contains information on copyrights. Another popular resource, the Legal Guide for the Visual Artist ($18.95; 1989; Allworth Press, 212/777-8395, 800/247-6553), is currently in its second edition; a third edition is due in September. Prentice Hall Law & Business (201/894-8260, 800/447-1717; fax 201/894-0074) offers binder-format publications that can be easily updated: The Publishing Law Handbook: Second Edition ($180; updated to 1993) and Multimedia: Law & Practice ($125; 1993) both offer extensive copyright information.

5. **Join a professional organization.** Many organizations work to educate their members about copyright law and can be invaluable in helping them protect their work. Among those organizations active in pushing for better copyright protection are the Graphic Artists Guild and the American Society of Media Photographers (212/889-9144).

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**What’s Fair**

Cartoonist Gary Hallgren created this illustration for an *Entertainment Weekly* news article, which reported on the Fox network’s successful bid to win broadcast rights to the National Football Conference away from CBS Sports.

To illustrate the story, Hallgren drew direct imitations of cartoon characters Lisa Simpson and Charlie Brown. According to Hallgren and *Entertainment Weekly* representatives, the characters’ appearance in this illustration is a fair use, as the cartoon comments upon a news report, and the characters aren’t being used to sell a commercial product.

---

**Q.** How do you find out who owns the rights to an image if it's not apparent?

**A.** There are companies that will search for the copyright owner of a particular work for a fee. Thomson & Thomson in Washington, D.C., and BZ/Rights & Permissions in New York are two examples (the latter will also negotiate usage rights on your behalf; see “How to Avoid Copyright Conundrums” for rates and contact information). You can also ask the U.S. Copyright Office in Washington, D.C., to perform a search, but don’t expect lightning-fast results.

**Q.** What can artists do to protect their work from copyright infringement?

**A.** The moment you create an image, it’s copyrighted—you don’t even have to register the work with the Copyright Office. Under current law, though, your work must be registered before you can file a suit. Should the judge rule in your favor, says Burk, you can collect either statutory or actual damages, as well as attorneys’ fees, and obtain an injunction against any further use of the infringing work. If you didn’t register your work until after the infringement, however, you can sue only for actual damages and an injunction.

“The victim of copyright infringement is always entitled to actual damages [the amount of monetary losses the victim suffered as a result of the infringement],” says Burk. “But if the losses are small or difficult to prove, the plaintiff can ask the court for statutory damages. In that case, the court picks an amount it considers to be fair compensation.”

Professional organizations such as the American Society of Media Photographers (ASMP) and the Graphic Artists Guild are currently pushing a bill in Congress that would enable artists to file for copyright infringement and collect statutory damages and attorneys’ fees even if the work is not registered with the Copyright Office. The bill was approved by House and Senate subcommittees last year, and a full Senate vote is expected sometime this year, according to Paul Basista, national executive director for the Guild.
It's difficult to prevent digital designs from being stolen or misappropriated—but not impossible. Whenever possible, try to ensure that a copyright notice accompanies your image. While such a notice is no longer required in order to sue for infringement, at the minimum it keeps a violator from claiming that infringement was done unknowingly.

Another option is to place a watermark, or translucent, copyright notice somewhere within the image. At least one online photography service is giving this solution a try. Arlington, Virginia–based Picture Network International (PNI), which is launching a stock-photography service called Seymour, in mid-1994, has embedded multiple copyright-notice watermarks in each of its online images. The watermarks are too small for most people to detect at low resolutions but are noticeable when the image is printed as a high-resolution CMYK file. PNI's marketing manager David Evans declined to say how this watermark-embedding scheme works.

"Someone could edit those notices out of the image," admits Evans, but they'd end up defacing the image somehow. And the time they'd spend editing out the images could represent more money than it would cost to license the image in the first place.

Q. Are there any efforts under way to update copyright laws, as a result of the explosive growth in personal computer use?

A. Most attorneys and experts interviewed by Macworld feel that, despite the advances in technology, the current copyright law is sufficient, particularly in relation to images and text. The 1976 Copyright Act (Title 17, U.S. Code) specifically states that protection "does not afford to the owner of a copyright in a work any greater or lesser rights with respect to the use of the work in conjunction with automatic systems capable of storing, processing, retrieving, or transferring information."

Nonetheless, there is growing concern among artists and photographers that they are losing the ability to protect their copyrights as a result of scanners, electronic bulletin boards, and the forthcoming information superhighway. Here again, many are looking to the music industry for inspiration. A few years ago, the industry protested the introduction of digital audiotape (DAT) players in the United States, fearing that the high-quality recording devices would cost musicians and studios millions in lost royalties. In July 1991, device manufacturers agreed to add a 2 percent royalty to DAT recorders and blank tape. The royalties compensate record companies, performers, songwriters, and music publishers for possible losses resulting from unauthorized music recordings made on DAT devices. The royalties will be collected and distributed under the auspices of the Copyright Office.

According to a spokesperson, the Copyright Office is interested in studying the DAT royalty agreement to determine if it could be applied to other situations in which technology easily enables its users to infringe copyrights—computer graphics, for instance. At press time, however, no specific studies were in the works.

"The solution to all of this could be more licensing societies," says Lutsch. Writers and visual artists need their own copyright-licensing organizations along the lines of the American Society of Composers, Authors and Publishers (ASCAP) and Broadcast Music Inc. (BMI). Those organizations license the works of their members for some common uses such as radio airplay.

Some organizations have already formed. In 1993, for instance, ASMP launched Media Photographers' Copyright Agency (MPCA) to protect and license the works of photographers in the field of electronic publishing (which includes the publication of photos on encyclopedia CD-ROMs and online stock-photo agencies). "MPCA is like the BMI of the photography world," says Peter Skinner, ASMP's communications director.

Ultimately, the question of how to protect the value of a visual artist's work—at a time when electronic images are increasingly, and easily, available—assumes ethical and philosophical proportions.

"There's not a whole lot I would want to do about it," says Louis Fishauf, creative director for Reactor Art & Design in Toronto, Canada, "unless someone copied my entire image outright and is taking away my opportunities to sell it. But if I happen to see a small piece of my work used somewhere else, in a different way, then the question is, Who knows if I originated that particular element in the first place? Artists always borrow from one another," Fishauf says, "and I'm just one link in the chain."

Photographer-writer Ward, however, believes that the ease of appropriating the works of others makes it even more important to vigilantly protect what you create. "Think of it this way," Ward says. "When it comes time to retire, what do you have to live on but the value of your collective life's work? And if you haven't defended that work, you've essentially given it away. Then what do you have?"

JAMES A. MARTIN is senior associate editor for Macworld's Graphics section.
TouchBase, DateBook Tighten Ties

Aldus's Contact Manager, TouchBase Pro, and its calendar manager, DateBook Pro, are being revised to feature tighter integration between the two programs and a new interface for TouchBase.

In version 4.0 both programs have optional mini menus to make basic contact-management and calendar functions available in all applications. You can link contacts to events by dragging them from TouchBase into DateBook; an event can have links to multiple contacts.

DateBook Pro 4.0's biggest addition is the Projects feature, which lets you group related events, to-dos, and other items. DateBook also lets users create custom items with preconfigured priority, alarm, automatically entered text, and so on. Custom searches can be saved and reused. Version 4.0 can look up a number in TouchBase and then send an alarm to a pager via Ex Machina's Notify.

TouchBase Pro 4.0 supports links to external programs—for example, DateBook runs as a TouchBase external. Externals, like other parts of TouchBase, each appear on a scrolling page, where they can be collapsed when not needed. Version 4.0 has room for two addresses per contact and can correctly format foreign telephone numbers and postal codes.

Both products should ship in late April or May at $79.95 each or $149.95 for both. Aldus, 619/558-6000.—D.L.

Personal Voice Mail

Do you get a kick out of sitting by your answering machine as ex-lovers and creditors leave desperate messages? High Tide Software's WaterMark and Pleiades Research's Digital Storefront are really intended for small-business voice-mail systems, though with a little imagination you can also steer unwanted callers into a hopeless maze of voice-mail commands.

The Digital Storefront package is $295 and comes with a device that routes voice between the Macintosh and the telephone. It can handle only one telephone line, but the software supports multiple voice-mail boxes; it can create hierarchical series of messages and perform other voice-mail feats such as forwarding messages to other boxes. Messages are displayed in a scrolling list and can be played back on the Mac's speaker. Version 1.1, which should be shipping when you read this, will add fax-back support and be able to forward calls to another number. Pleiades, 713/488-2134.

WaterMark is $499 and includes a device that digitizes and compresses speech before sending it to the Mac. Version 2.0, which is shipping, supports a directory of employees' names, extensions, and has a simulated call environment for testing the system you design. High Tide, 510/704-9927.—D.L.

PIM with a Passion

The successor to the sales-contact manager Field Assistant is Full Contact, a full-featured, general-purpose, personal information manager...
with some unusual strengths.

Full Contact lets the user create complex many-to-many relationships between pieces of information by simply dragging one onto another. For example, you can drag several person-items onto several event-items to link the people with a series of meetings, then link several to-do items with each meeting.

Events can be viewed in day, week, and month windows that can be open at the same time, and you can set up custom views and create reusable filters to hide or show certain types of information. Full Contact also has a word processor (with mail merge capabilities) and a telecom module; prints labels and envelopes; dials the phone (it stores multiple dialing configurations, such as one for the office and another for home); and provides alarms and reminders.

Full Contact loads files entirely in RAM, saving PowerBook battery life but possibly restricting file size. Full Contact costs $169 and is shipping. FIT Software (formerly Field Integration Technology), 408/562-5990, 800/725-3734.—D.L.

### Mac-Assisted Meetings

**HOW MANY BURSTS OF INSPIRATION** are quickly scrawled in pink or green on conference-room whiteboards—and just as quickly erased? Smart Technologies is developing a line of electronic whiteboards that capture what you write or draw on a screen and save it in PICT format on a Mac. With the software, you can scroll backward to see what was written on the board earlier. The WriteBoard, a 48-inch-by-36-inch wall-mounted unit that is shipping for $2995, uses normal dry-erase markers and erasers and includes a pen tray that tells the Mac which of four pen colors is being used.

A $99 software package called Smart Marker allows you to draw or write on an image displayed on the WriteBoard from a Mac screen or projected with an LCD projection panel.

Smart Tech's freestanding Smart 2000 Conferencing System Rear Screen (see "Smart 2000") transfers the image and markings from one electronic whiteboard to another (prices are roughly $15,000 to $20,000). The company is also developing systems that combine videoconferencing with whiteboard functions. Smart Technologies, 403/233-9333.—D.L.

### The Electronic Newspaper

**THE INTELLIGENT NEWSPAPER OF the future is available now with Ensemble Information Systems' Relevant, a Mac interface to Dow Jones's electronic news feed, DowVision.**

Relevant lets you decide what information you want your newspaper to carry. For example, you could designate column 1 as the government column, and set up your profile to track the federal agencies you want to read about by choosing from a list of about 40 agencies. Relevant will display headlines of the articles it captures from DowVision each day. Click on a story and it opens in its own window, with an option to scroll continuously as you read (you can adjust the scrolling speed.)

Dow Jones's staff assigns keywords to DowVision stories, so Relevant chooses stories based on keywords you select rather than by searching the stories' text—you're newspaper's content depends on how well Dow Jones indexes the day's stories. DowVision and Relevant require a Sun Microsystems server, and pricing depends on the number of users: for 100 users, software and data are each about $30 per month per user; for 1000 users, about $7 each per month per user. Ensemble plans to distribute a demo version of Relevant; details were not finalized at press time. Also, Dow Jones plans to make the DowVision information available to individuals using special search software over the Internet; details were unavailable at press time. Ensemble, 415/617-9600; Dow Jones, 800/522-3567, ext. 66.—D.L.
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Communicating with Tables

YOU PROBABLY DON'T SPEND MUCH TIME contemplating it, but tables are everywhere. The sports standings in the morning paper, the bus schedule that gets you to work, the menu you peruse at lunch, the airport monitor that shows your departure gate, the hotel bill that itemizes your charges: tables are the boats that keep us afloat in a sea of facts and figures.

A table presents information in a structured, row-and-column format that makes it easy to compare sets of data: How do the second quarter's figures compare with the first quarter's? How are the Giants doing compared with the Braves? How do Apple's laser printers compare with Hewlett-Packard's?

A table can also be a road map that helps you find the articles in a magazine or the chapters in a book, or a way to present parallel information—for example, the TV listings might put ABC in row 1, NBC in row 2, and CBS in row 3.

You might not think that your quarterly P&L statements have much in common with a TV schedule, but both share the same basic components: headings that identify columns; a stub, the table's leftmost column, where subjects or categories are identified; and the field, or body, which contains the bulk of the table's contents.

Table Tools

Word processors and spreadsheet programs each bring their own strengths to creating tables.

A spreadsheet's row-and-column orientation makes it an ideal table editor. (Macworld's product-comparison and benchmark tables begin life as Microsoft Excel spreadsheets.) There's no initial setup: just start typing headings and data, and then resize column widths as needed to accommodate the largest entry in each column. (Most spreadsheet programs can do this for you: in the heading area, double-click on the line separating a column from its neighbor to the right.) You can use the spreadsheet's border and shading features to dress up the table, and you can copy the finished product into a word processor or other program. More on these matters later.

Although a spreadsheet is a natural table editor, word processors provide better text-formatt ing options, and their style-sheet features let you automate repetitive formatting—of which there is plenty in a table. And the table-editing features most word slingers provide make creating a table almost as easy as in a spreadsheet program.

Tabs versus Table Editors

Microsoft Word (5.0 and 6.0), WordPerfect, Claris's MacWrite Pro, and WordStar's new WriteNow 4.0 allow you to create a table in either of two ways: by using typewriter-like tab stops or by using a built-in table editor. You can even use both techniques in the same table to combine the strengths of each.

What are those strengths? For starters, tabs have the edge when it comes to formatting flexibility. Want to align the decimal points in a column of numbers? Create a decimal tab. Want to guide the readers' eyes across from one column to another? Create a leader tab.

Tabs are also preferable if you plan to move a finished table into another program, such as Aldus PageMaker. Although all publishing programs can read documents created with most word processors, they can't import tables created in the word processors' table editors. This trade deficit can even occur between two word processors: WordPerfect can open tables in Word documents, for instance, but you may encounter formatting problems such as lost cell borders or displaced alignment.

One big drawback of tabs is that they can be confusing to set and adjust. Tabs, like line spacing and indent settings, are paragraph-level formatting attributes; in most tables, every line ends with a carriage return, which makes it a separate paragraph. Hence, the First Commandment of Table Editing: Before adjusting tabs, select the lines you want to affect.

The other big tab drawback surfaces with table entries that are more than one line deep. You must divide such entries across multiple lines playing a tedious game of hopscotch between the tab and return keys, and editing or reformatting a multiline entry is cumbersome.

Table Editors to the Rescue

Table-editing features eliminate these hassles by providing a spreadsheetlike grid of cells that hold the table. Just specify how many columns you want and start typing; the program adds rows as you go. Words wrap inside cells, so typing multil ine entries is a cinch: when a cell's contents spill onto subsequent lines, the...
whole row grows taller to accommodate them. Besides text, a cell can contain a graphic imported from another program. In MacWrite Pro, a cell can even contain another table.

Adjusting column widths is also easier with a table editor. Instead of dragging tab stops left and right on a ruler, you use the same resizing technique that spreadsheet programs provide: just drag the vertical line that separates two columns. (In Microsoft Word 5’s table editor, resizing isn't quite as easy—you select the cell, row, or column to be resized, and then drag a ruler marker left or right. The table editor in Word 6, due to ship in May, matches the competition’s and bests them in some areas.)

Table editors are like spreadsheets in other ways. You can create borders and shade cells to highlight key information or separate each row or column. In WordPerfect and Word 6, you can create simple formulas that calculate the values in a row or column to display a total or an average. In MacWrite Pro, WordPerfect, and versions 5 and 6 of Word, you can sort a table according to the contents of a given row or column—just the ticket for organizing those sports standings.

Who has the best table editor? At this writing, WordPerfect 3: its math—calculation features outdo the rest, and formatting cells is easier than with Word 5, the second-place contender. WordPerfect is also the only program that lets you specify that a set of column headings repeat on each page, a must for multipage tables. Word 6 will have a similar feature.

MacWrite Pro's table editor has one edge on the rest—you can change a table’s location on the page by simply dragging it—but otherwise, it’s a relative lightweight. It can’t create multipage tables, for instance, and it doesn’t do math.

Keeping the Eyes on Track
The aesthetic concerns behind table formatting are the same regardless of the tools you use. The most important aspect of table legibility involves guiding the readers’ eyes from left to right along each row. We read horizontally, from left to right—tables, with their strong vertical columns, disrupt this flow.

Typographers and designers rely on a bag of visual tricks to keep the eye on the right track. One common device is the leader tab, in which a row of periods, or dots in MacWrite, Word, or WriteNow, on-screen ruler, put a leader tab near the first column of a table that you’re creating with a table editor. Using your program’s on-screen ruler, put a leader tab near the right edge of the first column (see "Using Tabs in Tables"). To create the leader dots in MacWrite, Word, or WriteNow, type the first column’s information and then press option-tab (use μ-tab in WordPerfect).

Top Table Tips
Use these techniques to produce tables that are clean, attractive, and easy to read.

Consolidated Global Industries
1993 Sales (in U.S. million)

<table>
<thead>
<tr>
<th>Division</th>
<th>United States</th>
<th>Europe</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>$4,750</td>
<td>17.8%</td>
<td>$885</td>
</tr>
<tr>
<td>Government Services</td>
<td>8,773</td>
<td>70.7</td>
<td>3,211</td>
</tr>
<tr>
<td>Mining</td>
<td>1,068</td>
<td>(14.5)</td>
<td>1,814</td>
</tr>
<tr>
<td>Transportation</td>
<td>2,795</td>
<td>4.8</td>
<td>5,290</td>
</tr>
<tr>
<td>Total</td>
<td>$17,986</td>
<td>38.1%</td>
<td>$11,228</td>
</tr>
</tbody>
</table>

A more contemporary variation (and one used in Macworld’s tables) is to put a horizontal line, or rule, between each row of the table. This is particularly easy to do in a spreadsheet or in a word processor’s table editor: use the Cell Borders command and specify a horizontal border above and below each row. Don’t make the rules too heavy—a thin, hairline rule will usually do—and be sure the contents of each row are vertically centered between their surrounding rules. Use a heavier rule between the table headings and the first row. (By the way, if the flow of your table is vertical rather than horizontal—perhaps it contains parallel paragraphs in different languages—you might put a rule between columns instead of between rows.)

Yet another variation: shade every other row of a table. The border-and-shading options in spreadsheet programs and word processors make this easy. Use a very light shade—say, 10 percent—lest the shading obscure the text beneath it. If you’re printing the final table on a 300-dots-per-inch printer, think twice about shading: on a 300-dpi printer, even 10 percent gray can be too dark.

Lining Things Up
One thing that makes tables so tidy is that the contents of each column are aligned. Or at least they should be. Many table neophytes simply use their programs’ left-align presets, thus snubbing centuries of typographic tradition. Here’s how to do it correctly. (“Top Table Tips” illustrates the following rules.)

In a column of related numbers, decimal points must align. Use a decimal tab or, in WordPerfect 3’s table editor, the Decimal Align option on the Layout bar.

If the numbers are monetary values, put a currency sign before the first and last rows’ value only—don’t repeat the sign in every row. The currency sign must align with the largest value in the column, even if that means putting extra space between the sign and the number following it. (An easy way to do this is to type as many zeros as you need to push the currency symbol to the left, and then change the zeros’ color to white—they’ll disappear.) By the way, never use a lowercasel / or a capital l instead of the numeral 1, or a capital O instead of the numeral 0. Doing so will misalign columns of numbers and cause legions of deceased typographers to spin in their graves.

Some of the formatting gymnastics I’ve just described may require you to combine traditional tabs with a table editor. Say you want leader dots across the first column of a table that you’re creating with a table editor. Using your program’s on-screen ruler, put a leader tab near the right edge of the first column (see “Using Tabs in Tables"). To create the leader dots in MacWrite, Word, or WriteNow, type the first column’s information and then press option-tab (use μ-tab in WordPerfect).

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Using Tabs in Tables  You can combine tabs with a table editor to get the strengths of each. Top: A leader tab in a WordPerfect table. Bottom: A similar tab in Microsoft Word. In the Word table, I have dragged the tab to the right of the column’s right margin to extend the leader dots to the edge of the column.

Headings in the Right Direction  Column headings are traditionally centered above their columns. This one isn’t carved in stone, though; many designers prefer to left-align headings (particularly above text-heavy columns), or to right-align headings over numeric columns. If there’s a heading over the stub, always align it left.

Avoid putting long headings on one line. If headings are considerably longer than the columns below them, there will be too much white space between each column, and your readers’ eyes will need a trapeze to swing from one column to the next. Break long headings into two or more lines to create a narrower column, and format the headings vertically so that they align across their bottom lines. Don’t worry about filling all the space between the page’s left and right margins. There’s nothing wrong with a table that goes across only part of a page; on the contrary, a table that’s narrower than the margins stands out more and can enliven the page. (On a page containing several narrow text columns, try formatting the table so that it spans two or more columns.)

Column widths are also influenced by the font and type size you use. If you have a lot of information to squeeze into each row, use a space-efficient typeface such as Times or Helvetica Condensed—don’t shrink the point size to near-invisible proportions.

Transporting Tables  I’ve already mentioned that tables created with a table editor are more difficult to export than tables created with tabs. If you want to move an elaborately formatted table from Excel or Word into another program, there is one technique you can use: copy it as a picture.

Word and Excel let you copy any text as a picture, which you can then paste into another program. In Word, select the entire table by pressing option + double-clicking anywhere within it, and then press option-D. In Excel, select the table and press the shift key while opening the Edit menu—note the Copy command reads Copy Picture. Choose Copy Picture, then choose the As Shown When Printed button in the subsequent dialog box. Now switch to the destination program and paste. To edit or reformat the table, you have to return to your Word or Excel document and repeat the copy-as-picture routine to replace the table with the latest version.

Generally, if a table’s final destination will be a publishing program, I recommend doing the majority of your formatting using the publishing program; otherwise, you have to redo any formatting that your publishing program discarded when you import the table. If you use QuarkXPress, there’s another alternative to table-importing headaches: create tables within QuarkXPress using Npah’s Tableworks Plus, an extension that adds a table editor to QuarkXPress. Tableworks Plus can also import text-only files into tables.

WHERE TO BUY

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
<th>Vendor</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacWrite Pro 1.5</td>
<td>$249</td>
<td>Claris Corporation; 408/727-8227, 800/325-2747.</td>
</tr>
<tr>
<td>Microsoft Word 5.1a</td>
<td>$495</td>
<td>Microsoft Corporation; 206/882-8080, 800/426-9400.</td>
</tr>
<tr>
<td>TableWorks Plus 1.06</td>
<td>$349</td>
<td>Npah; 206/392-7745.</td>
</tr>
<tr>
<td>WordPerfect for Macintosh 3.0</td>
<td>$495</td>
<td>WordPerfect Corporation; 801/225-5000, 800/451-5151.</td>
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<tr>
<td>WriteNow 4.0</td>
<td>$119.95</td>
<td>WordStar International; 415/382-8000, 800/227-5609.</td>
</tr>
</tbody>
</table>

Next month: LaserWriter Power for Business

"I Chose A Mitsubishi Monitor For The Same Reasons I Chose A Mitsubishi TV."

Mac users buy Mitsubishi monitors for the same reason they buy our TVs: Trust. Our full line of 14" to 21" desktop and 29" to 42" large screen monitors for all Macintosh® applications delivers the quality, renowned durability, innovation and overall value you expect from Mitsubishi – at an affordable price. All desktop models feature exceptional performance, upgradability and low emission designs. And you can select from a range of advanced CRT technologies including flat square, Trinitron® and the exclusive new DiamondTron™ hybrid design. For information in the U.S. and Mexico, call us at 1-800-843-2515. In Canada, call 1-800-387-9630. For immediate product specifications, call Mitsubishi Qwikfax at 1-800-937-2094.
EIGHT PROGRAMS THAT HELP YOU THINK CREATIVELY AND PLAN

Page through any software catalog and you'll encounter a dizzying number of tools for charting, graphing, writing, and presenting your ideas on the Mac. But let's face it: presentation—even with the most spectacular software at your disposal—is still only half the formula. At the core of the most persuasive presentations and successful projects are great ideas—and you can't buy those on floppy disks.

The Art of Brainstorming

Being creative on demand is never particularly easy—and when you're feeling blocked, the challenge can seem insurmountable. If your creative juices need stirring, consider a thought-provoking session with MindLink Problem Solver or IdeaFisher. Both brainstorming programs encourage you to look at familiar ideas from a different angle, and both programs suggest links between related words and ideas. But while IdeaFisher encourages a freewheeling, serendipitous approach to idea generation, MindLink offers more structured guidance and coaching.

IdeaFisher is the more impressive of the two tools. It is built around a sprawling database called the IdeaBank, which contains more than 60,000 words organized by major categories (such as Animals, The Senses, and Emotions) and topical categories (groups of related concepts such as jump/spring/bounce/deflect/reflect or wild/fierce/uncivilized/tame/domesticated). All entries in the IdeaBank are cross-referenced by concept and association. You can engage in free association, jumping from one related word or phrase to the next, and IdeaFisher automatically records your findings on the Idea Notepad. When you're done idea-hopping, you can export the contents of your Idea Notepad as a text file. The program also allows you to generate new ideas based on combinations of words; type in any two words, and IdeaFisher creates a list of people, animals, verbs, adjectives, and phrases that are all somehow associated with that word combination.

Sometimes using the IdeaBank works and sometimes it doesn't; but in general, I found the rich supply of interconnected ideas enjoyable and effective in stimulating new ideas. You can also turn to IdeaFisher's QBank—a collection of more than 5000 questions that help you probe your responses to the QBank's questions by collecting a list of all the words you use repeatedly in answering the questions. IdeaFisher Systems also offers three plug-in QBank modules, one for creating a mission statement and producing long-range plans; one for preparing grant proposals; and one to assist in creating speeches, lectures, and other presentations.

MindLink Problem Solver offers a more structured approach to brainstorming. You type in a problem or challenge, and the program—actually a HyperCard stack—presents questions and exercises that help you examine the problem from different angles.

From the moment you open the box, it's clear that MindLink takes an unconventional approach. Along with the software and manual, you get a small bag containing, among other things, a tiny toy truck and a wooden pimento-stuffed olive. You're supposed to keep these items on hand as you use the program to stimulate your imagination.

Wooden olive in hand, I launched MindLink feeling somewhat skeptical. Nevertheless, I found the exercises helpful in articulating a problem and developing solutions. True, you may feel kind of wacky following the program's suggestion that you examine a gnarly business problem from the point of view of, say, a butcher (unless, of course, you are a butcher), but if you stick with it, these techniques really do prod you into reviewing situations from new angles and dreaming up solutions. As with IdeaFisher, you can save your responses to MindLink's questions as a text file for use in other applications.

On the downside, MindLink has the unimpressive, somewhat amateurish look of so many HyperCard stacks; its lackluster black-and-white interface feels a bit crude and clumsy, and the stack behaves unpredictably at times.

Thinking on a Blank Canvas

For those who don't need to contemplate a bag of toys or search a database to feel a creative spark, Inspiration provides a less formal, more open-ended brainstorming tool. Inspiration doesn't prompt you with probing questions or hypothetical scenarios; it simply provides a blank canvas on
which you can quickly record and arrange ideas as they occur to you.

Inspiration's diagram mode allows you to take a visual approach to organizing your thoughts. Each idea you type gets inserted into its own symbol box (see "Inspiration's Mind Map"). You can change the relationship between ideas by simply dragging the symbols on screen, and you can connect related ideas by dragging links between them to create a graphical map of your ideas. Visually clustering the idea symbols on screen allows you to see emerging relationships, thought patterns, and themes.

The program also has a strong outline mode for translating your idea map into a traditional hierarchical outline (more on Inspiration's outlining features below). At any time you can jump back to the diagram view, where you can use a palette of standard drawing tools to enhance your idea map before printing it.

Chena Software's Fair Witness, while not primarily a brainstorming tool, also has a free-form mode that can be helpful for working with embryonic ideas. You can type ideas anywhere on the free-form view's blank page, using the screen like an electronic whiteboard. And once you've typed them, you can drag the ideas around as much as you want, placing them in rows, columns, or clusters as the humor strikes you. The idea is to jot down thoughts as they occur to you—and worry about categorizing and arranging them later, using the program's superb outlining tools (more on this outstanding outliner/organizer below).

A new entry in the free-form outliner market is Corkboard from MacToolkit.
Billed as a graphical outliner, Corkboard is built on the old index-card model; you record each idea on a separate electronic index card that you stick up on a corkboard-covered screen (the cards can also hold graphics and QuickTime movies). You can drag the cards around and stack them, create categories and assign them to cards, and clump related cards together; it's a lot like working with a real packet of cards.

You can also turn your card-filled corkboard into a conventional outline. Corkboard's outline mode makes it easy to nest related points and assign each level of the outline a unique style. Items given a hierarchy in the outline view are linked tree-chart-style when you switch back to the graphical corkboard view. But the graphical corkboard approach is more of a novelty than anything else; Fair Witness, Inspiration, and Symantec's More are all far more powerful programs.

**Developing Your Plan**

OK, now you know your overarching goals and objectives, but you need to figure out how you're going to implement your plan. You have to home in on the details, set priorities, and decide what your next steps will be.

It's time to make lists. Of course, even the most basic word processor suffices for typing a simple text list, but a program with true outlining capabilities makes this kind of organizational task much easier. (Some word processors double as outliners—see the sidebar, "Thinking Tools You Already Have.") An outliner lets you reorder and prioritize items simply by dragging them into position—no cutting and pasting required. And instead of scrolling through pages of text, you can collapse and expand subpoints to zero in on precisely the information you need.

Outlining and organizational tools range from the supersimple to the elaborate. On the low end is Portfolio Software's DynoNotePad, a no-frills outliner that handles all the tasks described in the previous paragraph, but little else. DynoNotePad has a few neat features—phone-number dialing and the ability to record sounds directly into an outline entry, for example—but otherwise it's too utilitarian to justify its price of $59.95. Its formatting features are more limited than most outliners', too; there's no text ruler, and you can't set up global text formats for levels of the outline.

A far more powerful outliner/organizer is Symantec's More, which enables you to arrange ideas in an outline and then display them as a tree chart or as a series of bullet charts (which can also be printed for handouts or displayed in an on-screen presentation). More has a rich

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**Quick Guide to Thinking Tools**

<table>
<thead>
<tr>
<th>Idea-Generation Tools</th>
<th>Organizing Tools</th>
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<td><strong>Guides idea development</strong></td>
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<tr>
<td><strong>Suggests links between words, phrases</strong></td>
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<td><strong>Maximum subtopic levels</strong></td>
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<td><strong>Custom outline labels</strong></td>
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<tr>
<td><strong>Assigns styles by outline level</strong></td>
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</tr>
<tr>
<td><strong>Performs calculations</strong></td>
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*= yes; O = no; NA = not applicable. Strategic Planning Module $95; Presentation Module $79; Business and Grant Proposals Module $95. Only does addition.
set of features, but be aware that Symantec has decided against upgrading and supporting the product in the future.

Outlining with More is quite easy. You can quickly promote and demote entries in an outline using the tab key, and you can focus on one portion of an outline with the Hoist command, which jumps a topic to the top of the window temporarily hides all other topics in the outline. The program's Clone command lets you view a topic in more than one place in an outline, and the Mark and Gather commands let you select several subtopics in different places in the outline and move or clone them in one stroke. More also has a built-in calculation function: if a series of subpoints in an outline contains numeric data, More can total the numbers and place the sum in the heading above the subpoints. Also outstanding is a Calendar command that lets you quickly generate organizer-type calendars within your outline.

Formatting features are also plentiful. The Rules dialog box allows you to set up styles for each level of the outline, and there's a text ruler for setting tabs, spacing, margins, and justification, so you can turn out a polished-looking document when your outline is complete.

More also provides tools for presenting your ideas after you've organized them. More Graph—a separate application that comes with the package—can turn out impressive charts and graphs, and the program's slide-show feature is quite impressive.

Like Inspiration, More does a fine job displaying hierarchical outlines as tree charts, but More's tree charts are more rigidly structured than Inspiration's. With More, you can't use curved lines to connect related symbols, you can't drag symbols on screen, and you can't add new information in tree-chart view (see "Two Views of More"). For organizing in tree-chart style, Inspiration is the more flexible, creative tool.

For text-based outlining, the two programs are comparable. Inspiration's outline allows you to reorder topics easily and attach notes to topics. For an overview of your work, you can collapse or expand portions of the outline, and the Focus In command is equivalent to More's Hoist command. Inspiration's biggest problem is that it can't import text from any other programs (though it can export in five formats). More, however, supports a wide range of popular word processors.

**Adding the Details**

As a plan develops, setting deadlines becomes an important concern—and that means linking your outline to a calendar of some sort. Attain's In Control is a to-do-list manager that, like most outliners, allows you to set up a hierarchy of main headings and subpoints that can be expanded and collapsed as desired. But unlike most outliners, In Control also has clock and calendar functions. You can link outline items to specific dates and times by dragging the items to the appropriate day on the calendar, and you can set alarms to notify yourself of impending deadlines (see "Outliner/Calendar").

Even without its calendar functions, In Control holds its own as a full-featured outliner. Most notably, it allows you to set up columns for information related to each outline topic, such as projects or people. With a single click you can sort your outline by any column. And In Control is the only program discussed here that allows you to automate searches by saving specific sets of search criteria.

Fair Witness is even more flexible as an organizing tool than the other products; it has such a broad range of capabilities (outliner, calendar, spreadsheet, database) that it defies simple categorization.

Fair Witness organizes your data in a matrix of cells resembling a spreadsheet. The first column of the spreadsheet contains your basic ideas (called the primary text) in traditional outline form. As with the other programs, you can sort through your ideas and nest them as subtopics.

**Fair Witness 1.2.1**

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<tr>
<th>Feature</th>
<th>Fair Witness 1.2.1</th>
<th>In Control 2.0</th>
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<td>$295</td>
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<td>Chena Software</td>
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</table>

**Outliner/Calendar**

In Control is part organizer, part calendar, and part outliner. You can link topics and subtopics to dates by dragging them to the calendar portion of the screen; here, a meeting with Mona has just been scheduled for 1/18/94.

You use the remaining columns—which can be hidden, resized, and renamed as you desire—to hold other information connected with each idea: dates, times, numbers, pictures, and so on.
Beyond Outlining  In Fair Witness, the hierarchical outline at left is just one piece of your information matrix. You can link topics to dates, pictures, and other information in a row-and-column grid and, as shown here, dates can be displayed on a time line.

In this regard, Fair Witness is similar to In Control. But the real strength of Fair Witness lies in the different ways you can view and print your information. The Time Chart view, for example, displays dates from your outline on a graphical time line, a feature none of the other reviewed programs have. (Fair Witness cannot, however, display data in a true calendar format, as In Control can—see "Beyond Outlining.") The Ratings view allows you to rank ideas by preference or priority. The Graphs view shows your rankings as a bar graph or pie chart.

Fair Witness can also do math, providing 12 different calculations including average, standard deviation, and geometric mean. Moreover, you can set up custom formulas that calculate numbers across columns.

As for the task of organizing your ideas, Fair Witness offers a top-notch categorizing tool. Suppose you've jotted down a series of ideas in list form—no particular order or priority. The Categorize feature lets you turn each main topic into a separate tile along a bar at the bottom of the window. To turn another idea into a subtopic of a topic, you just drag the idea to a main topic tile, and the subtopic automatically jumps into its proper position in the outline. It's a painless and intuitive way to start organizing a mass of information into a logical order.

(Too late to cover in this article, we learned of plans to upgrade Fair Witness and rename it InfoDepot 2.0. The new incarnation should ship in February with a more polished interface, style sheets, sort through a jumble of ideas and hammer them into a workable plan—maybe even a great plan.)

You may already own an outliner. Many word processors such as Microsoft Word—and even integrated programs such as ClarisWorks—have an outliner built in, and there are some real advantages to tapping into your word processor's outlining. For one thing, high-powered products like Word actually offer more features than some low-cost stand-alone outliners. And when you use your word processor to outline, you don't have to worry about moving files between programs; your final outline is already in your word processor's native format.

Microsoft Word  Word has the best of the outliners within a word processor. When you enter the often-ignored Outline view, a special tool bar appears across the top of the screen, with buttons for creating a hierarchical outline and expanding or collapsing subtopics to any level desired.

An abundance of keyboard shortcuts makes quick work of promoting and demoting paragraphs (you can also promote or demote a paragraph by dragging it to the left or right), and you can move topics with their nested subtopics by dragging and dropping them into a new position. Formatting is easy: you can use Word's style sheets to format each level of the outline.

When your outline is complete, you can switch back to Word's Normal view, and each topic or subtopic will appear as a separate paragraph. Word can even generate a table of contents based on the topics in the outline. (Word 5.1, $495; Microsoft Corporation, 206/882-8808.)

WordPerfect  WordPerfect's outlining is much more limited. It supports automatic numbering (or lettering) of nested paragraphs, but it doesn't allow you to collapse or expand the outline to control how many levels are visible; nor can you drag outline entries up or down—one of the important functions of any outliner. Nesting subtopics is a cumbersome process because each new paragraph is inserted on the outline's highest level, so you have to manually demote each new subtopic to the level you want. In fact, WordPerfect's outliner is less of an outliner than it is an automatic paragraph-numbering system. (WordPerfect 3.0, $495; WordPerfect Corporation, 801/225-5000.)

ClarisWorks  Surprisingly, ClarisWorks, though equipped with relatively bare-bones word processing, has a great built-in outliner. Like Word, ClarisWorks allows you to selectively collapse and expand outline topics; drag topics and related subtopics up or down within the outline; and promote and demote items with keyboard shortcuts.

On the downside, the program provides no visual clue as to which topics contain collapsed subtopics and which don't. ClarisWorks offers 7 stock outline formats and 11 label types—letters, numbers, Roman numerals, bullets, check boxes, and so on. (ClarisWorks 2.0v1, $299; Claris Corporation, 408/727-8227, 800/325-2747.)

GreatWorks  Symantec's GreatWorks, another integrated program, also offers a respectable outliner. With GreatWorks you can drag topics to reorder them or change their hierarchy, and you can expand or collapse portions of the outline. The program offers six preset outline formats (including Legal, Numerical, and Bullets) and allows you to define text attributes to apply automatically to any topic at a given level. (GreatWorks 2.0.1, $129.95; Symantec Corporation, 408/253-9600, 800/441-7234.)
There are really only two reasons to buy your next personal printer from Apple.
It's more powerful. The LaserWriter Select 320 delivers the advanced capabilities of Adobe's "PostScript" Level 2 (and the speed of a RISC processor). Not surprising for a big-budget printer—but pretty amazing for one at this price.

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It's more expandable. With a simple memory upgrade, you can take advantage of Apple's "PhotoGrade" technology. You'll get photographic quality that rivals printers of much higher resolution (with price tags to prove it).

It's more streamlined. Thanks to careful Apple industrial design, the LaserWriter Select 320 weighs in at 15 pounds and has a very small footprint, so it easily adapts to your work space (not to mention your work style).

It's more personal. The LaserWriter Select 320 is built to work hand in hand with Macintosh computers—which also means it's just as easy for you to use. Just plug your printer in, pop the software in your Mac, and click on "Install." It's that simple.
It costs less.

It's less, period. A comparable personal printer such as the Hewlett-Packard LaserJet 4ML will cost you $1,279 (SRP), while you can take home the LaserWriter Select 320 for only $959. In other words, you can get a lot more printer for a lot less money. It's that simple.

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Circle 79 on reader service card
Tips, Tricks, and Shortcuts

HOLDING DOWN THE SHIFT KEY WHILE starting up your Mac turns off all system extensions, as you know if you read February’s Quick Tips. But with many non-Apple keyboards, a slight variation of this trick is required, according to Lloyd Lor- ing via CompuServe. If pressing the shift key the instant you hear the start-up chime elicits the “Welcome to Macintosh” message without the expected addendum “Extensions Off,” try this. Wait until the smiling Macintosh icon appears and then hold down the shift key until you see the message “Welcome to Macintosh. Extensions Off.”

Easy Rebuilding
Can you remember how to rebuild the Finder’s desktop database on your hard drive? (The answer is in April’s Quick Tips.) Danny Wong of Toronto discovered a simple method that not only doesn’t require remembering an arcane keystroke combination but also avoids the irksome dialog box that asks you to confirm rebuilding the desktop, which is especially a pain if you are rebuilding multiple volumes. In the window of a disk whose desktop you want to rebuild, create a new folder and name it Desktop. The next time you start up your Mac, the Finder immediately rebuilds this disk’s desktop with no questions asked. When rebuilding is done, be sure to drag the Desktop folder you created to the Trash so it doesn’t trigger another rebuilding at the next restart. This method works on multiple volumes (by putting a new folder named Desktop at the root level of each volume you want to rebuild) and with removable disk cartridges, but Wong found that it doesn’t work on floppy disks.

I figure Wong’s method works because the System 7 Finder is incorrectly identifying the folder named Desktop as a System 6 desktop database (which would actually be stored as an invisible file named Desktop) and therefore is wrongly assuming that the volume was last used with System 6. The System 7 Finder automatically rebuilds the System 7 desktop database (stored in two invisible files named Desktop DB and Desktop DF) on any volume larger than 2MB that the Finder assumes was used with System 6, in case any changes were made then. None of this applies to any volumes under 2MB, such as floppy disks, because System 7 uses the System 6 desktop database for them, rather than the two-file System 7 desktop database. In fact, you cannot name an item Desktop on a floppy disk because it contains an invisible file already using that name.

Automatic Fax Printing

We want to receive all faxes through our fax modem and store them on optical disks. However, we must be sure all incoming faxes that are received after hours are printed immediate-

ly to prevent the loss of faxes in case our system breaks down during the night. Also, by printing faxes at night, we would avoid tying up our equipment during work hours. Unfortunately, our Faxstf software has no option for automatic printing. Can you recommend a solution?

Klaus D. Lange Caracas, Venezuela

You will have to switch to different software, such as Delrina’s FaxPro for Macintosh (408/363-2345, 800/268-6082). Although FaxPro can send and receive faxes in the background, its automatic printing option works only in the foreground. While automatic printing is on, you cannot use other applications. Delrina FaxPro sells for about $90 by mail order, but your Faxstf serial number qualifies you for a $45 competitive upgrade (see Reviews, Macworld, February 1994, for a closer look at Delrina FaxPro). The Global Fax software that comes with the top-notch TelePort and PowerPort fax modems from Global Village Communications (415/390-8379, 800/736-821) can automatically print faxes in the background. Since Global Fax software is not sold separately, you’d have to replace your modem to get it.

Unwanted Dates

Why does Microsoft Excel interpret entries that contain slash marks as dates? For example, Excel converts 1/1/2 to January 1, 1902.

Gene T. Pretzer Clinton Township, Mississippi continues
Excel does this to protect you from the hideous truth that it, like other spreadsheet programs, stores dates and times internally as serial numbers. When you enter numbers separated by slashes or dashes, Excel interprets the entry as a date, stores that date's serial number, and changes the cell's format from General to a date format. For detailed information, look up entering dates and times in the Excel manual.

If you want to enter a nondecimal fraction in a cell with the General format, you must enter an integer and put a space between the integer part and the fraction part (for example, 1 1/2). A fraction (such as ½) without an integer part must be prefixed with a 0 and a space (0 1/2).

Upgrade or Replace?

Q. I have an SE/30 with 5MB of RAM and a 40MB hard drive. I want a bigger (and color) monitor and want to upgrade to System 7. Would it be cheaper to buy a new machine or upgrade my SE/30? If I upgrade, would I need more memory and a color card?

A. The SE/30 can display color if you add a color card and plug in a color monitor. A color card costs $300 to $500 through mail order at this writing, depending on the maximum number of colors per pixel. Add $75 for installation and $60 for System 7, for a total upgrade price of $345 to $635. A new Quadra 605 with 4MB of RAM, an 80MB hard drive, a keyboard, and System 7—(not to mention a one-year warranty)—costs under $1000. You should be able to get at least $500 for your SE/30, making the net cost of a new Quadra 605 about the same as upgrading your SE/30. Of course, the color monitor will cost extra, whether you upgrade your Mac or replace it.

The 605 has a major practical advantage: three times the SE/30's speed. The SE/30 has two theoretical advantages: a floating-point unit (FPU) and a higher RAM limit (128MB versus 36MB). Now I speed-rendering, modeling, and scientific analysis—which you probably won't do much on machines such as these—but does little for typical spreadsheet work. And adding more than 16MB of RAM would be prohibitively expensive at current prices. Therefore, I vote for the Quadra 605.

CD Start-up Delay

TIP If you start up a Mac from a CD-ROM (not possible on all Macs equipped with CD-ROM drives), then eject the CD, and restart from the hard drive, you will notice a delay of 30 seconds or so before the start-up process begins from the hard drive. To eliminate this start-up delay, which is caused by the Mac's fruitless search for a start-up CD, open the Startup Disk control panel and select the hard drive. You must reset the start-up disk every time you start up from a CD or you'll get the delay.

Chris Stuart
Walnut Creek, California

Pressure-Sensitive Mess

TIP When you're drawing with Adobe Illustrator 5.0's brush tool on a pressure-sensitive tablet, sharp changes in your stroke direction can create messy, overlapping paths. These artifacts make editing difficult and produce unesthetic results if you apply a stroke to the drawn object. You can clean up those messy paths with the Pathfinder/Unite filter, which is more commonly used to merge multiple paths into one object with a single outline (see "Cleaning Up Messy Paths").

Craig Hillis
Woodland, California

What's Your Sign?

TIP I often want to analyze—say, to count, sum, or average, for example—the entries in a Microsoft Excel array that are positive, negative, or zero. The Database feature can do this, but I find it clumsy, and it applies to only one array per worksheet. Formulas based on the SIGN() function can also analyze array entries according to sign, and such formulas can be used on any number of arrays in a worksheet. Recall that SIGN(Entry) has the value +1 if Entry is positive, +1 if Entry is negative, or 0 if Entry is zero. (You can replace Entry in this formula with anything that has a numeric value.)

To figure out the number of positive entries in an array named Array, notice that the array formula \( \{ \text{SUM} (\text{SIGN}(\text{Array})) \} \) counts +1 for each positive entry and −1 for each negative entry in the array. The formula evaluates to \( P - N \), where \( P \) represents the number of positive entries and \( N \) the number of negatives. The formula \( \{ \text{SUM} (\text{SIGN}(\text{Array})^2) \} \) counts +1 for both positives and negatives, so it evaluates to \( P + N \). The sum of these two formulas equals \( P - N + P + N \), which equals \( 2P \), or twice the number of positives.

Thus the number of positive entries in Array is calculated by the following array formula:

\[
\left( \frac{1}{2} \cdot \text{SUM} (\text{SIGN}(\text{Array})) + \frac{1}{2} \cdot \text{SUM} (\text{SIGN}(\text{Array})^2) \right)
\]

Analogously, the number of negative entries is calculated by

\[
\left( \frac{1}{2} \cdot \text{SUM} (\text{SIGN}(\text{Array})) - \frac{1}{2} \cdot \text{SUM} (\text{SIGN}(\text{Array})^2) \right)
\]

And the number of zero entries is calculated by

\[
\left( \text{COUNT}(\text{Array}) - \text{SUM} (\text{SIGN}(\text{Array})) \right)
\]

Combinations of SIGN() functions can be used to flag entries by sign. For example, \( \text{SIGN}(\text{Array})^2 + \text{SIGN}(\text{Array}) \) tags every positive entry with a +2 and all others with 0.

The sum of all positive entries is calculated by

\[
\left( \frac{1}{2} \cdot \text{SUM} (\text{Array}) + \text{SIGN}(\text{Array})^2 + \text{SIGN}(\text{Array}) \right)
\]

To get the average of the positive entries, divide this formula by the earlier formula for the number of positive entries. Additional examples abound:

\[
0.5 \cdot \text{SUM} (\text{SIGN}(\text{Array})) + 0.5 \cdot \text{SUM} (\text{SIGN}(\text{Array})^2)
\]

ShareMail

TIP Here's how a few people on a small network can exchange E-mail messages using nothing more than System 7 file sharing, some aliases, and TeachText. On each Mac that will receive messages, start file sharing with the Sharing Setup control panel and share the start-up disk using the Finder's Sharing command. On each Mac that will send messages, use the Chooser to access the shared disks of all the networked Macs that will receive messages. Open the shared disk of each receiving Mac and make an alias of the folder named Desktop Folder. As you make each alias, change its name to identify the owner of the Mac that contains the alias's original item. Put all these aliases in a new folder (optionally named Mail) on the desktop of each sending Mac. You can now select all messages...
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P. Wayner, BYTE, 1-92

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Circle 29 on reader service card
In-box Privileges  These access-privilege settings set up a drop-box folder that works like the corner mailbox. Network users can deposit files and folders in the drop-box folder but can't see—and therefore can't access—what's inside it.

By making aliases of your folders, giving each alias the name of the person on whose Macintosh the alias's original folder is located, and collecting the aliases in an out-box folder on your Mac. To see at a glance whether you've received something new in any folder inside your in-box, set your in-box folder for viewing by name and expand all the folders inside it. (A shortcut: press Shift-A to select all folders, then press Shift-right arrow to expand all selected folders.)

Rather than go through this rigmarole, you can use Apple's PowerTalk technology to send and receive mail. With PowerTalk installed you can send mail by dragging icons in the Finder, by creating memos (which can include enclosures) with the AppleMail program, or by attaching a PowerTalk mailer to a document using any application that incorporates this technology. PowerTalk automatically connects to other Macs in the network to send your outgoing mail, notifies you when incoming mail arrives, and lets you categorize mail in your in-box. Each person who wants to use PowerTalk must install System 7 Pro.—L.P.

**Where Am I?**

**TIP** If you create spreadsheets or macros for use in both Microsoft Excel and Lotus 1-2-3, you can have your creation determine the program in which it is operating and use this information in If functions to choose between alternate formulas or sets of macro commands that you have optimized for each environment. Here is one way to determine the environment: Enter the number 1 in cell A1, enter the formula ="A1:A1" in cell A2, and enter the formula =IF(ERF(SUM(INDIRECT(A2))) in cell A3.

Excel considers the range reference in cell A2 valid, but 1-2-3 considers it an error. This means that cell A3 is FALSE in Excel but TRUE in 1-2-3. The range in cell A2 is in quotes so that if someone converts the spreadsheet between Excel and 1-2-3, neither program will convert the range to a formula.

Peter Theron
Madison, Wisconsin

**Eye- and Battery-Saver**

**TIP** To save battery power on a PowerBook, invert the screen colors by using either Connectix PowerBook Utilities (CPU) (415/571-5100, 800/950-5880) or the CloseView control panel that came with your Mac. With the image inverted (white text on a black background), you can turn down the backlighting to its lowest level before it is totally off. This arrangement is easier on your eyes when you work in dim light, and it's less disturbing to others (especially fellow passengers watching an in-flight movie). To invert the screen with CloseView, just open the control panel and select the White on Black option. To invert the screen using CPU, open its control panel, select the LCD Saver icon, and check the box labeled Invert When Working.

Eric R. Ashby
Los Angeles, California

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 Pool, the address 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.

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MoviePak2 Pro Suite is a turnkey solution for expert video: Full-motion, full-screen [60 fields at 640 x 480] compression/decompression, unparalleled RasterOps 24XLT V display technology and complete encoding capabilities for NTSC or PAL—

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<th>RASTEROPS MOVIEPAK2 PRO SUITE</th>
<th>RADIUS VIDEOVISION STUDIO*</th>
<th>RASTEROPS MOVIEPAK PRESENTER</th>
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<tr>
<td>True 60 field/sec (640 x 480) video capture &amp; playback</td>
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<td>YES</td>
<td>8D-field capture 6D-field playback</td>
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<td>24-bit color on large screen displays up to 21-inch</td>
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<td>NO</td>
<td>NO</td>
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<td>QuickDraw acceleration</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
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<tr>
<td>Pro Features: Device control</td>
<td>YES</td>
<td>NO</td>
<td>Optional encoder with genlock for $444</td>
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<td>SMPE time code</td>
<td>YES</td>
<td>NO</td>
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</tr>
<tr>
<td>RGB video input</td>
<td>YES</td>
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</table>

Price: $4499, $4499, $1749

RasterOps
2500 Walsh Avenue • Santa Clara, California 95051

Circle 90 on reader service card
Opening Up the Big-File Bottleneck

Over the years, Mac hardware and software have been optimized for high-performance graphics and multimedia applications, but local area networking hasn’t kept pace.

For bandwidth-hungry applications, AppleTalk using LocalTalk—at 230 Kbps—crawls at a snail’s pace. Ethernet over unshielded twisted pair boasts a transmission rate of 10 Mbps, but it logs an actual throughput of closer to 5 Mbps. Even over expensive fiber-optic cable, Ethernet doesn’t go much faster because the protocol wasn’t designed to take advantage of the high-speed capabilities of fiber.

For applications that need better performance, two niche companies, Sonic Solutions and Transoft, have developed specialized high-speed network options. And new technology means a third choice is on the way.

MediaNet from Sonic Solutions delivers a throughput of up to 3 MBps, about ten times faster than Ethernet, over FDDI or CDDI wiring. To achieve such speeds, the company has developed its own transport protocol and file-allocation scheme.

MediaNet’s Media Optimized File System (MOFS) speeds data retrieval by allocating disk space in larger blocks than Apple’s Hierarchical File System (HFS). The MediaNet transfer protocol (MTP) boasts a more efficient packet size that is ten times larger than AppleTalk’s. And MediaNet uses its own on-board processor and SCSI interface, so the Mac’s processing power isn’t siphoned off for network needs.

Every Mac equipped with a MediaNet NuBus server board ($4495 for FDDI, $2795 for CDDI) can act like a server while operating as a workstation, according to Sonic Solutions. Macs equipped with client boards ($5395 FDDI, $2095 CDDI) can pull files from the server Macs at MediaNet speeds, but dragging a file from a client Mac to the server would take place at AppleTalk pace. Concentrators or hubs ($3575 to $13,995) are necessary to link nodes into a network—as many as 1000 nodes are theoretically possible.

Transoft offers small workgroups a less complex but faster option in the form of a SCSI-to-SCSI network. Called SCSI-Net, the network allows up to 6 Macs to access files housed on a set of common storage devices at speeds between 3 Mbps and 5 Mbps. The network consists of a SCSI-Net hub ($6500) linked in a star topology to the SCSI ports of the Macs. The seventh port of the hub connects to the common SCSI storage device or chain of devices.

If you can wait to unplug your network bottlenecks, you might want to hold off and take a look at an emerging technology called Asynchronous Transfer Mode (ATM). It’s a cell-based transmission method—designed for both local and wide area networks—that will support data, voice, and video at speeds up to 1 Gbps. ATM currently uses fiber-optic cabling, but standards for ATM over copper cabling are on the drawing board.

Eventually, ATM promises to blow the socks off today’s existing high-speed networks. Sonic Solutions is working on an ATM version of its MediaNet. Fore Systems, a leader in the ATM LAN field, is developing Macintosh-compatible ATM adapter cards that will be available later this year.

Sonic Solutions, 415/485-4800; Transoft, 805/565-5200; Fore Systems, 412/967-4040.—Martha Strizich
Ethernet to Go

Small is Beautiful When It Comes to Networking Products for PowerBooks. Dayna Communications has released two pocket Ethernet adapters; and Xircom, a company that has specialized in Windows and DOS networking products, has followed with a pair of adapters based on the Dayna technology.

Like Sonic Systems’ microSCSI (see Networks news, Macworld, February 1994), the Dayna and Xircom adapters plug into the SCSI port of a networked desktop Mac. In the case of 10BaseT nets, the adapter can draw power from a desktop Mac’s ADB port. The adapter’s compact power supply is necessary for thin Ethernet wiring, which needs more power than the ADB port provides.

Both companies’ adapters include two SCSI ports—one for the PowerBook and one for desktop Macs.

The adapters come in two models, one with a single RJ-45 connector for 10BaseT networks, the other with connectors for both 10BaseT and thin Ethernet. Dayna’s single-connector model, the Pocket SCSI/Link-T, lists for $299; the dual-connector PocketSCSI/Link-M lists for $369. Prices for Xircom’s models were not set at press time. Dayna, 801/269-7200. Xircom, 818/878-7630.

—NANCY E. DUNN

Compact Hubs Plug and Play

Whether you’re setting up a small workgroup Ethernet network or just want to add a few extra nodes, Sonic Systems and Asante Technologies each has a compact five-port hub that will fill the bill. Both devices have link status lights and allow users to plug and unplug nodes without disrupting the net.

Sonic Systems’ HubLite sports five RJ-45 jacks; one jack can be switched between normal and crossover modes. With the latter setting, you can connect to another hub without special wiring. Using this feature, you can create up to four nodes out of a single wall jack wired back into the central office hub. Alternatively, up to five hubs can be cascaded to form a small, independent workgroup network. The HubLite lists for $169.

Asante’s entry, the NetExtender Hub, operates on the same principle as the HubLite, but with a slight twist. The NetExtender has four RJ-45 jacks and a single AUI or AAUI connection, depend-

The Cellular Fax

Calling Your Boss from a Cellular Phone Is Simple. Sending E-mail messages or fax transmissions over the cellular network can prove difficult, however, because power-shifts, static, and other noise often interfere with cellular data communications. To tackle that problem, a year-old company called Air Communications (408/749-9883, 800/247-3282) has designed a multipurpose device for notebook computers.

The $1495 AirCommunicator is a fax modem and cellular telephone rolled into one. It uses a proprietary error-prevention scheme that the company claims improves cellular data communications reliability. It can send and receive at 9.6 Kbps over cellular connections and 14.4 Kbps over land lines.

The PowerBook-compatible model, due to ship in May, plugs into the serial port and draws power from its own battery pack. AirCommunicator software monitors transmissions for error rates, signal strength, and throughput.

—MARTHA STRIZICH

QuickMail Goes Wireless

A new edition of CF Software’s popular QuickMail package lets PowerBook users exchange E-mail via wireless modems. To take advantage of the feature, you need QuickMail Remote with Wireless Support ($295), an Intel wireless modem ($795 each for client and server models), and a subscription to the RAM Mobile Data network (201/343-9400, 800/347-0726). RAM Mobile Data runs a private packet-switched network that provides two-way electronic messaging services to 210 metropolitan areas in the United States. Subscriptions usually run $25 to $135 per month depending on usage.

The QuickMail software tells users the size of the messages in their mailboxes, so they can estimate the time and cost of picking up each message. The Intel modems are available from CF Software, at 515/221-1801 or 800/523-7638.

—MARTHA STRIZICH

The QuickMail wireless edition shows the size of each message.
A side-by-side comparison between SyQuest® and the new Bernoulli® 150.

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<th>Bernoulli MultiDisk 150</th>
<th>SyQuest 88c</th>
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<tbody>
<tr>
<td>70% more capacity.</td>
<td>150MB</td>
<td>88MB</td>
</tr>
<tr>
<td>Handles over 3x the shock—no more courier/mail worries.</td>
<td>96 inch drop</td>
<td>30 inch drop</td>
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<tr>
<td>Mounts every time.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2/3 the cart cost per megabyte.</td>
<td>$0.67/MB</td>
<td>$1.00/MB</td>
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<tr>
<td>More capacities to choose from to fit your job.</td>
<td>35, 65, 90, 105, 150MB</td>
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<tr>
<td>Competitive performance.</td>
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<td>20 msec</td>
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<tr>
<td>Resists head crash.</td>
<td>Yes</td>
<td>No</td>
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Circle 111 on reader service card
Are you running yourself ragged trying to manage your AppleShare servers, darting from console to console just to perform day-to-day housekeeping, like adding and deleting users? You’re in luck. Today there are several software packages that can help you manage AppleShare servers scattered all over your network, without ever leaving your desk.

Three such software packages offer a core set of functions that basically do what AppleShare Admin does, only better: TechWorks’ GraceLAN Server Manager 2.0, Sonic Systems’ Server Sentry 2.0, and Farallon Computing’s Timbuktu Pro.

These packages let managers perform the same tasks as with AppleShare Admin, but remotely and/or on multiple servers at once, as well as add a few bells and whistles to Apple’s basic administration utility. But at $400 to $500 each, these packages are a bit pricey for managing a single server. If you have only one server, or you are interested in extending your management capabilities beyond those offered by AppleShare Admin or even some of these remote-management packages, look into AppleShare server utilities (see “Beyond AppleShare Admin”).

**GraceLAN Server Manager**

GraceLAN Server Manager 2.0 is a robust, well-designed, fairly comprehensive server-management package, appropriate for any medium-to-large AppleTalk network. Server Manager’s main improvement over AppleShare Admin—its reason for existence, really—is to allow you to conveniently manage multiple servers simultaneously from one location, provided each server is running an agent system extension.

**FIVE APPleshARE UTILITIES COMPARED**

Server Manager’s Users & Groups administration replaces AppleShare Admin’s familiar window-based interface with a sleek one that enables you to perform routine management chores in about half the time. The administrator can create user accounts entirely from the keyboard, without constantly...
using the mouse for opening and closing user account windows. More important, Server Manager allows administrators to assign multiple users to multiple groups with the press of a single button. In AppleShare Admin you have to open group window after group window and repeat the same select-and-drag to add users to each group. And while AppleShare Admin uses a less-than-intuitive interface for removing users from groups, Server Manager allows you to simply highlight a user name and click on the Deassign button.

Another great feature is Server Manager's ability to import and export text versions of Users & Groups files. Using this feature, the administrator can clone

BEYOND APPleshARE ADMIN

For a better grip on your server than that offered by AppleShare Admin or its remote equivalents, take a look at Trik's Nok Nok A/S ($175; 617/933-8810, 800/766-0356) and Santorini Consulting & Design's Santorini Server Tools ($195; 415/563-6398, 800/851-7824).

Nok Nok A/S

Trik's single-purpose utility runs in the background on an AppleShare server, where it monitors, logs, and controls user log-in and idle times.

Nok Nok also allows administrators to control maximum idle and connect times for their servers, with appropriate messages that alert users to the limits of their accounts, whether superuser, registered user, or guest user. These features help administrators keep users from leaving client machines logged in perpetually, a problem at many sites that poses both a security risk (when the client machine is unattended) and a performance drain (when the client machine is connected to the server but is not actually using it).

To further address security concerns, Nok Nok's log includes not just account names but also the zone and machine name from which each log-in attempt occurs. It also controls the location and maximum size of the log files.

Trik also sells a useful little system extension that lets managers spot-check for security holes. Every time you open the Chooser, Look Out ($49.95) notes which servers in the list allow guest access.

Although Nok Nok A/S's usefulness and low price make it a good buy, at the time of this writing, the utility's future appeared uncertain. Trik has sold its major software offerings to Symantec, which also hired Trik's lead engineers. While Trik will continue to support the software, don't expect updates until or unless the company finds a buyer for Nok Nok A/S.

Santorini Server Tools

A grab bag of ten different single-purpose utilities, Server Tools is designed to fill the chips and holes in AppleShare Admin and the related server-management packages compared in the main article.

All the tools are available individually for $95 or in a bundle for $195. By and large, this means the bundle is very reasonably priced, since most administrators will be able to find use for several of the tools.

Each utility is very precisely targeted to answer a single management need.

Crash Guard, a control panel loaded on server Macs, reboots machines that have hung or crashed, something that seems only to happen when you aren't in the office. It also creates a log file in the System Folder (the same location as the AppleShare Log file), where it documents the date and time, whether the machine hung or crashed, and the fact that the machine was successfully restarted.

Disk Accountant is a dual-purpose tool. Run periodically on a server machine, the application generates two reports. One report details disk space usage by application and document type, the other by responsible account. Moreover, Disk Accountant can take administrator-supplied cost factors and perform all the calculations needed to break down usage of disk space by individual users or by groups, presenting the administrator with a neatly tabulated report of final figures.

Disk Cleaner is a tremendously useful utility. It sorts through a hard disk and puts duplicate files and applications, defunct aliases, empty folders, and all types of miscellaneous files into a list from which the administrator can delete them directly. On a 100MB boot volume that had been in use for about a year, I was able to reclaim more than 12MB of space that had been taken up by aliases that no longer connected to anything, corrupted files, and a truly shocking number of preference files for applications launched only once, long ago.

Server Tracker, which runs on AppleShare 3.0, 4.0, and Pro servers, maintains a log of users' actions such as creating, deleting, moving, renaming, or copying files and folders. Server Tracker is the first application to provide this security-conscious functionality. Although the 1MB application memory-partition that Server Tracker demands is a rather high overhead, it is one that many administrators (particularly those of memory-sparing 3.0 and 4.0 servers) will probably find acceptable. A single-server license of Server Tracker is included in the Server Tools package; multiple-server licenses are available separately.

Cache Register, the most promising utility of the bunch, will quickly become an indispensable part of any administrator's tool kit. It offers a vital service you simply can't get anywhere else: it plots a chart of all the caches on an AppleShare 4.0 or Pro server. Tallying the number of times a cache is used (or hit), it performs some basic statistical analysis that indicates whether you should increase or decrease the amount of RAM dedicated to a particular cache for maximum efficiency.

Since these caches are responsible for a great deal of the new Apple servers' speed advantage, Cache Register is incredibly useful. Real-world cache use can differ greatly from what you expected when you initially set the caches, so this utility can help you get the speediest server possible without needlessly wasting memory on caches.
entire user-account lists from server to server, giving users the appropriate access privileges and passwords on all servers companywide, without having to manually change any details for each server's user and group lists.

Server Manager retains the AppleShare Admin interface for assigning access privileges and passwords to users and groups, but improves on AppleShare Admin's muddled explanation of the inherit versus explicit-privilege option.

Like AppleShare Admin, Server Manager lets administrators add users and groups without interrupting and restarting the server process. This is something of an accomplishment, since ordinarily it requires opening the Users & Groups database, which is already in use when the server is running. To circumvent this problem, Server Manager creates a super-user account for itself, then 85 empty user accounts and 17 empty groups. To create a new user or group, you simply modify one of these accounts and put it into service. (The unused accounts are completely invisible to the administrator from inside Server Manager. However, anyone who is just looking at the server through AppleShare Admin will see the empty accounts.) You can configure Server Manager to replenish any phantom accounts you have modified each day at a time when no users are logged into the server (in the middle of the night, for instance).

Although Server Manager does not support balloon help, it offers a very thorough help system, accessed through a menu choice found under the balloon help icon.

The level of detail provided by Server Manager's error-alert window (which is automatically triggered by common server problems) is also incredibly helpful to neophyte AppleShare administrators. Rather than just naming a problem in technical jargon, the alert carefully explains the nature of the problem and proposes a means of correcting it.

Server Sentry

Server Sentry 2.0 from Sonic Systems offers the same basic features as GraceLAN Server Manager but with a little less panache.

When it comes to administering servers and groups, Server Sentry retains the look of AppleShare Admin, which wasn't designed to administer more than one server at a time. Thus, while Server Sentry's interface looks familiar, it unfortunately multiples AppleShare Admin's profusion of windows by the number of servers being managed. The result can be a desktop so cluttered with windows that it's difficult to tell which window belongs to which server.

Like GraceLAN Server Manager, Server Sentry ships in two parts: an agent application, which runs in the background on AppleShare servers, and a console application, which runs on the administrator's management workstation.

Server Sentry offers a usage histogram similar to GraceLAN Server Manager's, but it stores the information on the server rather than on the Mac running the Server Sentry application. Not only is there more room to save log data on the server, but the agent, always running in the background on the server, can manage the info constantly. (It saves more-recent information in greater detail, and thins out the older historical information to save space.)

Server Sentry can also create phantom accounts (250 users and 100 groups), which you rename and put into service as needed. This feature is optional in Server Sentry, so the administrator must remember to turn it on when initially configuring the server.

Server Sentry allows administrators to drag user and group names between the windows associated with different servers, but unlike GraceLAN Server Manager, Server Sentry cannot copy the user's password, which makes one wonder how the feature could be put to practical use. If the manager creates new accounts without passwords, the users have to log in to the new servers and set the passwords. Unless you individually configure new user accounts to force setting a password on log-in, many users will simply leave their passwords blank and your server riddled with security holes. The alternative is to maintain a table of users' passwords so that when you move accounts, a terrible security risk that would also require banning users from changing their own passwords.

One of the few things that Server Sentry offers that GraceLAN Server Manager doesn't match in some way is the ability to schedule a disk-usage report (or some other report that might take a lot of time and tie up the processor) to be run overnight and delivered to the administrator via E-mail.

Timbuktu Pro

Long a favorite of network administrators, this screen-sharing utility lets you open a window on your desktop through which you can view and control the desktop of another computer (including a server). As a result, Timbuktu Pro lets you do anything you can do with AppleShare Admin, only from your own desktop instead of from the server's keyboard.

Timbuktu Pro, Farallon Computing's impressive upgrade to Timbuktu 5.0, extends Timbuktu's famous ability to control so-called headless servers (server machines sans monitor and keyboard). Now the software can control every type of AppleShare server, whether version 3.X, 4.X, or the new A/UX-based AppleShare Pro. (For more on Timbuktu Pro, see Reviews, in this issue.)

Surprisingly, I was unable to find any bugs or glitches, despite this being the first release with A/UX support. The only drawback is that Timbuktu Pro, ironically, doesn't support Unix's native networking protocol, TCP/IP, when it runs under A/UX. Instead, it forces you to use AppleTalk to control a Unix-based AppleShare Pro server. This is no impediment to administrating the server; you just won't get the speed that you would using Unix-native protocols.
Help with AppleShare Server Management

<table>
<thead>
<tr>
<th>Company</th>
<th>AppleShare Admin</th>
<th>GraceLAN Server Manager 2.0</th>
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* = yes; O = no; NA = not applicable. * is included in the price of the AppleShare Server. \* For two copies of the $199 software, one for the server and one for the desktop machine.

Timbuktu won't make your AppleShare servers any more functional than they are when you administer them directly from their own keyboards, but it will allow you to manage them all from your own desktop, something that will save you steps. It can also help keep physical security tight by allowing server administrators to remove monitors and keyboards from servers and/or place servers in locked closets.

**Worth the Investment?**

Vendors who sell remote-server applications claim they save you many times the cost of the package in time and convenience. But you don't always need everything the packages offer. In fact, sometimes you don't need remote administration at all. Also, since the ways AppleShare servers are used vary so greatly, it's impossible to recommend any one product for all network administrators.

For administrators who manage only a single server, remote management is less a necessity than a luxury. Remote management isn't particularly useful if the server's location is convenient to you. Timbuktu can make life a little easier for the network manager, letting you run a headless server and perform basic management without leaving your desk. However, unless you plan to also use Timbuktu for functions other than AppleShare server administration, your money might be better invested in special-purpose server utilities such as Santorini Consulting & Design's Santorini Server Tools or Trik's Nok Nok A/S, both of which extend your management reach into areas that AppleShare Admin doesn't cover (see "Beyond AppleShare Admin").

If you manage several servers in different locations, a combination of Timbuktu Pro, the appropriate modules from the Server Tools package, and, optionally, Nok Nok A/S provides nearly any type of management service you could possibly need. (You don't need Nok Nok A/S unless you operate in an environment where detailed control and accounting of server usage is important, as when the administrator must charge specific departments by how much they use the server.) Timbuktu is the most comprehensive and powerful remote-management option if you need to manage more than just AppleShare.

But if you administer a truly large site with hundreds of AppleShare servers, configuring several different tools on each server can pose an excessive burden in time and money. In such a case, standards are a blessing, and you may want to consider a single, more comprehensive package. Of the two products compared here, GraceLAN Server Manager wins my vote for its simplicity and adaptability to large networks. I'm especially impressed with its ability to clone user accounts and to display several server settings at once without so many confusing open windows. Besides, it sells for about $100 less than Server Sentry.

Whatever your AppleShare server management needs, choose carefully and consider the future expansion of your network. And remember that when it comes to network management, value is in the eye of the administrator. What's best for you will depend greatly on how many servers you have, how spread out they are, and how much time and money you can afford to spend.

**BILL WOODCOCK** is a member of the board of directors for the Apple Network Manager's Association, author of Networking the Macintosh (McGraw-Hill, 1993), and principal for the Berkeley, California, network consulting firm Zocalo Engineering.
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Circle 47 on reader service card
Adding onto a PowerBook

I'VE PREVIOUSLY COVERED MANY BASIC accessories for PowerBooks—security cables (June 1993), modems (May 1993), memory (September 1993), and printers (February 1994). This time I go beyond the basics to a variety of useful PowerBook accessories. Like the products I covered in the past, these have one thing in common—they all work well on the road.

Keypads

Since the PowerBook lacks a numeric keypad, you normally enter numbers from the top row of the keyboard, a process that can quickly become tiresome. One alternative is to define your own numeric keypad by remapping some of your existing keyboard's keys (see "Embedded Keypads"). Such embedded keypads are pretty hard to use unless you can find a way to attach labels to the redefined keys. Apple decided against doing its own embedded keypad because the necessary labels would have cluttered up the keyboard.

For serious number entry, an external keypad is the best choice. Sophisticated Circuits (206/483-7979, 800/769-3773) follows Apple's keypad layout with 18 keys on its PowerPad (18.9 cubic inches, 8.1 ounces with cable; $115). A special key switches among four modes—number, cursor-key in a diamond layout on the number keys; and two flavors of function-key (F1-F15), one locking and the other a single-keystroke mode that automatically returns to number mode. An LED indicator shows the mode, but you must remember the different codes—off, steady, fast flashing, slow flashing. The enter and plus keys can be swapped to make the keypad mimic common adding machines, enhanced by an included adding machine program, 10 Key Tape. A pass-through ADB port allows you to connect another device.

The NoteBook KeyPad (29.6 cubic inches, 7.3 ounces) from Kensington Microware (415/572-2700, 800/535-4242) has 22 keys, including a horizontal row of four cursor keys on top. Most keys have two modes—number and function key; you switch modes by pressing two cursor keys simultaneously. The Kensington KeyPad sells for $119.95 ($149.95 with a pass-through adapter and adding-machine software).

The $149 Abacus (25.6 cubic inches, 7.8 ounces; Key Tronic Corporation, 509/928-8000, 800/262-6006) has the most keys—28. Its most distinctive feature is an eight-digit LCD display; using its own internal processor, the Abacus operates as a four-function memory calculator whose computations can be transferred to the Mac. Four small cursor keys are arranged in an inverted-T layout (just like on the Mac extended keyboard); six small keys let you select modes (including function-key and calculator modes with a separate indicator light for each) and calculator options.

The Plusware Numeric Keypad (13 cubic inches, 7 ounces; $64.95) from Plusware (905/477-0015, 800/268-7587) has 23 keys, with 4 cursor keys on the right side, plus a shift key for the function-key mode. Unlike on other keypads, Plusware's shift key does not latch; you hold it down with your little finger while pressing another key. The Plusware's thinness is due to its short keystroke design.

The MacPad Extended (35.5 cubic inches, 14 ounces) from SIIG (510/657-8688) resembles the Kensington keypad in layout and operation; street prices go as low as $39. This spring, Mac (213/780-6110) plans to ship the MacAlly keypad with 22 keys and three modes (number, function, cursor); to switch modes you hold down the num lock key and watch two LED indicators. The street price should be about $70.

Which keypad should you get? The PowerPad has the smallest footprint; it's the only one with a hard cover that also acts as a tilt base. Its cable is detachable, to minimize damage from sharp bending where it connects to the device; it's easy to pack—and easy to lose. The MacPad is simpler because it doesn't attempt as many modes. The Abacus has the most functions, yet its mode selection is easier than any of the others'. All of these keypads tread lightly on the PowerBook battery, with low power consumption. And they all work on any Mac; some people use them to replace the extended keypad of the Apple Adjustable Keyboard.
Embedded Keypads

An embedded keypad reassigns standard PowerBook keys to keypad functions. The top keyboard shows the standard PowerBook layout, David Kreindler's freeware PowerBook Numeric Keypad (middle) is an alternate keypad definition that you can select with the Keyboard control panel. Kreindler's keypad assignments closely follow Apple's keypad layout on its desktop keyboards. If you're not locked into this layout, you can use ResEdit's KCHR editor to customize your own, such as this one (bottom), which leaves the top row intact and adds the other numbers below. With either method, you invoke the keypad by holding down the control and option keys (shown in black). Whichever layout you use, you'll probably want to label the remapped keys to keep track of them. If you use the middle layout, you'll have to label 17 keys, whereas the bottom keypad remaps only 7.

Keyboards

The alternative to adding a numeric keypad is to replace the entire keyboard. The problem is that most keyboards are nearly the size of a PowerBook, although much lighter. The smallest keyboard that works with a PowerBook is the discontinued 81-key ADB keyboard sold for the Apple IIgs, which is 29 percent smaller than the standard Macintosh keyboard; nevertheless, it has a numeric keypad and standard key spacing. The MacAlly has a slightly larger, 96-key keyboard that adds a row of 15 function keys. I wouldn't take either one on an airplane trip, but if you travel mainly by car, you may find them convenient.

ADK Ports

If you have a Duo, then you need to add an ADB port with a suitable Dock. The Duo floppy adapter includes an ADB port, as do many larger docks. DGR Technologies (512/476-9853, 800/235-9748) has announced a small, S59 ADB adapter that plugs into the ADB wire inside the power jack to provide a standard ADB connector. (The ADB connector in the power jack controls the external Duo battery charger.) Unlike Apple's battery-powered floppy adapter, the DGR device is not typically portable because it requires an AC power source.

If you need more than one ADB port, you'll need an ADB splitter cable (available from many vendors). Kensington includes a small splitter with some of its keypads; the company has not yet decided if it will offer the splitter separately.

Serial Ports

The two serial ports built into most PowerBooks may not be enough. Computer Gate (408/730-0673) sells a two-position switch (model SB0602) for $8.95 and a four-position one (SB0804) for $12.95 that let you connect more serial devices. You'll need a cable to connect the PowerBook to the switch; the cable type continues.
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depends on the switch's internal wiring. I don't know of any current serial-port device that can be damaged by switching with the power on; check with the manufacturer if you are not sure.

Two companies have electronic switching boxes. The $99 Port Juggler (Momentum, 808/263-0088) automatically switches among four serial-port devices; the supporting software decides which device you need whenever the serial port is turned on. You can also switch manually, via F-keys. (Version 1.0 does not work with MIDI; Momentum says 2.0 will.) The $129 Axion Switch (Axion, 408/522-1900, 800/829-4661) does manual switching among three devices from a control panel or a pull-down menu; devices that use Apple's Communications Toolbox can be switched automatically. The Axion Switch needs a $20 accessory cable to handle a MacRecorder, GDT PowerPrint, or any other device that draws power from the port; the Port Juggler needs no accessories.

Some caveats: If you are using a PowerBook's internal modem, the modem serial port is not active. If you have a LocalTalk network connected through the printer port, these switches suffice for simple printing; for file sharing and other intensive network use, you shouldn't put a switch on the network port.

PowerBook 100 users have just a single serial (printer) port. Sigma Seven Systems (6041743-2416) makes PB Serial Adapter ($99), which puts a modem serial port in the space of the internal modem; a standard mini-DIN connector comes out the telephone line opening. (Sigma Seven can also install a floating-point coprocessor in a Duo 210, 230, or 250, or in a Duo Floppy Adapter.)

Telephone Dialers
My favorite accessory is a telephone dialer. The best I've seen is the $75 Desktop Dialer from Sophisticated Circuits (206/485-7979, 800/769-3773). It connects to the ADB port and can dial on one or two phone lines. In its control panel, you can define dialing hot-keys and dialing prefixes. It can dial any number on screen that you select, although not with all applications (Microsoft Word is not compatible, for example). It's about the size of two audiocassettes and weighs 4 ounces (excluding cables); it uses 5 milliamps of power when inactive, and 50 milliamps briefly during dialing; it has a pass-through ADB port.

CARY LU is a Macworld contributing editor who covers mobile- and remote-computing issues in this monthly column. His books include The Apple Macintosh Book (Microsoft Press, 1992).
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A galaxy of products confirm the Mac–Star Trek link

**The Desktop Critic**

**By David Pogue**

**Consider these amazing morsels:** (1) At the 1994 Official Star Trek Expo in Anaheim, California, 93 percent of the attendees listed themselves as Macintosh users. (2) Both Leonard Nimoy and William Shatner have appeared in PowerBook commercials. (3) The Star Trek screen saver outsells Microsoft Excel three to one.

Actually, none of this is true. But just, it sure ought to be. If you log on to America Online and search for “Star Trek,” 620 files turn up (versus 12 for word processor.) Few online discussion groups are more popular than the Trekkie areas. And the Mac marketplace is flooded with “Star Trek” stuff. Games. Fonts. Sounds. I think I’m definitely onto something here.

So, incidentally, does Kristine Ross. She’s the woman at Paramount Licensing whose permission you need if you want to sell a Mac-based “Star Trek” product. In her words, there’s an “overwhelming correlation” between Mac users and Trekkies. (She doesn’t much mind; since the TV show went off the air in 1966, Trekkies have bought $650 million of Official “Star Trek” Whatever.)

Not just any 30-year-old TV show scores with Mac types; the last time I looked, there weren’t any “60 Minutes” mouse pads or “Flying Nun” screen savers. So what accounts for the intense Mac/Trek symbiosis? Maybe we feel empathy for social outcast Spock—we have counterculture computers; he has pointy ears. Maybe it’s the shocking coincidence that the first two notes of both “Star Trek” TV show themes form an interval of a fourth—the same as the entire Mac II series’ start-up chime. Or maybe it’s the scene in Star Trek IV where Scotty, warped back to 1986, holds a Mac Plus mouse to his mouth and hilariously barks, “Hello, computer!” (Things would have been different if he’d had an AV Mac. Then again, maybe not.)

Anyway, here’s a roundup of the hottest, latest, Mac/Trek stuff for those who like to boldly go where no man has gone before—or to boldly split infinitives, scientifically accompanied by that electronic teletype sound.)

**Star Trek: The Screen Saver 1.0**
From the makers of After Dark comes this collection of 14 screen-saver modules ($49.95; Berkeley Systems, 510/540-5535). Some modules are hilarious: a mirthless, 2-inch Spock slouches across your screen, taking readings and muttering “Fascinating.” Some are deep-down satisfying: as the theme from the TV show plays, you stare into an infinite, black, starry sky as a shining Enterprise glides smoothly past a spinning planet. Other modules make your Mac screen resemble that of a computer on the Enterprise: impressive diagrams of spacecraft floor plans, planets, or medical conditions flash onto your darkened screen, complete with futuristic-looking diagnostic text. (As with all computers portrayed on TV and in movies, screen text is nonsensically accompanied by that electronic teletype sound.)

A handful of the modules are obviously great. Some are obviously fillers, little more than specified editions of existing After Dark modules. Also, as AV Mac owners and some Mac game players have discovered, After Dark isn’t the most compatible screen saver in the galaxy. Once you’ve lectured that caveat, however, if you’re a Trekkie, buy this program. And may the Force be with you at Warp 9. Or whatever.

**Star Trek: 25th Anniversary**
“Fascinating, Captain. A strange and foreign world. Laws of interface we are not familiar with. There appear to be no menus; graphics are colorful, but pixelated and jagged. We cannot even recognize our own faces. Sensors indicate a crude port from an alien operating system.”

“Damn, Jim, I’m a Mac fan, not a detective. How do you play this game?”

“Sir, I’m getting a high-frequency manual here. Indicates a series of eight interactive adventures, each half an Earth day in length. Text appears to be in a crude, all-caps font. There are dozens of icons, but all are unlabeled. And cursor movement is frustratingly jerky, sir.”

“Thank you, Uhura. Shoddy graphics and weak mechanics duly noted. Still, this being the only ‘Star Trek’ product that actually has a plot, characters, and dialogue—pretty good, at that—I’m inclined to proceed. Set course for MacPlay, phone sector 714/553-3550, warp $59.95.”

**Star Trek Font Packs 3.28**
Two sets are available (Bitstream, 617/497-6222): the Bitstream® Li’l BIts™ Star Trek® PostScript® Font Pack and the Bitstream® Li’l BIts™ Star Trek®: The Next Generation™ PostScript® Font Pack. (No exaggeration on those trademark symbols, by the way; let that be a lesson to anyone who thinks it’s a picnic getting the rights to this stuff.)

Anyway, these font packs are terrific. Each contains six fonts, representing virtually every symbol or typeface you’ll ever see in the credits or sets of the corresponding productions. For example, the regular Star Trek pack contains Star Trek (titles and credits of the sixties TV show), Star Trek Film, and even Star Trek Pi (uniform insignia—a for the love of Mike). The Next Generation pack continues...
offers STAR TREK NEXT (title font), Crillee Italic (credits), and Swiss 311 (computer screens, medical monitors, and so on), among others. Fortunately, Bitstream has taken the liberty of filling in each font’s missing lowercase letters, numbers, and symbols. Unfortunately, the company offers no bold or italic versions of these fonts. (And don’t try to make your own, says the otherwise outstanding manual: “Once a character is altered, it is no longer an official STAR TREK character.” Heaven forbid.)

Despite the officialness and gorgeousness of these fonts, you gotta wonder exactly how useful they are. I mean, are you really gonna write letters that begin: “DEAR UNCLE JACK . . .”? Then again, each pack is only $19.95. At that price, you can satisfy the Trekkie inside you without losing self-respect.

Star Trek Mousepad
Wanna know the nice thing about Trekware? It’s that usually the people who sell this stuff are too authenticity-obsessed to scam other Trekkies. Case in point: Moustrak’s Star Trek Mousepad mouse pads ($9.95 or $16.95 depending on size and finish; Moustrak, 702/884-1925). Mouse pads? Jeez, I thought, are we milking the wallets of helpless Trekkies just a little shamelessly, or what?

I needn’t have worried. This is no crumbly foam slab with a tiny Captain Kirk stamped in the lower-right corner. No, we’re talking 8½-by-11-inch, shiny­topped, gorgeously illustrated pads (one is actually 12 by 12 inches). Each pad is covered, edge to edge, by a striking full-color painting in the style of a Star Trek movie poster. Five different designs are available: three feature spectacular images of the Enterprise—passing a gauzy nebula, docking at an immense Federation space station, and so on. Another shows an only slightly goofy rendering of the complete “Next Generation” cast’s heads. My favorite pad shows a breathtaking Klingon cruiser soaring through a yellow sky past an alien, cliffy landscape. Any Trekkie rabid enough to recognize this scene from Star Trek IV should probably buy all five pads and switch them daily.

Star Trek AudioClips
I’ll tell you what makes the blood of Kristine Ross—the licensing lady, remember?—boil. It’s the thousands of “Star Trek” sound and video clips on America Online and other bulletin board systems, posted there illegally by fans for other fans to download and use. All of this recording and distributing goes on without permission (and, need I add, without payments).

Star Trek AudioClips ($37.95 for 66 sound snippets; Sound Source Unlimited, 805/494-9996) are fully authorized by Paramount. But that’s only one reason to love them. These juicy, well-curated collections of dialogue, sound effects, and music snippets have been recorded with incredible clarity from the sound reels of the original TV shows. Since they come with SoundMaster, the little control panel that lets you associate a sound clip with everyday Mac events, you can hear the transporter shimmer when you shut down, or “He’s dead, Jim” when you empty the Trash.

Only one problem: my friend Alison has witnessed an unexpected downside at work—the increasing irritation of coworkers when someone’s Mac broadcasts these blips and beeps all day long.

For that troubled Trekkie, perhaps the trick is to track down additional sets of sounds for variety. There are two AudioClips sets from the original TV show and two sets from “The Next Generation”—not to mention sound-bite sets from Star Wars, 2001, and that sci-fi classic The Wizard of Oz.

The Nitpicker’s Guide for Next-Generation Trekkies
You can find shelves upon shelves of “Star Trek” books, of course. I mention this one ($12.95, Dell, 1993, 433 pages) because (1) it’s new, (2) it perfectly represents the single-minded compulsion of the Trekkie faithful, and (3) it was written by a Mac programmer.

The book’s author is Phil Farrand, who wrote the Finale music notation program (disclaimer: he’s a pal of mine). One day, while watching “Star Trek: TNG,” he noticed something odd: sometimes Enterprise personnel have to touch their little lapel-pin communicators before speaking, and sometimes they don’t. A little research—and a lot of videocassette watching—revealed to Farrand that the series is riddled with inconsistencies, ranging from accidental reflections of the mike­boom holder to Picard’s mispronunciation of alien race­names. (A sequel to the book, documenting similar gaffes in the original series, is in the works.)

Shareware Trekware
I’d be dumb to deny the downloadability of dozens of shareware “Star Trek” programs that Paramount never OK’d. For example, there’s Net Trek, Randy Carr’s 1987, black-and-white arcade­ish space game you play against as many as four other people on your network. Phaser them before they phaser you!

The highlight of the black­market “Star Trek” racket, though, has got to be David Landis’s incredible Star Trek Guide 2.0 stacks for HyperCard. He’s created a separate stack for each series: the original, “Next Generation,” and “Deep Space Nine.” These stacks feature a wowingly complete card for every episode, including title, plot synopsis, air date, guest stars, director, plot lines altered or dropped, mistakes and inside jokes, and so on. Hyper­text links take you directly to references from other episodes. You get balloon help, a Find command, report printing, and even a place to note which tape in your collection contains the episode. (Oh, please.)

By the way, it’s all free. And it’s all in the Macworld area of America Online. Or send three 800K disks and a prepaid ma­teral to David Landis, 12414 Starlight Ln., Bowie, MD 20715.

Merchandise: The Final Frontier
Almost every company insists that the best “Star Trek” Mac stuff is yet to come. Sound Source is readying disks of video clips from the first six Star Trek movies. Mac­Play’s Star Trek game on CD­ROM, featuring dialogue read by the cast of the original TV show, is supposed to ship in six months. And Paramount, the “Star­Trek” company, has big software plans—watch for its “Star Trek: Deep Space Nine” interactive adventure and its CD­ROM Omnimedia.

As if you didn’t know, the future of TV and movies holds more “Star Trek.” This is, alas, the final season of the instant classic “Star Trek: The Next Generation.” But its two spin-off series, “Deep Space Nine” and “Voyager,” will no doubt strike similar chords in the hearts of the Mac faithful. Will fonts, games, and mouse pads be spun off from these future shows? Well, you know what Captain Picard would say: “Make it so!”

Contributing editor DAVID POGUE’s latest book is More Macs for Dummies, sequel to his number one Mac­bestseller. As an infant, he bonded with his father while watching two TV shows: “Star Trek” and “60 Minutes.”
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N 1990, JACK McHENRY confronted the question that every manager of a computer-design team faces when a project is completed: What next? In the dizzying world of personal computers—particularly at Apple, where some Macintosh models lasted about as long as a QuickTime video—this is a perpetually vexing conundrum.

Any engineer's dream is to develop a machine that represents the company's flagship, a computer that embodies not only marketplace realities, but also the company's future. At Apple, many designers had that dream, leading to an implicit competition that demanded a combination of technical knowledge, soothsaying, corporate politicking, and samurai confidence.

Four years ago McHenry's team was coming off a win—the Macintosh IIx, considered at the time a paragon of blazing speed and breathtaking power. This costly beast was one of the first salvos in a fusillade of about a zillion new Macintoshes that came out over the next few years, an ascending spiral of more-powerful models based first on the Motorola 68030 microprocessor, then on the 68040. But some motherboard visionaries at Apple understood that this entire family of processors—beginning with the 68000 that was chosen for the original Mac—was essentially a dead end. In order to process computation-hungry stuff like multimedia, telephone, and voice-recognition applications, Apple would need a more powerful chip. A few people thought the answer was to switch to something that used an exotic technology called RISC.

RISC is an acronym for reduced instruction set computer. Regular microprocessors, like those on the 680X0 family, have rich instruction sets that execute many commands. The inventors of RISC figured out that by cutting the instructions to a very few, you could have a faster processor. Sure, in order to perform the instructions that are no longer hardwired onto the chip, you have to run many more instructions using the few you have. But when the smoke clears, things come out faster with RISC.

Still, in 1990 RISC was a radical departure, a promising technology used in very expensive workstations. In 1990 Apple already had a group working on RISC technology: the Jaguar group. Jaguar got its start from a project that put a RISC chip on a board that fit onto a IIx (the GC board), and now its members were charged with designing a powerful RISC-based computer. The Jaguarians had decided that any Apple RISC computer would have to break cleanly from all previous Macintoshes. In their thinking, the first thing you would do upon switching from the Mac to a new RISC machine was to feed all your software to a neighborhood goat—who would munch on it happily, since it was garbage.

Because this machine would be powerful enough to do all sorts of heretofore impossible things, several technology groups at Apple allied themselves with Jaguar—groups working on projects like interfaces to telephones, audiovisual capabilities, adjustable keyboards, and the voice-recognition system called Plain-Talk. By 1990, there were between 30 and 40 people working on Jaguar-related projects.

McHenry's team, however, approached RISC from a different angle. On a group ski trip in March 1991, they made a decision to develop a RISC machine that would be a direct successor to the Macintosh family and would run the current software base. Considering McHenry's attachment to the Mac, this wasn't surprising. In 1984, McHenry had been an experienced 36-year-old Silicon Valley hardware gypsy who was blown away by the introduction of the Macintosh. "From then on, my goal was to go to Apple and design Macintoshes," he says, and that year he began doing just that.

Cognac

McHenry's new project was code-named Cognac, in honor of a RISC pioneer with a surname identical to a particular after-dinner liqueur. The key people on his team included IIx project holders Robert Holyer and Jonathan Fitch. The latter was also an old Apple hand, having worked on the Lisa.

Cognac and Jaguar, of course, knew of each other's existence. They worked in different buildings, but each kept up on the progress of the other. And each thought the other team was hopelessly misguided. "We thought Jaguar was a second step, not a first step to RISC," says McHenry, with some tact. Others are more frank: "We thought their approach was impossible," recalls Jon Fitch. "We viewed Jaguar," says McHenry, "as the evil empire."
But the tension between the two RISC teams was small beer compared with the disquiet that these units sowed within Apple in general. It is easy to see why: there were literally thousands of people within Apple devoted to extending the current operating system—the world of the 680X0—into the next decade and beyond. If either of these two small groups succeeded in moving Apple into the world of RISC, the company would see an upheaval not experienced since the Macintosh overthrew the Apple II. Though little publicized, this drama was the real subplot of Apple’s development efforts in the early 1990s.

RISCy Business

The main problem with switching to RISC, of course, lay in the deep investment Macintosh users had in their software. One would expect the vendors of high-volume applications like Microsoft Word or Aldus PageMaker to eventually port their wares over to any new Apple platform. But a lot of Mac software falls into the realm of folkware—quirky applications that may not have won a large audience but help to constitute the overall library that makes the Macintosh so valuable. At best, RISC versions of those applications would be slow in coming; at worst, they might never be attempted. If it couldn’t run existing software, a RISC-based computer would be of limited value to Apple’s current customers.

While running Macintosh software was not a priority for the Jaguar team, the Cognac team had to figure out how to build a computer that could run both existing programs and the new generation of applications that would be created specifically for the RISC computer. This meant choosing between two alternatives: either using the RISC chip to emulate a previously existing Macintosh, or shipping a two-in-one computer—a RISC machine with a 680X0 Macintosh chip set alongside.

Emulation is no picnic. It often slows a machine down, and who wants to buy an expensive computer that makes your existing software look like it’s working underwater? The history of dual-processor machines is littered with failures—no matter how elegantly you package them, they wind up as costly compromises. “Dual processors are a nightmare,” says Jon Fitch. “So we were looking for a way not to include a 680X0 chip in the machine.”

The breakthrough came late in 1991 when the Cognac team discovered what became known as the 90/10 rule. As McHenry explains, “It turned out that in a typical Mac application, 90 percent of the computing time is spent on 10 percent of the code.” This meant that it was theoretically possible to do a very fast emulator—it might be possible to actually produce a machine with only the RISC processor. “We could leave out the 680X0!” says McHenry.

Emulating Mac

It was the Jaguar team that wound up shopping for the chip manufacturer to provide Apple’s RISC processor. After a whirlwind tour of every potential RISC provider, including MIPS and even IBM, the Jaguar team wound up making a decision: it would use Motorola chips. Apple execs decided the Cognac team would use the same chips. (The rejected suitors were disappointed, since an Apple adoption of a company’s RISC chip would mean a minimum tenfold increase in sales.) Both teams continued working independently.

Cognac’s hardware design progressed, and in late 1990, the team reached what’s called gray screen (the point at which a prototype, its circuitry working, lights up a monitor). Still, the team knew that its efforts would be wasted if the Macintosh emulation was sluggish. “If there was a [speed] penalty in buying this over the 680X0 Mac, we couldn’t do it,” says Jon Fitch.

The man charged with producing the Cognac emulation scheme was an engineer named Gary Davidian. Before coming to Apple and working on various ROM toolboxes, he had been an experienced microcoder—a person who writes directly to the high-speed instruction sets on microprocessors. When Davidian joined the Cognac team, the Motorola decision had not been made, so every couple of weeks he was writing a new emulator, depending on the RISC chip du jour. It was not easy, making those chips pretend they were 68000s, but as he progressed he learned many tricks. By the time the group settled on Motorola in 1991, Davidian was ready to apply all his knowledge. By midyear, he had an emulator that ran inside a Macintosh LC box using a RISC chip—look, Ma, no 68000! The RISCified LC, which they called RLC, accepted off-the-shelf Macintosh software and ran it at speeds comparable to a Mac II.

“The RLC worked great—it blew away the company,” says McHenry. It emulated almost everything that ran on the Mac—not only the new things but some of the earlier software as well. One particularly triumphant moment was the Cognac team’s demonstration to the Jaguar team in late 1991. The Jaguar engineers attempted to break the emulator with offbeat software—they even dug up some ancient 400K floppies to stump the RISC machine. But the RLC maintained its charade that it was a 68000 computer. And when the RISC machine ran software written specifically for its processor, it churned out Mandelbrot fractals at dizzying speeds.

The success of the RLC prototype was a real milestone on the road to RISC. “Until then, people didn’t think it was possible,” says Wayne Meretsky, who was then a Jaguar engineer. “They didn’t understand that the limited instruction set could do all that.”

Deal with the Devil

As the Cognac team produced more prototypes—by 1992 they had an RLC running the Finder in a Macintosh IIix box—Apple’s executives were busy with another matter entirely. John Sculley and his colleagues had begun negotiations regarding a joint venture with Apple’s former blood enemy: International Business Machines. Ironically, one of the things that first brought Apple and IBM together was the Jaguar team’s search for a RISC chip. Once that back channel was opened, it turned out that Apple and IBM officers had plenty to talk about (maybe they discussed how they hated Bill Gates). In the summer of 1992, after months of top-secret discussions, the companies made an announcement: they would work together on several projects, the most important of which would be the development, working together with Motorola, of a new microprocessor that would be the heart of new machines from Apple and IBM. The chip would be called PowerPC. And it would be a RISC chip.

Apple people called it, with a measure of mockery, The Deal of the Century. As far as Cognac was concerned, it meant at least a retelling of its emulation scheme—using a chip that literally hadn’t been designed yet. Even more daunting, the team had to bring on software wizards to develop an entirely new operating system built around this vapor processor. The PowerPC itself would be a collaboration between companies with cultures so different that some doubted that anything at all could come from it. (Picture Roy Cohn and Alger Hiss sharing a soldering iron.) And all of this had to be completed to meet an incredibly tight deadline—January 24, 1994, the tenth anniversary of Macintosh!

What happened next? See next month’s column to learn how Apple met the challenge.
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Software Shopping by CD-ROM

Electronic catalogs want your business

ONE ARE THE DAYS WHEN we bought all our software at computer dealers. Superstores and mail-order companies now do brisk business. But a new rival has come to town in the form of electronic software catalogs on CD-ROM. The idea itself is simple: Pack product info and demos onto a CD-ROM so Mac owners can try a program before buying it. Give users access to an 800 number they can call to buy the software by exchanging their credit card number for a password that unlocks the program they want to download.

Apple Computer (800/937-2828) and MacZone (800/684-8080) say speed and ease of use are the main benefits of buying via CD-ROM. KidSoft (800/354-6150) says children won't know if they like a program unless they use it, and a CD-ROM lets kids try out programs they can't play with at dealers. Is buying by CD-ROM that quick and easy? Here's what I found by buying software (using a pseudonym) from all three companies.

Interface Tales
Apple's Software Dispatch and MacZone's Instant Access have very different interfaces. Software Dispatch has a nifty QuickTime movie designed to make users feel all warm and fuzzy by explaining how the system works. (Too bad the movie launches every time you use the disc.) The interface is boring but quite functional—a black-and-white format that mimics the Finder in System 7, with triangles that you click on to see more detail.

You can navigate Software Dispatch by product name, company name, category, or price. What you can't do is exit from the initial screen—you must click on Shopping or Special Offers before you can quit the program. You can view product "guided tours" directly from the CD-ROM. Users must copy product demos to a hard drive to use them.

Instant Access has a more attractive color interface but a far less useful navigation system. You can search by product name, if you know it; or you can browse category by category, which can be time-consuming. The search engine isn't always reliable: Advanced Software's In-Touch has two entries, for example, but the find function only located one.

Several operations that could be automatic aren't. You can't take IA's guided tours directly; you must copy them to a hard drive, which takes time and space. (Another small annoyance was IA's insistence on returning to the top level of my hard drive whenever I copied a guided tour or product demo, instead of going to the folder set up for such purposes.)

Navigating the first KidSoft CD-ROM is also a click-heavy experience. (The next version should be easier to negotiate.) You can search for software by its target age group, but there's no simple list of products to scroll. KidSoft is fun, though, because it also offers several small entertainments for children, such as connect-the-dots exercises and picture matching. Applause and aubs rewards the successful gamester. KidSoft's interface is clean, colorful, and direct. And sometimes annoying—you can quit only from the first screen. However deep you are in the program, you have to click on arrows until you get back to the beginning.

Apple's first Software Dispatch is kind of a stealth application. Extensions and other necessary files are copied into the user's System Folder without warning. This obviously irritated early users, who didn't know what to remove to resolve any compatibility problems. (Apple says the next version will inform users what is being copied to their hard drives.)

Instant Access warns you when the application must add files to the System Folder. But that doesn't avoid all compatibility problems. The first IA disc I received didn't work. The MacZone employee who tried to help seemed shocked to hear that I was attempting to run it on a Mac running system extensions and other apps at the same time. (The replacement disc gave me no compatibility problems.)

KidSoft avoids the compatibility issue: it leaves your System alone.

Operators Are Standing By
All three CD-ROMs follow a similar path once your lust for acquisition has been ignited. Software Dispatch users hit the Add to Order button to create a shopping list. Up comes a license agreement for the product, which you must approve before you can proceed. Clicking on Place Order brings up an order form with the product number, name, price, and status (locked), along with the 800 number to call for ordering. If you try to quit with unpurchased products, the program asks if you want to retain the shopping list. If you continue...
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Instant Access doesn't maintain a shopping list on your hard drive automatically; you must save a Purchases folder to your hard drive. If your purchase is interrupted after you create the Purchases folder, IA prompts you to save the same folder again, which you can't do, because one already exists with that name. If you successfully purchase a product and want to buy another, the same maddening thing happens—you must first delete or rename the old Purchases folder.

Apple, an avid collector of demographics, requires its Software Dispatch operators to ask whether you use your computer in a home, school, government, or business setting before allowing you to place an order; at the conclusion of the transaction the operator asks you to take part in a voluntary survey. In between, the operator takes credit card and order information and then provides a code for unlocking the software. A Purchases shopping bag shows up on your desktop with the program, which has been downloaded to your hard drive.

The MacZone folks weren't as noisy as Apple when I called, but they weren't nearly as efficient, either. To buy via Instant Access, you must call one of MacZone's general operators, who then transfers you to an IA specialist. The first time I called, no IA operators were available. On my second try, about 70 minutes later, I was transferred to the wrong person, put on hold, transferred to the right person, and put on hold. It was nearly 6 minutes before someone began to take my order.

During my call, the IA operator started me by saying, "Keep your mouse moving—it's one of the things that can cause it to crash." He was entirely serious, so I kept the cursor moving while I waited, and waited, for the IA database to spit out the code for unlocking the program I was buying. Telephone time elapsed: 17 minutes, 31 seconds.

My KidSoft experience was a marvel of efficiency by comparison. The process was surprisingly quick, considering that the Express Checkout screen completely baffled me. There were no instructions and several blank windows. Even so, in less than 5 minutes I was able to give my product info to the operator and get the secret code to unlock my program. Telephone time elapsed: 4 minutes, 57 seconds.

Since CD-ROMs compete most directly with mail-order companies, I called MacZone to see how ordering a program via mail compared with my CD-ROM experiences. No contest, really. I asked to buy a program, it was in stock, the operator took the information, and I was off the phone in a relative flash. Telephone time elapsed: 3 minutes, 13 seconds.

Of course, the comparison isn't entirely fair. People can't easily play with demo software over the phone lines—at least not yet. And I did have to wait for my program to arrive by mail. But some of the programs on CD-ROM require serial numbers that are tied to manuals, so customers must wait until the manuals arrive before using their programs. And many programs don't come with demos. Finally, the selection remains fairly limited. Large computer dealers may stock 200 or so Mac titles; major mail-order companies stock more than ten times that number. The number of applications available via CD-ROM is far smaller.

Promising but Premature

None of the CD-ROMs provide any reviews or product comparisons, so it's hard for users to evaluate differences between similar programs. And since each program's developer provides the product specs and presentations, any drawbacks in the application aren't publicized. All three companies will refund your money if you have problems with the software you purchase and meet certain conditions. Prices for software bought via CD-ROM are competitive with mail-order prices—and just as subject to change.

Users who already know what they want will not benefit from these discs. People who want to try the demos or get basic information may enjoy using them. But if you need advice or want more in-depth information, this magazine and the experienced staff at a computer dealer, superstore, or mail-order company will probably be much more helpful.

Software distribution via CD-ROM may look promising, but it's not yet ready to rock and roll.
Quantum
3.5" Hard Drives
PowerSTOR Internal External
270MB LPS $269 $329
340MB LPS $289 $349
540MB LPS $479 $539
1080MB Emp $859 $919
1800MB PDR $1139 $1199

2.5" Hard Drives
170MB DDGLS $249
2560MB DDGLS $349
Includes F/WB Personal T $49.95

Toshiba
CD-ROM Drive
PowerCD Dual Speed External $49.99

Epson
3.5" Optical Drive
PowerMO
128MB External w/cart $799
128MB Cartridge $499
Includes F/WB Personal T $49.95

SyQuest
5.25" Removable Drives
PowerSyQuest
44/88/MB Ext w/cart $499
44/MB Cartridge $65
88MB Cartridge $99

3.5" Removable Drives
105MB External w/cart $499
105MB Cartridge $59
270MB External w/cart $699
270MB Cartridge $95
Includes F/WB Personal T $49.95

Wang
3.5" DAT Drive
PowerDAT
16GG External w/tape $1299
120 meter DAT Tape $35
Includes RetractaMax $19.95
Includes F/WB Personal T $49.95

DigitStar

Power PC Accelerators
with Apple Licensed PowerPC ROMs
66MHz PowerPro 601 $369
60MHz PowerPro 601 $329
FastCache PowerPro $519
Turbo 040 Accelerators
25MHz Turbo 040 $639
33MHz Turbo 040 $799
33MHz Turbo 040 w/PC $999
40MHz Turbo 040 $1069
40MHz Turbo 040 w/PC $1649
Turbo 040i Accelerators
20MHz Turbo 040i $579
25MHz Turbo 040i $639
33MHz Turbo 040i $799
33MHz Turbo 040i w/PC $999
Image 040 $1809
Quad 040 $1399
PhotoBoost $779
SCI 2 Boost $259
PrecisionColor Pro 24x $1979
PrecisionColor 24x $1539
PrecisionColor 24x/PC $769
PrecisionColor Pro 24x/PC $469
Video Vision Basic $1559
Video Vision Studio $3499

Global Village

Desktop Mods
TelePort Mercury $329
TelePort Gold $279
TelePort Silver $259
TelePort Bronze II $99
PowerBook Int. Mods
TelePort Mercury $329
TelePort Gold $279
TelePort Silver $259
TelePort Bronze $99

Supra Mods
SupraFax 14.4v2bis $219
SupraFax 14.4L $155
SupraFax 14.4PB $275

SONY

Color Displays
17" CPD1730 $999
17" CPD17SE $1139

Farallon Color Displays
T-1611 $1299
T-20 $2479
Futura SX $359
Futura LX $779

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Don't Be Left Behind.

Suddenly and surprisingly, the markets for digital media and digital communications are exploding before our very eyes. This year is critical. The information superhighway, multimedia, interactive television and video dial tone — the exclusive domain of "visionaries" a few short months ago — are being defined and decided upon right now.

Blink, and you'll miss an opportunity to help shape and profit from a revolution that will challenge the very foundations of how we inform and entertain ourselves.

For the past four years, the place to gain insight on these changes has been Seybold's Digital World Conference and Exposition. This year, 20,000 executives, producers, artists and technologists will gather at the Los Angeles Convention Center June 6-8. Their purpose is to set the digital agenda for 1994 and beyond.

Special Events at Digital World 94:

Join leading writers, directors, producers and other creative professionals at the Creative Cafe, the new interactive media gathering place, sponsored by the Writers Guild of America, West. Visit the Creative Marketplace, a special showcase for content developers, publishers, designers and programmers.

Experience the top 25 interactive media products from around the world at the inauguration of the Interactive Media Festival (IMF).

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"The turn-out [at Digital World] is so high because the realization is dawning that the entertainment industry will be one of the most significant forces behind any near-term success high-tech companies might have in creating things like interactive television."

San Jose Mercury News 6/24/93
THE BEST PRODUCTS FEATURED IN MACWORLD

EDITORS' CHOICE

Edited by Susan Grant-Marsh

Macworld Editors' Choice is a complete listing of the hardware and software products selected as the best of their type in Macworld's comparative articles. A next to a product indicates that we chose more than one product in that category.

Hardware

MONITORS

BLACK-AND-WHITE MONITORS, May 93

Portra it monitor: 15-inch Gray Scale Portrait Display; Mirror Technologies, 612/633-4450; $399, with video-display board $549.

Two-page monitor: D L-View MultiMode; Sigma Designs, 510/770-0100; $1099, with video-display board $1399. D MD 202 Two Page Display; M obius Technologies, 510/654-0556; $699, with video-display board $798.

COLOR MONITORS, Oct 93

16- and 17-inch: D ErgoView 17; Sigma Designs, 510/770-0100; $1349.

MultiSync 5FG; NEC Technologies, 708/860-9500; $1355 (NEC's estimated dealer price).

GRAY-SCALE MONITORS, May 93

Portra it monitor: 15-inch Pivot Display; Radius, 408/434-1010; $849, with video-display board $1148.

Two-page monitor: MultiMode 120, SilverView Pro; Sigma Designs, 510/770-0100; $1099, with video-display board $1299.

SMALL COLOR MONITORS, Jan 94

14-inch display: D Sony CPD 140; Sony Corp. of America, 800/222-7669; $779.95. D N ano FlexScan F340+; N ano USA, 800/800-5202; $799.

15-inch display: D NEC MultiSync 4FG; NEC Technologies, 708/860-9500; estimated street price $755.

NETWORK HARDWARE

HARDWARE ROUTERS, Jul 93

Under $1500: EtherRoute; Compatible Systems, 303/444-9532; base model $1495 (no TCP/IP support).

Between $1500 and $3500: InterRoute/5; Farallon Computing, 510/814-5000; $3299 to $3499.

HIGH-SPEED FAX MODEMS, Oct 93

Teleport Gold and Silver with Global Fax; Global Village Communication, 415/990-8200; Gold $499, Silver $429.

PowerBOOK TOOLS

DUO DOCKING CONNECTORS, Feb 93

PowerLink DeskNet; E-Machines, 503/646-6699; $699.

EXTERNAL HARD DRIVES, Feb 93

D Companion 120; APS Technologies, 800/874-1428; $599. D PocketDrive 120MB; La Cie, 503/520-9000; $699.

INTERNAL FAX MODEMS, Feb 93

D PowerModem series; PSI, 408/559-8454; $195 to $495. D PowerPort series; Global Village Communication, 415/390-8200; $225 to $499.

PRINTERS

COLOR PRINTERS, May 93

Dye-subs: D ColorStream/DS; Mitsubishi International, 408/980-1100; $9950. D Phaser IISD Color Printer; Tektronix, 503/682-7377; $9959.

Thermal-wax: D ColorScript 210; QMS, 205/633-4300; $4995. D Personal ColorPrint PSE; Seiko Instruments, 408/922-6800; $2999.

Low-end liquid-ink: HP DeskWriter 5950C; Hewlett-Packard, 800/252-0900; $1095.

Midrange liquid-ink: HP PaintJet XL300; Hewlett-Packard, 800/752-0900; $1495.

Solid-ink: Phaser III PIX Color Printer; Tektronix, 503/685-3585; $9995.

PERSONAL PRINTERS, Sep 93

INK-jet: D StyleWriter II; Apple Computer, 408/996-1010; $399.

PostScript laser: D Triniti LaserJet Series; Texas Instruments, 935/250-6679; $1199 to $1599.

QuickDraw laser: D LaserWriter Select 300, Apple Computer, 408/996-1010; $1839.

WORKGROUP PRINTERS, Feb 94

High-speed: D Hewlett-Packard 4Si MX; Hewlett-Packard, 800/792-0900; $5499.

Best buy: D Apple LaserWriter Pro 630; Apple Computer, 408/996-1010; $2599. D Hewlett-Packard LaserJet 4M; Hewlett-Packard, 800/792-0900; $2399.

SCANNERS

LOW-COST COLOR SCANNERS, Nov 93

D ColorStream/DS; Mitsubishi International, 408/980-1100; $9950. D Phaser IISD Color Printer; Tektronix, 503/682-7377; $9959.

SYSTEMS/STORAGE

DOUBLE-SPEED CD-ROM DRIVES, Jul 93

Sheer speed: Pioneer DRM-60X; Pioneer, 408/988-1702; $1795.

Overall value: AppleCD 300; Apple Computer, 408/996-1010; $599.

MACINTOSH UPGRADES, Jun 93

Classic accelerator (40MHz): TramWrap Classic; Applied Engineering, 214/241-6060; $79 (with FPU).


SE/30 accelerator (50MHz or 33MHz): Universal PowerCache; DayStar Digital, 404/967-2077; 50MHz $399 (with FPU), 33MHz $449 (without FPU).

LC and LC II upgrades: Macintosh LC LC Logic Board Upgrade; Apple Computer, 408/996-1010; $999.

Mac II accelerators: D Radius Rocket 25i, Radius Rocket 33; Radius, 408/843-1010; $2199, 33 $2499. D Universal PowerCache series; DayStar Digital, 404/967-2077; $449 to $999.

Irix SCSI accelerator: QuickSCSI; PLI, 800/288-8754; $499.

Quadra static-RAM cache card: FastCache Quadra/Use; DayStar Digital, 404/967-2077; $299 for Quadra 700 and 900, $449 for Quadra 800 and 950.

MIDRANGE HARD DRIVES, Mar 93

Low-capacity drive: La Cie Circus 240; La Cie, 503/520-9000; $769.

Notable technology: DiamondDrive 510; Mass Microsystems, 408/512-1200; $2099.

Bargain: APS Fujitsu 520; APS Technologies, 800/874-1428; $1149.

All-around quality: hammer 525FMF; FWB, 415/474-8055; $2799.

OPTICAL DRIVES, Dec 93

3½-inch: D Epson OMD 5010; ClubMac, 800/258-2622; $995. D 128 MO; APS Technologies, 800/874-1428; $899. continues
Software

ACCOUNTING/FINANCE

GROWING A SMALL BUSINESS, Nov 93
Small-business system: M.Y.O.B.; Teleware, 201/586-2200; $199.

Home office/personal finance: Macmoney; Survivor Software, 310/410-9527; $119.95.

PERSONAL FINANCE, Jun 93
+ CheckWriter 4.0; Astric Software, 701/746-6801; $79.
+ Andrew Tobias' Managing Your Money 5.0; MECA Software, 203/256-5000; $79.95.

BUSINESS TOOLS

STATISTICS, Oct 93
Exploratory data analysis: DataDesk 4.1; Data Description, 607/257-1000; $599.

Comprehensive package: SYSTAT 5.2.1; SYSTAT, 708/864-5670; $195.

CD-ROM

TOP 10 CD-ROMS, Mar 94
Overall: Seven Days in August; Time Warner Interactive Group, 818/955-9999; $79.99.

COMMUNICATIONS/NETWORKS

HIGH-SPEED FAX MODEM SOFTWARE, Oct 93
Fastfil; Telefocus, 816/886-9800; $79.

VIDEO/DISPLAY

24-BIT VIDEO CARDS, Apr 94
Inexpensive acceleration: PrecisionColorPro 24XP; Radius, 408/434-1010; $599.

Full-featured acceleration: Thunder II CX+1360; SuperMac Technology, 408/541-6100; $4499.

COLOR LCD PROJECTION, Jan 93
Display panel: Mediapro; mVew Corp., 804/873-1354; $600.

Low-end panel: TFT Rainbow HD Model 700; Chisoms, 408/599-1111; $5295.

Complete LCD projector: System 6000; In Focus Systems, 503/692-4968; $8495.

PHOTOSHOP ACCELERATORS, Apr 94
PhotoBooster; Radius, 408/434-1010; $999.

VIDEO-CAPTURE BOARD, Jan 93
VideoSplgot; SuperMac Technology, 408/541-6100; $449 to $1399, depending on bundling options.

GRAPHICS

2-D CAD, Jan 93
Low-end: BluePrint; Graphsoft, 410/461-9488; $529.

3-D DESIGN, Aug 93
Price for performance: -o- Ray Dream Designer 2.0; Ray Dream, 415/960-0765; $199.
-o- Alias Sketch 1.5; Alias Research, 415/960-0765; $995.

All-in-one solution: -o- Infini·D 2.5; Specular International, 413/253-3100; $995.
-o- StrataVision 3D 2.6.1; Strata, 801/628-5218; $995.

CLIP ART'S GREATEST HITS, Jan 94
Overall collection: -o- ClickArt Studio Series; T/Make r Company, 415/962-0195; $99.95 per volume.

Electronic Clipper subscription service; Dynamic Graphics, 800/255-8800; $67.50 per month. -o- Images with Impact series; 3G Graphics, 800/456-0234; $99.95 to $129.95 per volume, CD-ROM $149.95.

Typographers' ornaments: Fontek; Letravendors: Please write to Macworld Editors' Choice, 501 Second St., San Francisco, CA 94107, or send a fax to 415/442-0766 to inform us of changes in your phone number or your product's list price.

BARGAIN COLLECTION: Monotype ValuePack; Monotype, 312/895-1440; $89 for 57 fonts.

IMAGE DATABASES, Oct 93
+ Aldus Fetch 7.0; Aldus Corp., 206/628-5739; $295.
+ Multi-Ad Search 2; Multi-Ad Services, 303/692-1530; $249.

PAINT AND IMAGE-EDITING, Sep 93
Budget buy: Expert Color Paint; Expert Software, 305/567-9990; $49.95.

Overall program: Fractal Design Painter; Fractal Design Corp., 408/688-8800; $399.

Image-editing program: Adobe Photoshop 2.5.1; Adobe Systems, 415/961-4400; $895.

INTEGRATED SOFTWARE

INTEGRATED SOFTWARE, Feb 94
ClarisWorks; Claris Corporation, 408/727-8227; $299.

ORGANIZATION/PRODUCTIVITY

CALENDARS, Jul 93
Alarm system: -o- First Things First; Visionary Software, 503/234-6200; $79.95.
+ Small Alarms Plus; JAM Software, 203/630-0655; $75.

All-around scheduler: Now Up-to-Date; Now Software, 303/274-2800; $99.

Meeting scheduler: Meeting Maker; On Technology, 617/374-1400; five-pack $495.

SALES-AUTOMATION SOFTWARE, Oct 93
Contact Ease; Westware, 619/660-0356; one user $395, five users $1495.

+ CBS; Colleague Business Software, 512/345-9964; $495.

TEXT-RETRIEVAL SOFTWARE, Dec 93
Small system: On Location; On Technology, 617/374-1400; $129.

Multilater system: Personal Librarian; Personal Library Software, 303/990-1155; $999.

PRESENTATION TOOLS

MULTIMEDIA AUTHORING, Mar 93
Entry-level: -o- Action; Macromedia, 415/252-2000; $495.
+ Passport Producer; Passport Designs, 415/726-0280; $495.

UTILITIES

BRAVE NEW DOCUMENTS, Jan 94
Application-independent document distribution: Common Ground; No Hands Software, 800/598-3823; $185.

Book-length documents: FrameReader; Frame Technology, 800/843-7263; $84.95.

PRINTING, Sep 93
PC-printer cable packages: PowerPrint; GDT Softworks, 604/291-9121; $149.
Star Ratings

OVER 350 HARDWARE AND SOFTWARE REVIEWS AT A GLANCE

Edited by Wendy Sharp

Macworld Star Ratings lets you compare hardware and software products for the Macintosh by providing summaries of hundreds of Macworld's authoritative product reviews. The number of stars at the beginning of each capsule review indicates quality; our reviewers assign five stars to outstanding products and one star to poor ones.

If a product has been upgraded since our last review, the most recent version number supplied by the vendor appears in parentheses after the reviewed version number. To read a full review of any product in the listing, please consult the issue listed at the end of each synopsis.

Vendors: Please write to Macworld Star Ratings, 501 Second St., San Francisco, CA 94107, to inform us of changes in the version number or list price of your product, or of changes to your phone number.

Software

BUSINESS TOOLS

★★★★★ 4D Server 1.0.1 (1.0.5), ACI US, 408/252-4444, $1495 to $3495. Database server uses the ingenuous multitasking technology built into 4D to make it appear that each client has the full resources of the server. If you use 4D on a network, you need this product. Jun 93

★★★★ 4th Dimension 3.0.1 (3.0.5), ACI US, 408/252-4444, $895. Multitasking, which greatly improves speed, makes this upgraded relational database delightful for both developers and end users. For a relational database, it's impressively easy to use. Apr 93

★★★★ AccuZip 6 1.5.2 (1.8.5), Software Publishers, 800/233-0555, $889. Professional-level mail-merge management tool on CD-ROM is the most comprehensive system available, but its aggravating user-interface violations make our reviewer reluctant to recommend it. May 93

★★★★ Acrobat Exchange, Acrobat Distiller, Adobe Systems, 415/961-4400, $195 to $2495. Complete, well-planned paperless office system creates application-independent viewable files that can be readily distributed on a network. Still, it's not yet as inexpensive or as convenient as you might wish. Oct 93

★★★★ @Risk 1.1, Pallside Corp., 607/277-8000, $395. Statistical simulator for Microsoft Excel financial computations generates complex, statistically valid templates within Excel and is the first choice of the analyst who works with probabilistic models every day. It assumes that the user is an Excel power user. Aug 93

★★★★ ClarisWorks 2.0, Claris Corp., 408/727-8227, $299. Integrated program provides more features, is easier to use and faster, and has better integration among modules than other available programs. Aug 93

★★★★★ Common Ground 1.0, No Hands Software, 415/802-5800, $189.95. Simple, robust document-management system is the clear choice for modest-document distribution jobs. In tests, it worked easily with documents from many different applications. Oct 93

★★★★ Cricket Graph III 1.5, Computer Associates International, 516/342-6000, $129. Basic and foolproof charting program produces cleaner charts than Excel with little effort, although its interface is fairly modest. Apr 94

★★★★ DeltaGraph Pro 3, DeltaPoint, 408/648-4000, $195. At its new lower price, this charting program is the best feature-for-feature value in Macintosh charting. There's even a new Chart Advisor function that suggests the appropriate display for your data. Apr 94

★★★★ EasyFlow 1.1, HavenTree Software, 613/544-6035, $229. The rough edges and distinctly un-Mac-like attributes of this flowcharting software reflect its DOS heritage, but on the whole it's easy to use. Sep 93

★★★★ Helix Express 1.0 (2.0), Helix Technologies, 708/465-0242, $439. This relational database has an icon-based programming language that sometimes baffles programmers, but provides an easy route into basic data-handling for nonprogrammers. Jul 93

★★★★ Helix Tracker 1.0, Helix Technologies, 708/465-0242, $439. Well-designed workgroup-document manager has strong audit and annotation features; imposes just the right amount of administrative discipline. For large documents, however, Ethernet will look mighty attractive. Nov 93

★★★★ ihink 2.2.1, High Performance Systems, 603/643-9636, $695. Although it requires a real training commitment for effective use, this product is an attractive dynamic business modeling system. It's a good bet for identifying clunky spots in the crystal ball. May 93

★★★★ Lotus Notes 3.0, Lotus Development Corp., 617/377-8500, $495 per client. Well-organized, robust, and flexible business data system demands a full-time administrator, preferably with considerable programming experience, for effective use. Sep 93

★★★★ MacBarcod 2.2.4, Compad Label, 508/462-0993, $349 to $895. Simple-to-use desk accessory creates bar codes in EPS or Adobe Illustrator 1.1 format. DA cannot automatically create serial codes. Jun 93

★★★★ MacProject Pro 1.0 (1.5), Claris Corp., 408/727-8227, $599. If you're working on a midsize project and like using PERT charts, this may be the project-management software for you. However, the multistep scheduling process and the limited integration between charts are frustrating if you prefer Gantt charts. May 93

★★★★ Marco Polo 2.0, Mainstay, 805/484-9400, $395. Inexpensive, easy-to-use product allows you or your workgroup to archive and retrieve documents, whether in electronic or paper form. Queries are easy to construct and searches are handled quickly. Sep 93

★★★★ Market Master Manager 3.5, Breakthrough Productions, 916/285-0911, $395 to $1995. Sales automation software is designed to keep track of contacts, generate mailings and make sure that leads don't fall through the cracks. It includes a robust module, but it has some odd user-interface features. Oct 93

★★★★ Memorizer 2.0, Brainsoft Engineering, 432-231-2897 (Australia), $100. Software records dictation, and you transcribe the dictation in a word processor. You may prefer to stick with a hand-held tape recorder, considering the product's RAM and storage appetite and its propensity to crash. Aug 93

★★★★ Micro Planner Manager 1.1, Micro Planning International, 303/757-2216, $595. When you require cross-project resource sharing and leveling for a reasonable price, this project-management software has the edge. It has a generally intuitive interface, though there's a steep learning curve for its advanced features. Nov 93

★★★★ Microsoft FoxPro for Macintosh 2.5, Microsoft Corp., 206/882-8080, $495. Dazzlingly fast and easy-to-use relational database has a greatly improved interface and cross-platform compatibility. For projects of 4 to 20 users and large amounts of data (hundreds of thousands to millions of records), it offers excellent performance. Apr 94

★★★★ Office Tracker 1.1, Millum Corp., 512/327-2255, $195 to $995. The efficient user interface of this software sign-out board, in both single-user and networked versions, makes it easy to learn and use: it has some minor flaws. Dec 93

★★★★ OrgChart Express 1.0, Kaetron Software, 713/298-1500, $195. Organization-chart software links a database to standard box-drawing functions. Although the learning curve is steep, the effort may be worthwhile for people who regularly work with large or complex organization charts. Apr 93

★★★★ Project Scheduler 5, Scitor Corp., 415/570-7700, $695. For midrange project-planning, this program's many hits outweigh its few misses. It goes beyond the requisite scheduling options, with inflation factors and unlimited projects in memory, and conforms to accepted standards, so you get consistent, predictable results. Aug 93

★★★★ Useful Voice Processor for Macintosh 1.1V (1.1V), Useful Software Corp., 508/774-8233, $179.95. Dictionary software lets you record and transcribe on a Mac. It has some useful features, but you must take uncommon care to avoid crashes. Dec 93

★★★★ Winge 1.1ae, Informix Software, 913/599-7100, $399. Low-overhead spreadsheet offers advanced-math functionality, a competent calculating engine and superior charts; but is missing outlining, real 3-D continues...
spreadsheet linking, and the host of third-party add-ons offered for Microsoft Excel. Jul 93

★★★★ WordPerfect Works 1.2, WordPerfect Corp., 801/225-5000, $249. This program offers seven well-integrated and flexible modules. It has a few shortcomings, including some memory-management problems, but buyers should generally be pleased. Jun 93

COMMUNICATIONS/NETWORKS

★★ AccessPC 3.0, Insignia Solutions, 415/694-7600, $129.95. Utility translates most word processor and some database formats, but it doesn’t translate graphics, and some of its translations result in data loss. Apr 94

★★ Delrina FaxPro for Macintosh 1.0, Delrina Corp., 408/363-2345, $129. Fast, efficient fax software has an excellent address-book feature but also has some interface quirks and minor bugs. Feb 94

★★★ DOS Mounter Plus 4.0, Dayna Communications, 801/269-7200, $100. File-transfer and transaction utility works with floppy, removable drives, and network volumes and supports word cards in DOS extensions. Apr 94

★★ EtherPeak 2.0.3, LocalPeek 2.0.3, TokenPeek 1.0 (2.0.3), AG Group, 510/937-7900, $495 to $995. Priced at a fraction of the cost of dedicated hardware analyzers, these network analyzer tools give you better analysis with a friendlier interface. They're a worthwhile investment. Jan 94

★★★ MacLinkPlus/Translators Pro 7.5, DataViz, 203/268-0830, $149. If your PC files are unreadable in Mac text, you'll need this file-transfer and translation utility. It's a great option for most users, but it doesn't support removable drives or network volumes. Apr 94

★★ MicroPhone Pro, Software Ventures Corp., 510/644-3232, $295. Truly comprehensive telecommunications package now includes send-and-receive fax software. Although the new TCP/IP tools are complicated, the documentation is clear and precise. Apr 93

★★ On The Air 1.0.1 (1.0.2), Digital Eclipse Software, 510/547-6101, $79.99 to $639.99. Intercom system transmits System 7 SHD resources, SoundEdit, and AIFF sound files across a network. It's well designed and performs decently, but its usefulness seems limited. Aug 93

★★ On The Road 1.1, Connectix, 415/571-5100, $59. Helpful PowerBook utility looks at what's hooked up to your computer and adjusts accordingly—for example, printing when a printer is available and otherwise deferring printing. It only supports some hardware, however, so it can be frustrating. Apr 94

★★ Silver Cloud 1.2, AG Group, 510/937-7900, $495. If you are administering a large network and are drowning in a sea of devices and zones, this network-management software will make your life simpler. Feb 94

★★ SitComm 1.0, Aladdin Systems, 408/761-6200, $120. Inexpensive telecommunications software is fairly easy to set up and use, and will do well for people who use port one or two online services. Still, it lacks true scripting and has limited protocol options. Apr 94

★★ SoftPC 3.1, Insignia Solutions, 415/694-7600, $499. While the speed of this Windows PC emulator is greatly improved, buying an add-in PC card for your Mac is more efficient. Mar 94

★★★★ Timbuktu 5.0.1, Farallon Computing, 510/814-5000, $199 to $5500. By letting one computer (a Mac or a Windows-based PC) control, observe, or exchange data with another computer, this terminal-emulation product allows you to use resources almost anywhere on a network. Mar 94

★★★★ VersaTerm 5.0, Synergy Software, 215/779-0522, $195. The price and feature set of this network-terminal-emulation package make it a terrific value, in spite of its complex documentation and limitations. If you're looking for a fast path to Internet connectivity, this is it. Jan 94

DESKTOP PUBLISHING

★★ AboutFace 1.1.1 (1.1.2), Big Rock Software, 716/288-2860, $69.95. Type-generator has many serious deficiencies that need to be addressed. Jan 94

★★ Aldus Fetch 1.0, Aldus Corp., 206/622-5500, $295. The rich feature set and network support of this image-cataloging software make it a clear winner. Although cataloging is slow, users have fine control of the depth and compression of thumbnails. Aug 93

★★ Aldus PageMaker 5.0, Aldus Corp., 206/622-5500, $895. Desktop publishing software has added the features, both great and small, that it's been lacking, while still retaining the ease-of-use advantages that it's always had. This is a superb upgrade. Nov 93

★★ Aldus Personal Press 2.0, Aldus Corp., 206/628-2320, $199. Basic, inexpensive page-layout program gains strength, but is still missing elements that novice users need, such as automatic kerning. Its software—known best approach to coping with makes manual line-tuning difficult and is likely to confuse beginners. Mar 93

★★★ Cumulus 1.1 (2.0), Canto Software, 415/431-6871, $295 to $3895. Good network support. A feature that creates a protocol file for recording user actions, makes this image-cataloging program a good choice for workgroups. It doesn't have an image-preview feature, nor does it offer 32-bit thumbnails. Aug 93

★★★★ Expanded Book Toolkit 1.0.1 (2.1), The Voyager Company, 310/451-1383, $295. Using this hypermedia publishing program, average mortals can create highly functional multimedia books in a fraction of the time it would take to do the job manually. Beware, though, that it's no QuarkXPress. Jan 93

★★ FontMonger 1.5.7, Ares Software Corp, 415/578-9090, $149.95. Font-convetion utility provides cross-platform, cross-font conversion and makes it easy to create composite, subscript, superscript, and rotated characters. Sep 93

★★ Foto TuneUp 1.1, Agfa Division of Miles, 508/658-5600, $795. Color-management software has a capable engine, but it isn't the complete color-management system Agfa tools. Invisible tech-support and poor documentation were only part of the problem. Apr 94

★★ FrameMaker 4.0, Frame Technology Corp., 408/433-3311, $895. For such projects as long, structured documents—books, instruction manuals, and textbooks—this desktop publishing program is one of the best tools available. It's fast, well mannered, and a real time-saver. Mar 94

★★ ImageAccess 1.0, Nikon, 516/547-4355, $495. This expensive image-cataloging program has an unusual interface and cannot be used over a network. A plug-in module provides direct support for Nikon's LS-350AF film scanner. Aug 93

★★ Kodak ColorSense 1.0, Eastman Kodak, 716/253-0740, $499. Color-management system gives average users access to a reasonable level of color consistency at a reasonable price. It does not make color separations. Oct 93

★★ Kudo Image Browser 1.0 (1.1), Impac Systems Corp., 619/272-2600, $195. This image-cataloging software cannot control thumbnail depth or compression and doesn't have a keyword feature or allow multiple users to access the catalog simultaneously. The unique filter feature lets you quickly scan images. Aug 93

★★ Lazy Dog Foundry Personal Font, Lazy Dog Foundry, 612/291-0306, $199.99 to $499.99. Type 1 font made from your handwriting has clean, even lines—whether or not your handwriting does. Apr 94

★★ Print Shop Deluxe, Broderbund Software, 415/382-4400, $50. Over the last few months, this program has become a must-have for professional-looking graphics, cards, banners, letterhead stationery, and calendars with these desktop publishing templates and graphics. While it's not a substitute for a high-end program, it is easy to use and inexpensive. Apr 94

★★ Publish It Easy 3.0 (3.02), Timeworks, 708/599-1300, $199.95. Desktop-publishing program offers writing, editing, formatting, page-layout, drawing, and painting tools with well-thought-out interface innovations, plus an excellent database manager. Unfortunately, the program is unstable and crash-prone. Mar 93

★★ QuarkXPress 3.2, Quark, 303/894-8888, $895. This upgrade adds the ETC/Color XVersion to ensure the greatest possible fidelity of color images and is a must-have for professional color publishers who use Quark. For others, the enhancements are welcome but minor enough that they provide little incentive to upgrade. Nov 93

★★ SuperATM, Adobe Systems, 415/961-4400, $149. This upgrade to Adobe Type Manager lets you view Adobe-brand PostScript fonts on screen and output them at high resolutions, even when the corresponding printer fonts are unavailable. Although it has limitations, this is an outstanding advance in font technology and a tremendous value. May 93

★★ TableWorks Plus 1.05, Npsoft, 206/392-7745, $299. Publishing utility adds a full-table editor to QuarkXPress and is a must-have for anyone doing even mildly complex tables. Jan 94

EDUCATION

★★★ Algebra 1.0, Broderbund Software, 415/382-4400, $69.95. Interactive, imaginative math tutorial is keyed to the standard textbook order of topics, but offers much more. It is particularly strong on word problems and graphing. May 93

★★★★ Comprehensive Review in Biology, Quest, 203/735-0908, $229. There isn't a textbook publisher in North America with the nerve to publish a black-and-white biology book with nothing more than text and basic line drawings, much less charge several hundred dollars for it, but that, in effect, is what this CD-ROM is. May 93

★★★★ Compton's Multimedia Encyclopedia 1.00M, Compton's New Media, 619/929-2626, $795. The down-to-earth writing style and numerous bells and whistles of this multimedia encyclopedia on CD-ROM appeal to younger readers, but the high cost and sluggish performance may be prohibitive. Apr 93

★★★★ Decimal & Fraction Maze 1.2 (1.2.3), Great Wave Software, 408/438-1990, $69.95 to $89.95. Education software weaves the threads of
eight-math curricula—from third grade to eighth, along with two levels of adult education—into an interesting and visually stimulating game. Jul 93

** Dvorak on Typing 1.0, MacPlay, 714/553-3530, $49.95. Typing tutor offers sold lessons, but the small admonishments, such as never being able to take intermediate or advanced lessons without first passing a test, add up. Jan 93

** HyperStudio, Roger Wagner Publishing, 619/442-0522, $179.95. Hypermedia authoring tool supports color and multimedia functions through easy-to-use dialog boxes, but the interface doesn't always follow Apple guidelines. Oct 93

** MacGrade 1.5.5, Callid Software, 800/793-0641, $85 to $245. Grade-book program has a straightforward, simple interface and clear documentation. Although there's room for improvement, it's easy to use and flexible. Feb 94

** Mavis Beacon Teaches Typing 2.0, The Software Toolworks, 415/883-3000, $49.95. If being entertained while learning to type interests you, this typing tutor provides various environments, interesting lessons, and good games. Jun 93

** Millie's Math House 1.0 (1.1), Edmark Corp., 206/556-8400, $49.95. Math-education software provides ways for preschoolers to experiment with numbers and counting. It's engaging, but more advanced levels would keep children challenged longer. Jul 93

** The New Grolier Multimedia Encyclopedia, Grolier Electronic Publishing, 203/797-3530, $395. The scholarly text of this encyclopedia on CD-ROM is suitable for sophisticated readers, while its speed, ease of use, and value are impressive. Apr 93

** The Rosetta Stone, Fairfield Language Technologies, 780/432-6166, $395. Foreign-language instruction on CD-ROM is a valuable educational tool and fun to use. The lessons are well paced, and the content is generally excellent and diverse. Jan 94

** The Secret Codes of C.Y.P.H.E.R. 1.0, Presto Studios, 619/689-8495, $69.95. The many-branched, interwoven, hypertext style documentation of this music-education CD-ROM makes it hard to navigate, but the interface isn't completely Mac-like. Apr 93

** Motorcycle Maniac: Hellcat Racing 1.0, MacPlay, 714/553-3530, $49.95. Learn the strategies you need to win at blackjack with this program. There are a number of trivial bugs, but they won't get in the way. Oct 93

** Cogito 1.0 (1.04), Inline Software, 203/435-4955, $59.95. Rubik's Cube fans will like this challenging game where the goal is to replicate a pattern by moving rows and columns of tiles. It gets more and more complex as you progress through the 120 levels. Apr 93

** Daily Sports Quiz 1.0, DreamTime, 619/236-1341, $49.95. If you think you know a lot about sports and love to play trivia games, then this entertaining and informative game is for you. Oct 93

** Falcon MC 1.0, Spectrum HoloByte, 510/522-1164, $69.95. Whether you're an armchair jet pilot or an experienced fighter pilot, you're bound to be impressed by the 4-bit color, enhanced graphics, and sophistication of this latest incarnation of the original Maitosh combat flight simulator. Dec 93

** Hell Cab 1.0, Time Warner Interactive, 818/955-9999, $99.99. Take a diabolical cabbie with a penchant for time travel, toss in the Empire State Building, add a few brain teasers, and you've got this engaging game on CD-ROM. It's slow and the arcade sections are hard to control, but overall it succeeds. Jun 93

** Hellcats Over the Pacific 1.0.3, Graphic Simulations, 214/693-7400, $69.95. Fly a WWII-era Navy fighter, the Grumman F6F Hellcat, against enemy planes in the South Pacific with this flight simulator that offers smooth graphics, good special effects, and great documentation. Apr 93

** Indiana Jones and the Fate of Atlantis, LucasArts Games, 415/721-3394, $59.95. In this game, the whip-wielding archaeologist goes looking for Atlantis and finds it armed to the gills with magical technology and Nazi stooges. If you're not bothered by the story's astonishing sexism, you'll find it intriguing. Oct 93

** The Journeyman Project 1.0 (1.2), Presto Studios, 619/689-4895, $79.95. Interactive science-fiction epic on CD-ROM is a work of art. The scenes are rich with painstakingly detailed graphics, elaborate models, and subtle textures, but the sluggish pace may leave you impatient and bored. Sep 93

** Maelstrom 1.0, Evoltech, 203/643-1090, $55 plus shipping and handling. Fast-paced arcade game is loosely modeled after Asteroids, the Atari classic. Maelstrom features superb animation, hilarious sound effects, exciting action—and best of all, it's shareware. Jun 93

** Monkey Island 2: LeChuck's Revenge, LucasArts Games, 415/721-3394, $59.95. This whimsical Twilight Zone of life on the sea in the adventure-game equivalent of island magazine, filled with splendid out-of-joks, hoagies of self-parody, and enough bizarre detail to keep you amused for days. May 93

** Mozart: The "Dissonant" Quartet, The Voyager Company, 310/451-1383, $59.95. CD-ROM includes an unusual essay on stringed instruments, discussions of general musical concepts, an analytical overview of the quartet, and a taped.minilecture on Mozart; but the music is limited almost entirely to the late piece. Apr 93

** Myst 1.0, Broderbund Software, 415/382-4400, $59.95. The smooth pacing of actions and sounds in this beautiful CD-ROM game will give you a dreamlike quality. This is a game that's been polished until it shines. Mar 94

** The Orchestra: The Instruments Revealed, Time Warner Interactive Group, 818/955-9999, $79.95. The many-branched, interwoven, hypertext style of this music-education CD-ROM makes it hard to navigate and digest, despite its richness. For the price, other music-education CD-ROMs present better values. Apr 93

** Richard Strauss: Three Tone Poems, The Voyager Company, 310/451-1383, $59.95. Don Juan, Till Eulenspiegel, and Death and Transfiguration are included in this CD-ROM. The musical analysis is satisfying, and the lush orchestral music will appeal to both novice and experienced classical music listeners. Apr 93

** Shubert: "The Trout" Quintet, The Voyager Company, 310/451-1383, $59.95. Alan Rich, classical music commentator for NPR, conveys his enthusiasm for this appealing music in this CD-ROM's lively text. The discussion is relatively unchallenging, and the musical performance is not at the top of most reviewers' lists. Apr 93

** The Secret Codes of C.Y.P.H.E.R. 1.0, Presto Studios, 619/689-8495, $69.95 to $89.95. The pleasure of this game comes not in high scores, but in the almost addictive sense of control you get from moving your tank around the screen. It's so much fun that it's even fun when you lose. Dec 93

** Super Mines 1.0, Callisto Corp., 503/241-4381, $59.95. As Roger Wilco, starship janitor, you must defeat the evil Sariens in this adventure game where your head is more important than your hands. For most players the game will be easy to complete. Apr 93

** The Flight of the Bumblebee, Spectre Supreme, Velocity Development, 415/274-8840, $69.95 to $89.95. This is a game that's been polished until it shines. Dec 93

** Who Killed Sam Rupert, Creative Multimedia Corp., 503/241-4351, $39.99. You're a police detective trying to solve the murder of a popular restaurateur in this interactive CD-ROM that exploits the full range of multimedia options and provides a wealth of clues and surprises to hold your interest. May 93

FINANCE/ACCOUNTING

** Andy Tobias' TaxCut 1993, MECA Software, 203/255-1441, $79.95. The free-form approach and flexible Help menus of this tax-preparation software make filling out your tax return a smooth, almost relaxing process. The only state versions available are Cali-
Star Ratings

** BestBooks 1.0, Teleware, 201/586-2200, $99. In a straightforward, unimmitigating manner, this small-business accounting program integrates the standard bookkeeping functions of accounts receivable, accounts payable, and general ledger. Apr 93

** ExpensePlus 1.0.1, State Of The Art, 714/753-1223, $139.95 to $195.95. Software uses a Newton MessagePad to record expenses, then sends the data to a Mac to create and print expense reports. While it's a real time-saver, you need AppleScript expertise to modify the expense reports. Apr 94

** MacinTax 1993, ChipSoft, 602/295-3110, $69.95. Tax-preparation software provides a reasonably detailed manual and a reliable, structured interface for building your tax return. It's inaccessible to accept figures containing amounts in cents or to round off to whole dollar amounts will frustrate some users. Apr 94

** MacinTax Tax Planner, ChipSoft, 602/295-3110, $19.95. Software allows you to construct a five-year forecast of your tax liability, projecting tax figures through 1997 in a concise summary format. If you have a tax-preparation program, you can do the same thing by creating alternative tax returns. Apr 94

** MacinTax Tax Savings Guide, ChipSoft, 602/295-3110, $14.95. Simple, straightforward collection of well-written, fully indexed tax tips and suggestions is designed to help you better understand your tax return and reduce your tax liability. Although strong in context, it doesn't include forms, a tax glossary and paste, export as a text file, or even print. Apr 94

** Quicken 4, Intuit, 415/898-6095, $69.95. Personal-finance software is powerful and easy to learn, even for a financial neophyte. Although slower than previous versions, 4.0 lives up to its promise of making financial chores easier and better organized. Nov 93

** WealthBuilder 2.0, Reality Technologies, 800/346-2024, $79.95. Financial-planning software forces you to think about your money and helps you develop an investment plan. It's a good program for beginning investors, but more-sophisticated investors will want more-advanced features. May 93

GRAPhICS

** addDepth 1.0.2, Ray Dream, 415/960-0768, $179. The purpose of this graphics program is to enhance the creation of 2-D images with 3-D effects. It's versatile, accommodating, and affordable, but working on complex images gets tedious because of the automatic application of styles. Aug 93

** Adobe Dimensions, Adobe Systems, 415/961-4400, $199. This three-dimensional-effects utility may seem very limited, with white-only light and no surface texturing, but it's a ground-breaking product. It performs its 3-D illusions within the object-oriented, resolution-independent world of PostScript. Apr 93

** Adobe Illustrator 5.0, Adobe Systems, 415/961-4408, $595. The Mac's most dependable drawing program addresses Adobe's new features to beguile the mind. It still can't import TIFF images, but it catches up with, and in some areas surpasses, the competition. Nov 93

** Adobe Photoshop 2.5 (2.51), Adobe Systems, 415/961-4400, $895. No graphics program is as universally loved as this one, but while this upgrade builds on the program's capabilities, it ignores some minor weaknesses that have begun to peek through the product's armor. It's still great but perhaps not perfect. Jun 93

** Aldus FreeHand 4.0, Aldus Corp., 206/622-5500, $595. The new page-design and text-editing functions of this powerful draw program make it more than worth the price of admission. Aside from some bewildering interface elements, it's an outstanding program. Mar 94

** Alias Sketch 1.5, Alias Research, 416/362-9181, $995. The enhanced model and revamped rendering capabilities of this 3-D illustration program contribute to a terrific, better program for less. A heartening example of a company listening to its users. Jul 93

** ArtBeat Professional 1.0, Plo Practical Solutions, 201/902-9500, $249. Despite a smattering of unique capabilities, this inexpensive draw/paint program lacks features of equivalent programs. Apr 93

** artWorks 1.0 (1.01), Deneba Software, 305/596-5644, $149. If you're expecting a graphics dynamo, this combination paint and draw program will leave you a little cold. Despite its flaws, it ranks as one of the best graphics programs on the market. Oct 93

** Blueprint 4, Graphsoft, 410/290-5114, $295. Entry-level 2-D drafting program is a wonderful antidote to the complicated CAD system build before. Not to be misled by the low price; this full-featured drafting package is powerful enough to serve professionals who appreciate the value of simplicity. Jul 93

** BrushStrokes 1.0, Claris Clear Choice, 408/727-8227, $139. If you have absolutely no experience with computer graphics, the simplified interface of this 24-bit paint program might warrant its price. Otherwise, you'd prefer a more refined program for less. Oct 93

** CA-Cricket Draw III 2.0 (2.01), Computer Associates International, 516/342-5224, $249. This draw program is not going to inspire experienced Mac artists to jump up and down, but its features are abundant, the interface is straightforward, and the price is right. Oct 93

** Canvas 3.5, Deneba Software, 305/596-5644, $399. Draw program offers two to three times as many features as any competing program, but our reviewer would prefer an interface that you can navigate without scrambling for the manual. Jan 94

** ColorIt 2.0.1, MicroFrontier, 800/388-8109, $299.95. Overpriced color paint program has a full range of painting and image-retouching capabilities, including 15 levels of undo and an impressive magic-wand tool, but its naming conventions are bewildering. Apr 93

** ColorUp 1.0, Pantone, 201/935-5500, $599.95. Professional graphic designers don't need the advice of this color tutorial and series of palettes. Although nonprofessionals might benefit from the information on color theory, it may not be worth the money. Nov 93

** CPM Graphic Tutor 1 & 2, Cassey's Page Mill, 303/220-1463, $489 per volume. Although some neophytes may find these CD-ROM tutorials on Adobe Illustrator and Adobe Photoshop helpful, the programs' dualistic approach and inconsistent execution, lack of polish, and high price weigh strongly against them. May 93

** DeBabelizer 1.5 (1.5.5), Equilibrium Technologies, 415/332-6433, $295. Bitmapped-graphics-converson software supports a huge number of file formats and can work wonders. If you spend any significant time dealing with file conversion, you should have this program. Nov 93

** Easy Color Paint 3.0, MECC, 612/569-1500, $59.95. For a program that purports simplicity, this color paint program lacks image-editing tools but has a versatile cast of selection and painting tools—and it's priced to sell. Apr 93

** Easy Print 1.0, MicroFrontier, 800/388-8109, $59.95. Straightforward color paint program lacks image-editing tools but has a versatile cast of selection and painting tools—and it's priced to sell. Apr 93

** Fractal Design Painter 2.0, Fractal Design Corp., 408/688-8800, $399. If you can put up with a few inconveniences, this color paint software provides the tools required by professional artists, and many of its functions—natural-media brush tools, the color-sensitive magic wand—are entirely without peer. Jul 93

** Generic CADD 2.0, Autodesk, 206/487-2233, $945. Competent, midlevel 2-D drafting program has a well-executed XMac interface, a good complement of tools, and a sprinkling of high-end features, such as floating-point precision. Aug 93

** Image Assistant 1.0, Caere Corp., 408/395-7000, $1595. Besides amastfully addressing Adobe Photoshop's small list of liabilities, this image-editing software's problems include an unforgivable lack of anti-aliased text, no selective revert function, and an incorrectly implemented smudge tool. Apr 93

** Infinite-D 2.5.1, Specular International, 413/253-3100, $599.95. Servicable 2-D graphics program has a wide range of rendering, animation, and options, with a straightforward interface and quick operating speed. If it weren't for the bloated price, it would be the ideal entry-level program. Feb 94

** Ofoto 2.0 (2.02), Light Source Computer Images, 415/461-8000, $395. Many new features—notably color support—have been added to the already impressive toolbox of this scanning software. It often produces good results, but it rarely produces the best scan possible for a given image and output method. Jul 93

** Paint I.t, MicroFrontier, 800/388-8109, $59.95. Straightforward color paint program lacks image-editing tools but has a versatile cast of selection and painting tools—and it's priced to sell. Apr 93

** PosterWorks 3.0, S. H. Pierce & Co., 617/388-2222, $395. This large-format graphics production tool is for people who think big, up to 10,000 square feet big. It fills the need for user-defined, full-color, large-format output robustly and elegantly. Aug 93

** PowerDraw 4.0 (4.5), Engineered Software, 910/299-4843, $795. The best new feature of this polished 2-D drafting program is an open architecture that supports modules that you can add to customize the program with application-specific tools, floating palettes, and menu commands. Sep 93

** Showplace 2.0, Pixar, 510/236-4000, $495 to $695. Adequate, entry-level 3-D modeler is suitable for illustration and other graphic arts applications. This version offers improved access to MacRenderMan, one of the best renderers around, plus plug-in modeling tools. Apr 94

** StrataVision 3D 2.6.3, Strata, 801/628-5218, $595. A 3-D program includes animation, and a superior rendering tool and versatile modeler. It's a challenge to learn, however, as the interface is overly dense and sometimes sluggish. Feb 94

** StudioPro 1.0, Strata, 801/628-5218, $1495. If you need a well-balanced, all-in-one 3-D modeling, rendering, and animation solution, this application is an excellent choice. Mar 94

** Transverter Pro 1.0 (1.51), TechPool,
**BUYERS’ TOOLS**

**Star Ratings**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>★★☆☆☆</td>
<td>Now Contact 1.0, Now Software, 503/274-2800, $599. This contact manager has some innovative features and could easily become the top address-book program for the Mac by adding some features, such as file reconciliation. May 94</td>
</tr>
<tr>
<td>★★☆☆☆</td>
<td>Now Up-to-Date 2.0, Now Software, 503/274-2800, $69.95 to $599. Calendar utility combines flexibility, ease-of-use, and streamlined operations in an almost irresistible package. The Reminder control panel, under the Calendar window's menu, has had minor conflicts. Jun 93</td>
</tr>
<tr>
<td>★★★★★</td>
<td>Power Team 1.0, ProVue Development Corp., 714/892-8199, $149.95. Personal information manager consists of seven modules: Phone Book, Calendar, Correspondence, Checkbook, Calculator, Expense Report, and Mailing List. It has some bugs, but the data entry features are excellent. Oct 93</td>
</tr>
<tr>
<td>★★★★★</td>
<td>Rae Assist 1.0, Rae Technology, 408/725-2850, $199. Although this personal-information manager offers some fresh ideas, including automatic linking of company and contact information, it's too big and too slow. Apr 94</td>
</tr>
<tr>
<td>★★★★★</td>
<td>TimeVision 1.0, Powercore, 815/668-3737, $99. New scheduler with notepad and card-filing functions lacks on some worthwhile features, but in general doesn’t match up to the competition. May 93</td>
</tr>
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**PRESENTATION TOOLS**

- **Adobe Premiere 3.0, Adobe Systems, 415/961-4400, $695.** Solid and dependable QuickTime video-editing software offers a structured, responsive, and flexible interface with enhancements that range from the mundane to the dramatic. It can now mix 99 tracks. Jan 94
- **Astonish 1.0, Gold Disk, 408/982-0200, $399.** Presentation software lets you include sound, text, and animations within a multimedia package that you can take with you. Apr 94
- **Authorware Professional 2.0.1, Macromedia, 415/252-2000, $499.** Multimedia-authoring software lets you develop complex presentations with amazing speed. Although expensive, it’s wonderfully done and will pay for itself in time saved. Feb 94
- **Avid VideoShop 2.0, Avid Technology, 508/660-6798, $499.** QuickTime video-editing program shines in its intuitive, easy-to-use interface, although it may fail short on features for serious video professionals. Feb 94
- **Comet CG 1.0.3 (2.2), MSI, 317/842-5097, $995.** Program for generating artificial text over live video is reasonably priced combined with dedicated graphics systems, but often fails to be as seamless as its limitations as you are impressed by its capabilities. May 93
- **CoSa After Effects 1.1, CoSa, 417/831-2672, $1295.** QuickTime movie editor blurs the boundaries between animation and traditional video-editing. It produces results that simply can’t be created in other packages. Oct 93
- **Elstatic Reality 1.0, ASDG, 608/273-6585, $349.** Exotic morphing tool can create professional-caliber results—if you can figure out how to use it. The needlessly convoluted interface, poor documentation, and inadequate tech support make that a difficult task. Feb 94
- **Hi Rez Audio Volume 1.0, Presto Studios, 619/689-4895, $149.95.** The enjoyable, high-quality music on this CD-ROM adds a nice touch to presentations. The software for browsing the music is quirky, and the product could use some documentation. Jul 93
- **Interactive Training for Director 1.1, Media in Motion, 415/621-0707, $199.** This somewhat expensive program teaches basic Macromedia Director skills and provides a foundation for exploring Director's other features. It has a clear, often light-hearted approach, but navigating the lessons can be frustrating. Jun 93
- **Media-Pedia Video Clips, Media-Pedia, 617/235-5617, $195 to $495.** Fifty-seven minutes of stock footage for use in QuickTime movies includes over 150 different segments, ranging from unremarkable to dramatic. Nov 93
- **Morph 2.0, Gryphon Software Corp., 619/454-6836, $239.** Easy-to-use morphing software is beautifully designed, with delightful new features such as the ability to morph QuickTime movies. Using it is as painless as morphing gets. Jun 93
- **MovieWorks 1.1, Interactive Solutions, 415/377-0136, $395.** Over 100 bugs were fixed in version 1.1 of this multimedia authoring software that takes an all-in-one approach to creating presentations, but problems remain. It's a good idea, poorly executed. Jun 93
- **QuickFlix 1.0, VideoFusion, 419/891-1090, $149.** Approachable QuickTime moviemaking software lacks the high-end features of other programs but costs a whole lot less. Feb 94
- **VideoFusion 1.0.1 (1.5), VideoFusion, 419/891-1090, $499.** Collection of special effects for QuickTime movies may not be for the casual user, but if you have the equipment and you can't live without spinning logs, then go ahead and indulge. Jul 93
- **Working Model 2.0, Knowledge Revolution, 415/553-8153, $495.** Animators and engineers will love this terrific motion simulator that mimics real motion by applying physical laws to objects. It's easy to learn and use, but you'll need some understanding of math and physics. Oct 93

**PROGRAMMING**

- **Climate 1.0, Orchard Software, 617/876-4608, $59.95.** With a little more documentation and a few more sample programs, this utility that provides a subset of Unix-like commands for the Mac environment could be an irresistible package. Oct 93
- **EISToolKit 2.0 (2.1), MicroStrategy, 302/427-8800, $1995.** Reliable, field-tested developer's environment for creating executive information systems provides automatic access to information in spreadsheet and database sources, across a distributed database environ. May 93
- **FutureBASIC 1.0 (2.0), Zedcor, 602/881-8101, $299.95.** Complete, easy-to-learn, real-world programming tool has full Toolbox, System 7, and assembler support. It's a wonderful tool that's rapidly becoming a favorite among commercial developers. Jul 93
- **Macintosh Common Lisp 2.0 (2.0.1), APDA, 716/871-6555, $495.** Anyone who likes programming in LISP will be pleased with the environment provided by this version of the standard dialect and its extensive debugging and interface-building facilities. Oct 93
- **Object Logo Student Edition, Paradigm Software, 617/576-7675, $49.95.** This book-plus-disk package offers a wide-ranging introduction to programming concepts. It's aimed roughly at the high-school educational level and lets you see something happen for every few lines of code you type. Jul 93
- **Object Master for Think C and C++, ACI US, 408/252-4444, $255.** Object-oriented development environment is full of goodies and will pay for itself in about a week, due to increased programmer productivity. Apr 94
- **PG:Pro 1.5 (2.1), Staz Software, 601/255-7085, $169.** For part-time or novice programmers, the combination of these BASIC programming tools and FutureBASIC is a fast path to a working program. Jul 93
- **PowerWorks 2.0, NDG Phoenix, 301/718-8880, $225.** Programmers' tool kit for 4th Dimension provides 280 external procedures to improve custom applications and exploit System 7 features. Don't expect any quick fixes for 4D's less-than-blistering performance in most areas, though. Oct 93
- **Smalltalk/TV for Macintosh 2.0, DigitalTalk, 714/513-3000, $495.** Object-oriented development system is now even more viable for commercial projects, while DigitalTalk's customer support and documentation set a standard other vendors should emulate. Feb 94
- **SoftPolish 1.1, Language Systems Corp., 703/478-0181, $295.** Program-quality-assurance utility systematically checks the resources in a program's interface against a huge laundry list of errors. It's a programming tool for anyone who hopes to produce a commercial Mac application. Sep 93
- **SourceSafe 2.1, One Tree Software, 919/821-3300, $295 to $1195.** Solid, relatively easy-to-use product handles program-development administrative tasks, including version control, for multiprogramming packages being created by several groups. Sep 93
- **Symantec C++ for Macintosh 6.0, Symantec Corp., 408/293-9600, $499.** If you like Think C, you'll like this software-development system, too. For the Mac, it's an excellent opportunity to catch a new wave in programming. Nov 93

**UTILITIES**

- **7th Heaven 2.5 (2.5.1), Logical Solutions, 612/659-4295, $59.95.** Our reviewer found the seven enhancements to System 7 fun and elegantly done, but not all of them were useful. Jul 93
- **Alki Seek 2.1, Alki Software Corp., 206/286-2600, $399.95.** Competent file-finding utility scans by file name or content and lets you combine multiple search criteria. It cannot search in the background or find text in compressed files. Jul 93
- **Billy Steinberg's PBTools 1.0.1, Inline Software, 503-435-4995, $59.95.** If you want basic PowerBook management without added frills or complex menu-bar displays, this collection of four utilities may be just your cup of tea. Jul 93
- **Chameleon 2.0.3 (2.1), Logical Solutions, 612/659-2495, $59.95.** Sleek desktop-pattern editor comes with an ample supply of rich, textured color images and a set of limited but functional editing tools. Sep 93
- **ClickChange 2.0, Dubl-Click Software, 818/888-2068, $89.95.** Interface-customizing package has nothing you need but is filled with everything you want, including tools that let you alter major elements of the Mac's look and feel. Aug 93
- **Connectix Desktop Utilities 1.0 (1.0.1), Connectix Corp., 415/571-5100, $39.** Although some of the 16 utilities offered in this package are more at home on a PowerBook, this collection offers one-stop shopping at a low price. It's worth it if the file-synchronization, Keyboard Power, and Hot Keys features alone. Nov 93
CopyDouble 2.0 (2.0.1), Symantec/Fifth Generation Systems, 504/291-7221, $59.
This utility speeds up copying, lets you queue jobs for background copying, and offers a variety of other useful, copying-oriented features—all at a very reasonable price. Nov 93

Copyright Pro 1.0.3, CSG Technologies, 415/247-7170, $79. Utility takes over the Finder's copying function, copies in the background, and allows you to regularly schedule copying. It doesn't speed up copying, however. Nov 93

CPU 2.0 (2.0.1), Connectix Corp., 415/571-5100, $99. Reasonably priced collection of utilities for the PowerBook adds new features, including file synchronization, that easily justify the upgrade price. Sep 93


DiskIt Direct 1.0, Dantz Development Corp., 510/253-3000, $49.95. Basic but efficient backup system is simple and painless enough to foster better backup habits in anyone who uses it. It doesn't back up to hard drives or tape drives. May 93

DiskLock PB 1.0, Symantec/Fifth Generation Systems, 504/291-7221, $59. PowerBook security software balances robust security with simplicity and ease of use. It's much harder to crack than most PowerBook utility collections' security features, and will keep out all but the most determined. Jan 94

The Disney Collection Screen Saver, Berkeley Systems, 510/540-5535, $49.95. Mickey, Goofy, Peter Pan, Ariel, and other Disney favorites cavort around your screen with this screen saver that includes 16 different modules. Mar 94

DriveShare 1.03, Casa Blancas Works, 415/461-2227, $129.95. This utility allows users to share a removable drive over a network. It's most useful if your network consists of both System 6 and System 7 users, as its advantages over System 7 file sharing are slight. Nov 93

DriveTech 1.0, MicroMat Computer Systems, 415/890-6227, $59.95. Without decent documentation or clearer error messages, this floppy-drive cleaning and diagnostic program is essentially a $60 floppy-drive cleaning kit. Since you can buy a cleaning kit without software for $10, that makes it a bad deal. Jan 94

DupLocater 1.03, Midnight Software, 303/933-1013, $99. For new Macintosh users who don't have a general file utility, this software that locates duplicate files, as well as performs basic file commands such as moving and renaming files, may be useful. Jan 94

DynePage 2.0, Portfolio Software, 802/865-2700, $59.95. While this utility simplifies the printing of booklets and double-sided pages, it doesn't support PostScript graphics, is incompatible with some popular applications, and has a buggy drag-and-drop feature. Jul 93

eDisk 1.0 (1.2), Alysis Software Corp., 415/566-2263, $149.95. Driver-level compression software has little to recommend it over file-level, idle-time compression programs. The biggest drawback is the strong potential for disk or file corruption. Oct 93

Freedom of Press Classic, ColorAge, 508/667-8585, $149. Utility allows you to print PostScript graphics on almost any non-PostScript printer—easily and with impressive results. Mar 94

Icon 7, Inline Software, 203/845-4995, $79.95. Simple, straightforward utility has a streamlined and intuitive library feature for storing and retrieving icons, plus tools for icon editing. Its icon collection, however, is pretty paltry. Sep 93

Icon-it Pro 3.0.6, Olduvai Corp., 305/670-1112, $129. Utility allows you to attach custom tool bars to almost any application, including the Finder. The interface is quirky, but you get used to it. Dec 93

I Like Icon 1.0, Basel Publishing, 901/692-9676, $59.95. Glidey utility has tools for icon editing, has a nice library of icons, and can create animated icons. Some basic features, such as a text tool, are missing, and the animated icons are fun but impractical. Sep 93

KidDesk 1.0 (1.1), Edmark Corp., 206/556-8484, $39.95. If you have young children who love to experiment with your Mac, this desktop environment provides easily navigable play while protecting your files from the havoc that little fingers can wreak. Jun 93

MacPak 1.0, Symantec/Fifth Generation Systems, 504/291-7221, $149. The quality of this utility collection is uneven—some modules are unpolished—but if you don't already own AutoDouble, CopyDouble, and a good file-management program, it's worth the price. Jan 94

MacTools 3.0, Central Point Software, 503/690-8090, $149. Recovering trashed files is a snap if this utility package that fixes more disk problems than its competition. It includes disk-and-file management, disk repair, virus protection, and backup. Mar 93

MagicTypist 2.0, Olduvai Corp., 503/670-1112, $129. If you want to speed up your typing of repetitive phrases or if you don't have full use of your hands, this utility, which automates typing of repetitive phrases, may be useful, but some functions work erratically or not at all in Microsoft Word. Sep 93

Mr. File 2.0, Softways, 408/978-9167, $99. The well-designed background capabilities of this Finder utility make it a handy tool for copying, finding, moving, launching, and renaming files, although it has a few interface quirks. Dec 93

Norton Essentials for PowerBook 1.0, Symantec Corp., 310/453-4600, $129. Unseen collection of PowerBook utilities ranges from the useful Instant Access module, which automatically turns AppleTalk on and off, to the relatively inaccurate Battery Gauge feature, which tries to tell you your battery's status. Apr 93

Now Compress 1.0 (1.0.1), Now Software, 503/274-2800, $59. Compression utility holds its own in a crowded market; it's easy to use, it's complete, and it compresses as well as or better than other options. Dec 93

Now Fun, Now Software, 503/274-2800, $59. Five control panels let you liven up your Mac by customizing everything from menu colors to system sounds. The included screen-saver modules and desktop patterns and pictures are fairly limited, though. Dec 93

Now Utilities 4.0.1 (4.0.1p), Now Software, 503/274-2800, $129. Many thoughtful improvements have been added to this collection of utilities, which is now better integrated, more logically designed, and still an excellent deal at your dollar. The new swapbook feature, however, is awkward and inconvenient. Aug 93

OptiMeeM 1.4.1, Jump Development Group, 418/681-6292, $129. Systemwide memory manager monitors RAM use and allocates RAM where it's needed. Works best with software that handles minimum-memory situations effectively. Mar 94

Peace of Mind 1.2.2, Polybus Systems Corp., 716/871-6533, $149. Hardware diagnostic tool performs exhaustive tests on major hardware components; does an excellent job of diagnosing simple simulated hardware errors. The program has minor bugs and lacks a comparative test-history feature. Jan 94

PicturePress 2.5, Storm Technology, 415/691-6600, $99. This image-compression software supports every useful storage mode, has new calculation features for improved image fidelity, and is twice as fast as version 2.0. Mar 93

Power To Go 2.0, Claris Corp., 408/727-8227, $59. PowerBook utility collection has a few unique slants—including a floating palette that can display battery-life estimates—that keep it above the also-rans. It does lack features of similar products. Dec 93

Public Utilities for the Macintosh 1.0, Symantec/Fifth Generation Systems, 504/291-7221, $149. Utility program sticks to the basics of disk diagnosis, disk repair, and file optimization. It does a good, and in some cases unique, job, although disk optimization is slow. Jun 93

QuickKeys 3.0, CE Software, 515/221-1801, $169. The simple, unintruding interface of this macro-building utility allows you to build a set of useful shortcuts quickly. Mar 93

RapidTrak 1.0 (2.0), Insignia Solutions, 415/894-7600, $99.95. If you've got RAM to spare, this hard drive formatter offers driver-level RAM caching to store frequently used data and improve performance, especially on slower-speed drives. May 93

RedUX Deluxe 2.0, Inline Software, 203/435-4995, $79.95. Easy to learn and relatively simple to use, this disc utility program has some powerful features, such as scripting, but it doesn't have a compression option. Jan 94

Retrospect 2.0, Dantz Development Corp., 510/253-3000, $249. Powerful backup and archiving software has an improved interface and scripting capabilities, and works well for all levels of users. Sep 93

Retrospect Remote 2.0, Dantz Development Corp., 510/253-3000, $449. Utility allows fast, automatic backup of networked Macs to a central Mac with a backup device. It worked flawlessly in our reviewer's tests. Sep 93

Safe and Sound, Central Point Software, 503/690-8090, $49.95. Limited but useful disk-protection and -recovery utility has a clean, simple interface and is an efficient emergency recovery tool. Jun 93

SafeDeposit 1.2, Dayna Communications, 801/269-7200, $189. Automated backup program is easy to set up but slow. Also, unattended backups must be restarted from scratch if disk space runs short and a new disk isn't inserted. Sep 93

Safe or Sorry 1.0, Olduvai Corp., 305/670-1112, $59. Unobtrusive control panel periodically saves all of your keystrokes, but requires System 7.1 and offers no clear advantages when compared with other test-recovery programs. Oct 93

SAM 3.5.8, Symantec Corp., 408/253-9600, $99. Efficient, thorough virus-protection software slows down system start-up and application launching, but this program is a worthwhile investment for anyone who exchanges or downloads files. Mar 93

Screenescapes 1.0.1, Kiwi Software, 808/685-4031, $44.95. With more than 600 desktop patterns—and a suite of well-designed modules to trans-
BUYERS’ TOOLS

Star Ratings

from those patterns—this fun and frivolous utility lifts deck-top-pattern design to new heights of elegance. Nov 93

★★★★ Square One 1.5.2, Binary Software, 310/582-8293, $74. Flexible, attractive icon-based file launchers provides infinitely customizable palettes, including one that displays active applications. The application will consume 400K of your system memory. Aug 93

★★★★ Stacker for the Macintosh 1.0.1, Stace, the Data Compression Company, 619/431-7474, $149. As long as you pay attention to the capacity of your hard drive, this driver-level compression product performs reasonably well, except for its slow hard drive read quotient. Oct 93

★★★★ Star Trek: The Screen Saver, Berkeley Systems, 510/540-5535, $49.95. Go where no Mac has gone before with this screen saver based on the original "Star Trek." May 93

★★★★ Star Wars Visual Clips, Sound Source Unlimited, 805/494-9996, $98.95. Control panel lets you play QuickTime movie clips from Star Wars at system events. If you have the money, the hard drive space, and the RAM, this is the kind of totally cool toy that will make you remember why you love your Mac. Sep 93

★★★★ Super 7 Utilities, Atticus Software, 203/324-1142, $99.95. Collection of seven control panels/extensions adds some ease of use to System 7, although none of its functions are essential. Modules perform tricks such as turning any menu into a tear-off palette, and randomizing the sounds that play in response to errors. Apr 93

★★★★ Tempo II Plus 3.0.9, Affinity Microsystems, 303/442-4840, $179.95. Very capable macro-creating utility may be daunting for novices but offers plenty of power for advanced users. Mar 94

★★★★ TimesTwo 2.0, Golden Triangle Computers, 619/587-0110, $149. This driver-level compression utility is transparent and robust. It caused me no problems through a two-month course of testing, on a system with myriad utilities and system software tools. Mar 94

★★★★ Toner Tuner 1.0.3, Working Software, 408/423-5696, $24.95, inexpensive, incredibly useful extension adds a sliding bar to print dialog boxes allowing you to adjust the amount of toner applied to each print job. If you can’t save trees, you can at least save toner. Dec 93

★★★★ ultraShield 1.252 (1.3), usreZ Software, 714/756-$140, $149. Sophisticated security product combines practically every feature you might need into an integrated package, including a lightning-fast version of the U.S. government data-encryption standard. Dec 93

★★★★ Virtual 3.0.1, Connectix Corp., 415/571-5100, $99. If you need to eke out as much virtual memory speed as possible, this utility may be a useful tool. For System 6 users who want virtual memory, it’s the only game in town. Sep 93

★★★★ Working Watermarker 1.02, Working Software, 408/423-5696, $49.95. Simple, useful system extension allows you to print or fax text and/or graphics "watermarks" in the background of virtually any document. Although it has imperfections, it’s earned a permanent spot in our reviewer’s System Folder. Jan 94

VERTICAL MARKETS

★★★★ Compare-A-Loan 4.0.2 (4.1), Softflair, 612/894-3357, $79.95. Although geared to professionals, this product for home-loan evaluation provides thorough documentation and is structured so that anyone can use it. Apr 93

★★★★ Expert Home Design 1.0 (1.0.3), Expert Software, 305/567-9990, $49.95. Quickly and easily create home- or office-interior layouts that are precise, but not as detailed as blueprints, with this interior design software. May 93

★★★★ Finale 3.0.1, Coda Music Technology, 800/843-2066, $749. Upgraded music notation software is now infinitely more pleasant to use. Its comprehensive feature set makes it the standard against which all other music notation products must be judged. Aug 93

★★★★ LoanLease Library 3.0.3 (3.0.5), Softflair, 612/894-3357, $99.95. If you are generating a loan or a lease and need to keep track of payments, this well-documented program for loan evaluation is a worthwhile investment, despite its minor eccentricities. Apr 93

★★★★ MacInteors, Microspot, 408/253-2000, $129. Correctly placing objects is oddly cumbersome in this interior-design software, but once you catch on to the program’s quirks, it’s useful. For sale.

★★★★ Musicshop 1.0, Opcode Systems, 415/856-3333, $149.95. MIDI sequencer is an excellent choice as a first sequencer. It’s powerful enough to satisfy the needs of most MIDI users. Oct 93

★★★★ Roll Call 2.0 (2.5.6 or 3.0), By the Numbers, 603/927-4508, $459 to $595. 4th Dimension database application for church management helps track donations, attendance, church-group membership, and visitation. While not a complete church-management system, it’s an acceptable complement to a general accounting program. For sale.

★★★★ Sailing Master 1.1, Starboard Software, 313/662-4393, $64.99. Though the slow speed and jerky motion point to less-than-polished programming, this sailboat-racing simulation offers good tactical play and is fun—well worth the price for sailing competitors. Nov 93

WRITING TOOLS

★★★★ Draft 2.0.3 (2.0.4), MacTikit, 310/395-4243, $49. Script-writing gets simpler with this well-conceived software that automates formatting of different elements in a script. Customization is easy, and macro-automating typing of common phrases. Apr 93

★★★★ Just Joking 1.0, WordStar International, 415/382-8000, $49. HyperCard stack of around 2800 humorous quotations offers a serviceable selection of sayings from a diverse group of humorists, comedians, philosophers, and writers, among others. Apr 93

★★★★ MasterWord 5.1, Alki Software Corp., 206/286-2600, $399.95. The centerpiece of this package is Add-on for Microsoft Word commands is a set of customizable tool bars. Unfortunately, rough edges remain, including inaccuracies in the documentation and some features that don’t work as advertised. Aug 93

★★★★ Microsoft Word 5.1 (5.1a), Microsoft, 206/882-8080, $495. Small, solid upgrade fine-tunes some plug-in modules and adds new modules including an icon tool bar and text annotation. It’s worth the upgrade price, but it won’t give Word 5 users geeseberries. Mar 93

★★★★ The Oxford English Dictionary, Oxford University Press, Electronic Publishing, 212/679-7300, ext. 7370, $895. CD-ROM dictionary contains 20 print volumes including half a million words, but the flaws, omissions, unlikelihood, and unforgettably poor design are unbearable. Apr 94

★★★★ RightWriter for the Mac 5.0, Que Software, 317/573-2500, $99.95. Grammar checker looks at writing style, word usage, punctuation, and capitalization, as well as grammar. Customizable filters and multiple approaches to analysis are nice, but—as with all grammar

checkers—not all the advice is great. May 93

★★★★ ShowScape 4.1, Lake Compuframes, 914/941-1998, $429 to $5679. This script-writing software formats scripts in either screenplay format or dual-column format (for audio and video) and allows you to choose the number of shots displayed per page, but it requires you to own and work in WordPerfect. Apr 93

★★★★ Spelling Coach Professional 4.0, Deneba Software, 305/996-5644, $159. If you’re considering investing in reference software, this spelling checker, dictionary, and thesaurus is a relatively capable, if expensive, alternative. Oct 93

★★★★ Thunder 7 1.5.3, Baseline Publishing, 901/682-9676, $99.95. Stand-alone spelling checker and thesaurus interactively monitors your keystrokes and alerts you to potential errors as they are entered. It quickly and transparently prevents you from making embarrassing typos. Nov 93

★★★★ VersionMaster 1.5, AStar Technologies, 508/486-8532, $199.95 to $1199.95. Document-management utility helps you archive and track versions of a file by maintaining a database of altered documents. It’s recommended only for workgroups that routinely check-out documents. Apr 93

★★★★ WordPerfect for Macintosh 3.0, WordPerfect Corp., 801/225-5000, $495. The innovative interface of this word processor uses context-sensitive button bars and expandable rulers to make innumerable features accessible with a click of the mouse. It’s an accomplishment in ease of use. Mar 94

★★★★ A Zillion KaJJion Rhymes 1.0, Eccentric Software, 206/628-2687, $49.95. Rhyming dictionary is quick, small, simple, and self-contained; but it only rhymes with the roots of search words (and ignores -ed, -s, and -ing endings). Nov 93

Hardware

MISCELLANEOUS HARDWARE

★★★★ ACS100, Altex Lansing Consumer Products, 717/296-2818, $180. Lightweight powered speakers don’t sound as good as they should. There’s too much emphasis on the high end at the expense of the midrange, and they hiss noticeably. Dec 93

★★★★ ACS150, Altex Lansing Consumer Products, 717/296-2818, $150. Subwoofer rounds out the sharp tones of the ACS100, but the bass response is neither punchy enough nor loud enough, and the unit is about the size and weight of a concrete block. Dec 93

★★★★ Address Express, CoStar Corp., 203/661-9700, $499. Flaky performance and system crashes plagued this envelope-label and printer in our tests, but the print quality was good. Oct 93

★★★★ Apple Adjustable Keyboard, Apple Computer, 408/996-1010, $219. Keyboard is only a slight improvement on the flat slab keyboard. Theoretically, it corrects ulnar deviation, but many sufferers of repetitive stress injuries want a keyboard that adjusts vertically. Jul 93

★★★★ AppleCD 300, Apple Computer, 408/996-1010, $599. Double-speed CD-ROM drive spins its discs at twice the speed of earlier drives, providing faster access to large files. Jun 93

★★★★ Apple Color OneScanner, Apple Computer, 408/996-1010, $1349. Tests of this color scanner demonstrate unparalleled colors and sharp image details, perhaps due to color filters and lenses that Apple claims were designed and tuned for the scanner. Jul 93
Phone and you need timely delivery of electronic news and is an acceptable option for PowerBook users. Oct 93

PowerBook users who are frequently in places with no telephone services, 407/364-2000, $395. Unfortunately, the System 7 power manager periodically alerts you that your battery is not charging and dims the screen through battery pack has hours of time left. Mar 94

ScanPlus Color 6000 for Mac, PlusTek USA, 408/960-1234, $749. Small, inexpensive sheet-fed color scanner is not appropriate if exact color matching is critical, but it is otherwise a good, economical option. Sep 93

ThinPack, VST Power Systems, 508/287-4600, $199.95. External battery pack for PowerBook is compact, with a lightweight design. It comes with handy power-management utilities. Mar 94

TrackMate, Key Tronic Corp., 509/928-8000, $149. Input device integrates a trackball into a wrist pad. While the design is interesting, it’s not for everyone. Feb 94

The UnMouse, MicroTouch Corp., 510/922-0880, $399. Hardware-software-guitar instruction package lets your Mac “hear” the notes you play on your guitar. Although the hardware works well, the software has some basic problems and doesn’t live up to the hardware. Apr 94

Hello Music, Yamaha Corp. of America, 714/522-9240, $449. MIDI starter kit includes an impressive tone generator that’s compatible with General MIDI Level 1 and Roland MT-32, but the included software is functional at best. Dec 93

LightningScan Portable, Thunderware, 510/254-6581, $459. PowerBook owners will find this hand scanner’s modem- or serial-port connection, lightweight interface, and total portability well worth the cost, although the scanner is incompatible with some desktop Macs. Dec 93

Macintosh TV, Apple Computer, 408/996-1010, $2079. As a computer, this combination television-computer—CD player is sleek but slow. You can get faster performance and better expandability from several less-expensive Performa models. Apr 94

Mirror 800 Plus Color Scanner, Mirror Technologies, 612-633-4540, $1299. Add the Nulls JPEG board ($300) and easy-to-use 35mm transparencyscanning module ($599) to get a nifty—if slow—desktop scanning package for a reasonable price. Jan 94

Perfct Port-A-Com, Perfct, 303/330-7333, $349. Compact, ADB-powered, high-speed fax/data modem is difficult to configure, due to its Spartan and poorly organized documentation, but it is still a solid product at a reasonable price. Nov 93

SupraFax Modem 144PB, Supra Corp., 503/967-2400, $349.95. Looking for a high-speed internal modem for your PowerBook? Want to save a few bucks? This modem is worth considering. Disabling its fax software solved occasional transfer problems. Nov 93

Apple ColorPrinter, Apple Computer, 408/396-1010, $439. Sleek, portable ink-jet printer weighs 4.5 pounds and is a pleasure to use. It uses standard StyleWriter cartridges. Jan 94

DEC Laser 1152, Digital Equipment Corp., 508/493-5111, $599. Four-page-per-minute, 300-dpi, PostScript Level 2 printer offers simultaneous support for Mac and PCs, plus excellent image quality, for a ground-breaking price. May 93

DeskWriter 310, Hewlett-Packard, 800/752-0900, $379 to $455. Versatile, low-cost ink-jet printer is a 4.3-pound, battery-powered portable. With its 60-page sheet feeder, it’s also a great desktop printer; and with a $49 color print cartridge, it offers inexpensive three-color printing. Mar 94

LaserWriter Pro 600 and 630, Apple Computer, 408/996-1010, $2099 to $2529. From their paper handling to their print quality, these laser printers are Apple’s best. Unfortunately, they don’t support emulation-sensing, and thus may be less desirable for mixed-platform offices than other possibilities. Jun 93

LaserWriter Select 300, Apple Computer, 408/996-1010, $839. Inexpensive, low-capacity printer is networkable, and an excellent buy, despite a few weaknesses. Add a 4MB SIMM to take advantage of the amazing PhotoGrade capabilities, which allow the printer to generate 91 shades of gray. Aug 93

LaserWriter Select 310, Apple Computer, 408/996-1010, $1099. This, slow printer is a true Adobe PostScript printer with both Mac and DOS ports, but it’s not networkable or compatible with the Communications Toolbox, it can’t automatically switch ports, and it doesn’t have adjustable paper guides. Aug 93

LaserWriter Select 360, Apple Computer, 408/996-1010, $1599. Low-cost, high-performance, 10-ppm printer is perfect for small LocalTalk or mixed networks. For bigger networks, consider buying more than one; they’re more cost-effective than a 20-ppm printer. Apr 94

MobileWriter PS, Mannesmann Tally Corp., 206/251-5524, $999. Fast, portable printer is currently the only PostScript portable available. While the print quality is quite good on glossy laser paper, it’s mediocre on inexpensive bond. Dec 93

Phaser 2001 Color Printer, Tektronix, 503/682-7377, $5995. This thermal-wax color printer continues...
**Star Ratings**

TekColor image-enhancement technologies provide excellent output quality that is, however, poor on letterhead and inexpensive color copier bond. Aug 93

PrintPartner 10W, Fujitsu Computer Products, 408/432-6333, $2450. While this multipurpose printer is fast and prints clearly, many Mac users will find it frustrating as it can't print some TrueType fonts. Jul 93

StyleWriter II, Apple Computer, 408/996-1010, Datasoft 105, Mass Microsystems, 408/522-1200, $594 to $1049. Well-built 105Mb SyQuest drive comes with a decent, no-frills cartridge-formatting package and a copy of 7th Heaven. The preformatted cartridges have a lifetime warranty. Sep 93

PowerBook measures 11 1/2 by 2 by 3 1/4 inches and weighs 2 1/4 pounds. It's no speed demon, but it's fine for short jobs. May 93

**SYSTEMS/STORAGE**

Centris 610, Apple Computer, 408/996-1010, 4/80 $1859. Slim-design Mac uses a 20MHz 68LC040 processor at a price-performance ratio that comes close to competing with Windows PCs; however, its expandability is severely limited. Jun 93

Centris 650, Apple Computer, 408/996-1010, 4/80 68LC040 $2699. Moderately priced but fast 640 system offers three expansion slots and one drive bay, and (except for the base model) has built-in Ethernet, video port, and a math coprocessor. Jun 93

Expert Pad PL-7000, Sharp Electronics, 612/628-6288, $1499. Slick and elegant RAID drive worked beautifully in tests, but it costs more than other options, and the QuickSCSI board is sensitive to minor SCSI problems. Apr 94

PowerBook Duo 150, Apple Computer, 408/996-1010, 4/80 $1799. NuBus board has a DOS processor, letting you have your Mac and a PC, too. It's fairly well executed, though there are some minor problems. Oct 93

PLI 2.4 GB MiniArray, PLI, 510/657-2211, $4815. Slick and elegant RAID drive worked beautifully in tests, but it costs more than other options, and the QuickSCSI board is sensitive to minor SCSI problems. Apr 94

PowerBook Duo 150, Apple Computer, 408/996-1010, 4/80 $1799. NuBus board has a DOS processor, letting you have your Mac and a PC, too. It's fairly well executed, though there are some minor problems. Oct 93

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**AudioVision 14 Display, Apple Computer, 408/996-1010, $769.** Monitor integrates audio and video with built-in speakers that produce surprisingly rich, full-bodied sound. The display, while nice, is small for multimedia work. Dec 93

Dymac Model 3, Dymac, 818-998-8008, $895. Low-end, digital still camera is easy to use, and is a solid product if Instantmatic-style grade-scale meets your image-quality requirements. Sep 93

Editing Aces Suite, RasterOps, 801/785-5750, $3899. Video professionals can record and play back full-screen movies in 24-bit color with 16-bit CD-quality sound with these products. Despite flaws, this package represents a step forward in QuickTime technology. Nov 93

IntellioColor Display 20, Radius, 408/434-1010, $3199. Although with its exceptional brightness and clarity this monitor would be a fine addition to any designer's desk, the included IntellioColor software, which lets you control the settings of your display, doesn't offer much added value. Apr 94

Lightning Effects II, Spectral Innovations, 408/955-0366, $1295. Digital-signal processor chips dramatically speed up some Photoshop operations with this expensive Photoshop-acceleration board. It has problems acquiring some JPEG files. May 93

LTV, Lapis Technologies, 510/748-1600, $349. Interface board allows a Mac LC, LC II, or Performa to use a TV as a display. Unfortunately, a TV is a poor substitute for a monitor, so while the LTV does its job, the setup is unsuitable for many applications. May 93

MovieMovie, Sigma Designs, 510/770-0100, $699. Video professionals can record and play back full-screen movies in 24-bit color with 16-bit CD-quality sound with these products. Despite flaws, this package represents a step forward in QuickTime technology. Nov 93

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PaintBoard Turbo, RasterOps, 408/562-4200, $1499. Midrange video board supports 24-bit color on monitors up to 17 inches and resolutions as high as 1024 by 768 pixels. If you can live without changing resolutions on the fly, it's a reasonably good deal. Oct 93

ThunderStorm, SuperMac Technology, 408/541-6100, $699. Photoshop-acceleration board uses digital-signal-processor chips to speed up some Photoshop operations. It's fast, with good JPEG compatibility and a great manual. May 93

VideoToolkit 2.0.1, Abatte Video, 508/376-3712, $279. Despite a few rough edges, this is an attractive, inexpensive solution for those who need to capture and edit video tape on a budget. Sep 93

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Streetwise Shopper

SPECIAL HARDWARE AND SOFTWARE BUYING OPPORTUNITIES

Selected and edited by Charles Barrett

The following listings represent special promotions being sponsored by Macintosh vendors and their resellers. Each listing indicates which products have been awarded a star rating in Macworld's Reviews (products rated ★★ or lower are not eligible for inclusion), have been selected as an Editors' Choice, or have won a World Class award. In some cases, the editorial evaluation quoted is for an earlier product version.

When placing an order, please mention that you saw the offer in Macworld. Should any problems arise, contact the Streetwise Shopper editor by fax (415/442-0766), phone (415/907-3241), or mail (Macworld, 501 Second St., San Francisco, CA 94107).

Vendors and resellers desiring to have products and services included in this section are encouraged to contact the Streetwise Shopper editor with particulars.

BUNDLES

- DuoMate 16x + PowerPath RasterOps is bundling Farallon's $149 PowerPath software (PhoneNet StarConnector LocalTalk connectors not included), which enables PowerBook users to connect to Ethernet and Token Ring LANs, with its $649 DuoMate 16x PowerBook Duo docking station, featuring video output, DB-25 SCSI port, and floppy drive port (current DuoMate 8 and 16x users can add PowerPath for $78). Call 800/729-2656 to order or for more information.

- FilmPrinter turbo II + Astound 1.0 Minus Industries is including a free copy of Gold Disk's $399 Astound multimedia presentation application (Nov 93 ★★★) with its $6995 FilmPrinter turbo II slide maker (Aug 92 "Slides while You Wait", Editors' Choice). Call 800/942-9770 to order or for more information.

- iSpy + iMovie + iMail + Action 1.0 + VideoShop 2.0 SE Axion is including Macromedia's $495 Action multimedia-integration program (Mar 93 "First-Time Authoring", Editors' Choice); Feb 93 ★★★), a special edition (limited to 320-by-240-pixel capture) of Axion Technology's $499 Avow VideoShop QuickTime video-editing program (Feb 94 ★★★), plus the $159 Mail video-mail application for recording and playing back QuickTime movies (allows System 7 Pro users to send and receive video mail) free with a $799 bundle consisting of its iSpy desktop full-motion color video/still-picture camera and iMovie digital video and audio (16-bit, 44 kHz) capture board which provides real-time hardware compression. For further information, call 800/829-4667.

- Home Office Suite Five applications have been combined into a $599 suite of integrated productivity tools consisting of WordPerfect's $495 WordPerfect for Macintosh 3.0 word processor (Mar 94 ★★★), DeltaPoint's $195 DeltaGraph Pro 3 charting and graphic package (Mar 94 ★★★ for version 2.0; 1993 World-Class), Intuit's $69.95 Quicken 4 personal finance package (Nov 93 ★★★), ChipSoft's $69.95 Macinit personal tax-preparation program (May 93 ★★★), and Advanced Software's $399.95 iTouch 2.0 address book and reminder desk-accessory (Feb 93 ★★★; 1993 World-Class). Street pricing is expected to be under $200. Retailers include CompUSA (800/451-7638), Computer City (800/826-3936), and Egghead Software (800/344-4323).

- Macintosh Quadra 605 + ClarisWorks 2.0 Compaq is reissuing a free copy of Claris's $299 integrated software package (Aug 93 ★★★; 1993 World-Class) on its Quadra 605 Systems (Mar 94 ★★★). To locate the nearest retail outlet, call 800/266-7872. Offer expires 12/31/94.

- MegaToons I + MegaToons II Canned Art Connection is offering Creative Media Services' $265 CD-ROM bundle of over 1200 business cartoons by syndicated illustrator Phil Frank for $199 (regularly $238.50). Call 800/495-4278 for further details and to order. Offer expires 5/31/94.

- Radius Stage Two Rocket + Macromodel + Three-D Radius is offering a $2999 3-D modeling and animation bundle consisting of Macromedia's $1495 Macromodel modeling tool for multimedia, graphics, and product design (May 94 ★★★) and its $1495 Three-D for animating and rendering those modeled images, plus a $1999 Radius Stage Two Rocket 33MHz accelerator board. Call 800/227-2795 for product and reseller information.

- SAM 3.5.8 + AutoDoubler 2.0 Symantec Corporation's $89.95 AutoDoubler compression utility for doubling hard disk space is being included free with the purchase of the $99 Symantec AntiVirus for Macintosh (SAM) program for virus prevention, detection, and elimination (Mar 94 ★★★). Available through resellers including MacConnection (800/880-4444), MacWarehouse (800/295-6227), May Zone (800/248-0800), and Mac's Place (800/260-0009). Offer not to expire before 4/30/94.

- ScanMaker IIG + OmniScan Software Edition Microtek Lab is bundling a multifunctional software tool package from Corel Corporation with its $649 ScanMaker IIG gray-scale flatbed scanner (effective 3/31/94). Tools include Corel's OmniPage Direct OCR software, an Image Assistant GS gray-scale image-editing system, and FaxMaster fax-transmission software. For more information, call 800/654-4190.

SIDEGRADES/UPGRADES

- Virex 5.0 Datawatch Corporation is offering this $99.95 antivirus utility (May 94 ★★★) for $39.95 to users of Symantec AntiVirus for Macintosh (SAM) or Central Point Software's MacTools, CallMacWare (800/225-6227) or Dataview (919/549-0711) for qualification requirements and to order. Offer expires 6/30/94.

- WordPerfect 3.0 for Macintosh WordPerfect Corporation is offering this new version of its $495 word processor (Mar 94 ★★★) to users of any competing product for $99. Offer direct (800/321-4566) or through resellers. For more information, call 800/451-5151.

DISCOUNTS/REBATES/FREE OFFERS

- ARCserve for Macintosh Cheyenne Software is offering a special introductory price of $125 on the $245 five-user version of this high-performance backup software for workgroups and stand-alone computers that works with most tape and optical drives. Call 800/243-9462 for product and reseller information. Offer expires 5/31/94.

- Bernoulli 90MB/150MB Drives Iomega has reduced its Bernoulli removable-cartridge drive retail prices: MacTransportable 90 Pro from $589 to $419; Transportable 90 Pro from $599 to $499; Dual 90 Pro from $1099 to $999; MacTransportable 150 from $699 to $599. Single cartridges go from $119 to $12 (three-packs from $397 to $323). For more information, call 800/95-9522.

- Bookends Pro 3.0 Westing Software is offering this $149 bibliography-management software, which automatically generates bibliographies and footnotes to meet journal specifications, direct for $79. Call 800/325-1862 for further information and to order. Offer expires 5/31/94.

- CorrectPrint 3000i Printer RasterOps has reduced retail prices on this dye-sublimation printer (May 93 "Dye-Sublimation") from $6199 down to $3999 for the 16MB version and from $9249 down to $4999 for the 32MB version. For more information, call 800/729-2656.

- MasterJuggler Alsott is offering the full version of this $249 utility (Apr 94 "Top Utilities")—an alternative to SoftWare that provides users with access to unlimited numbers of fonts, DAS, F-keys, and sound—for $14.95. Call Alsott at 800/257-6381 to order. Offer expires 5/31/94.

- PhoneNet connectors Fatral Computing is offering a PhoneNet Bonus Pack of three $36.99 connectors for the price of two ($59). PhoneNet connectors are for networking Macintosh computers, printers, scanners, and Newton MessagePads together using ordinary telephone wire. For reseller information, call 800/859-7761. Offer not to expire before 6/30/94.

- StrataVision 3D 3.0 Strata has reduced the retail price of this $995 3-D modeling, rendering, and animation program (Feb 94 ★★★ for version 2.6.3) to $695. For more information, call 800/678-7282.

- Troll Touch PB Troll Technology is offering a special $495 introductory price on this compact $695 touch-screen system for the Apple PowerBook 180c. Troll integrates a resistive screen onto the PowerBook's LCD. The system comes with Troll's Touchular software and an ADB controller box readily mounted onto the lid with its own ADB port. Call 800/295-0770 to order. Offer expires 5/31/94.

- TurboPS Laser Printers NewGen Systems has reduced retail prices by $1000 on its TurboPS/660 B (Feb 94 "Workgroup Printers") and 1200B laser printers to $3995 and $4995, respectively. In addition, pricing for the TurboPS/440 has been lowered by $500, to $3495. For more information, call 714/641-8600.
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<td>Epson America</td>
<td>800/BUY-EPSON</td>
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<td>204-205</td>
<td>Express Direct</td>
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12 ScanCo —

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---

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<table>
<thead>
<tr>
<th>A. Including yourself, approximately how many people are employed at your entire work-site (i.e., employees in your office, building, or cluster of buildings)? (Check one.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ 1000+</td>
</tr>
<tr>
<td>□ 999 - 100</td>
</tr>
<tr>
<td>□ 99 - 25</td>
</tr>
<tr>
<td>□ Under 25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Which of the following computers are installed at this entire work-site? (Check all that apply.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Apple Workgroup Servers/ Mac Quadra-series</td>
</tr>
<tr>
<td>□ Macintosh II/iIJ series/1C/III/ Performa 6000/505/SE 30</td>
</tr>
<tr>
<td>□ Mac II/IIc/Perfora-40/60/400/Classic-series/20/Plus/ 512K/128K/Portable</td>
</tr>
<tr>
<td>□ Mac PowerBook-series/Duo-series</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. What is the total number of Macs installed at this entire work-site? (Check one.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ 500+</td>
</tr>
<tr>
<td>□ 499 - 100</td>
</tr>
<tr>
<td>□ 99 - 50</td>
</tr>
<tr>
<td>□ 49 - 10</td>
</tr>
<tr>
<td>□ 9 - 1</td>
</tr>
<tr>
<td>□ None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D. For how many Macintosh computers within this entire work-site do you have purchase involvement for products and/or services? (Check one.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ 99.25</td>
</tr>
<tr>
<td>□ 69.25</td>
</tr>
<tr>
<td>□ 39.25</td>
</tr>
<tr>
<td>□ 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E. In which ways are you ever involved in purchase decisions for Macintosh products at this entire work-site? (Check all that apply.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Inquire/Determine need for products/capabilities/features</td>
</tr>
<tr>
<td>□ Evaluate, recommend, or approve brands/models</td>
</tr>
<tr>
<td>□ Evaluate, recommend, or approve purchase-source</td>
</tr>
<tr>
<td>□ Authorize purchases</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F. Over the next 12 months, how much will this entire work-site spend on Macintosh products and/or services? (Check one.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ $1 million or more</td>
</tr>
<tr>
<td>□ $500,000 - $999,999</td>
</tr>
<tr>
<td>□ $100,000 - $499,999</td>
</tr>
<tr>
<td>□ $50,000 - $99,999</td>
</tr>
<tr>
<td>□ Under $50,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G. Considering the entire work-site, which of the following Macintosh hardware and software products are currently installed? (Check all that apply.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Business software (Word processing, spreadsheet, database, etc.)</td>
</tr>
<tr>
<td>□ Graphics/publishing software</td>
</tr>
<tr>
<td>□ Accounting/Finance</td>
</tr>
<tr>
<td>□ Marketing/Sales/PR/ Communications</td>
</tr>
<tr>
<td>□ Art/Design/Creative Services</td>
</tr>
</tbody>
</table>

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ThunderStorm .............. $419 60067

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<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x8 80ns</td>
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<tr>
<td>2x8 80ns</td>
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</tr>
<tr>
<td>4x8 80ns</td>
<td>$155</td>
</tr>
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</table>

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<th>Internal</th>
<th>External</th>
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<td>85MB 17ms</td>
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<td>$298</td>
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<td>127MB 17ms</td>
<td>$234</td>
<td>$334</td>
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<tr>
<td>170MB 17ms</td>
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<td>256MB 17ms</td>
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**LPS SERIES, 3.5” Low Profile**

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<td>270MB 11ms</td>
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<td>$308</td>
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<tr>
<td>340MB 11ms</td>
<td>$288</td>
<td>$358</td>
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<tr>
<td>540MB 10ms</td>
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<tr>
<td>1088MB 11ms</td>
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**ELS SERIES, 3.5” Low Profile, Low Power**

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**PRO DRIVES**

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<tr>
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</tr>
<tr>
<td>1800MB 10ms</td>
<td>$1149</td>
<td>$1218</td>
</tr>
</tbody>
</table>

---

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<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x8 80ns</td>
<td>$42</td>
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<tr>
<td>2x8 80ns</td>
<td>$76</td>
</tr>
<tr>
<td>4x8 80ns</td>
<td>$155</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacTransportable 90M (no cart.)</td>
<td>$299</td>
</tr>
<tr>
<td>MacTransportable 90 Pro (w/cart.)</td>
<td>$349</td>
</tr>
<tr>
<td>MacTransportable 150 Pro (w/cart.)</td>
<td>$479</td>
</tr>
<tr>
<td>90MB Bernoulli Cartridge</td>
<td>$92</td>
</tr>
<tr>
<td>150MB Bernoulli Cartridge</td>
<td>$99</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Capacity</th>
<th>Size</th>
<th>Access</th>
<th>External</th>
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<tbody>
<tr>
<td>545MB</td>
<td>3.5&quot;</td>
<td>9MS</td>
<td></td>
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<td>1.2GB</td>
<td>3.5&quot;</td>
<td>9MS</td>
<td>ST1200N</td>
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<td>2.2GB</td>
<td>5.25&quot;</td>
<td>9MS</td>
<td>W6N 9</td>
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<tr>
<td>2.6GB</td>
<td>5.25&quot;</td>
<td>8MS</td>
<td>Barracuda 1</td>
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<td>2.5GB</td>
<td>5.25&quot;</td>
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<td>Barracuda 2</td>
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<td>3.4GB</td>
<td>5.25&quot;</td>
<td>10MS</td>
<td>Elite 3</td>
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</table>

### Capacity Model Access External

- Toshiba 4401
- Toshiba 3401
- Sony CDV-561
- Ricoh Playwright 1000

### CD ROMs

- ColorPrint CD
- Make your own!
- UMAX Transparency Adapter
- TypeReader OCR Software

### Tape Backup Systems

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Model</th>
<th>Media</th>
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<td>Archive 4320</td>
<td>4MM</td>
<td>$839</td>
<td>$899</td>
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<td>1.2-5GB</td>
<td>Archive Turbo*</td>
<td>4MM</td>
<td>$1839</td>
<td>$1999</td>
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<td>Exabyte 6205</td>
<td>8MM</td>
<td>$1839</td>
<td>$1999</td>
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<td>8MM</td>
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<td>Sony 4000</td>
<td>4MM</td>
<td>$1189</td>
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<td>Sony 5000 DDS-2</td>
<td>4MM</td>
<td>$1199</td>
<td>$1249</td>
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- 60M 4mm Tape: $10
- 100M 4mm Tape: $13
- 112M 4mm Tape: $18
- 120M 4mm Tape: $22

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Magic Modems
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2400bps modem, 9600bps send & 4800bps receive, F.42/Bis/32/6Bis, MNP 1-5.
14400bps Data FaxModem $199
57,600 Data 14400 Fax, V.32bis, V.42bis, MNP-1-5.

Magic Modems
28,800bps modem, 14400bps send & receive, P.42/Bis/5.32/6 Bis, MNP-1-10 protocols. 2 year warranty, 30 day money back guarantee.

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24/32 Data FaxModem $79
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14400bps Data FaxModem $199
57,600 Data 14400 Fax, V.32bis, V.42bis, MNP-1-5.
Still Faster Than Fujitsu for $749

Magic 128 Optical With 3 Free Cartridges

• Faster than the Fujitsu 128
• Twice the warranty
• Authorized Repair Center

The Olympus 128 mechanism was rated in MacWorld December 93 as being 15% faster overall than the Fujitsu 128. The Magic 128 Optical has a max transfer rate of 3.3 MB/Sec using a split head laser design.

Magic 128 Optical ** $749

Magic CD-ROM

Absolute CD-ROM Compatibility and Blazing Speed. The AllCache™ drive software replaces your CD-ROM drive’s original driver software, allowing drive access functions to be sped up significantly.

System Compatibility

Windows 3.0 or later, IBM PC/AT compatible, CP/M, DOS, Macintosh, NeXTstation & compatible

Mac-World December 93 as being 15% faster overall than the Fujitsu 128. The Magic 128 Optical has a max transfer rate of 3.3 MB/Sec using a split head laser design.

Magic 128 Optical ** $749

Magic CD-ROM

Absolute CD-ROM Compatibility and Blazing Speed. The AllCache™ drive software replaces your CD-ROM drive’s original driver software, allowing drive access functions to be sped up significantly.

CDs

CD-ROM Multimedia Encyclopedia $49

CD/ROM Compatibility sped up significantly.

Jetinc. Ink Refills

Two Pack Black $15.99
High Capacity Black $19.99
Two Pack Color $22.99
Single Blue $9.99
Single Red $9.99

SYSTEAMS

Custom Configurations Available

PowerPC Macs Call
Quada 840 av $2,650.00
Quada 800 $1,999.00
Quada 660av $1,529.00
Quada 650 $1,899.00
Quada 610 $1,349.00
Quada 605 $849.00

Duos/PowerBooks/Newtons Call

COMMUNICATIONS

Asante 10T Hub/12 $459.00
Asante 10T Friendlnet $59.00
Asante 10T Hub/8 $219.00
Starinet Ethernet Card $97.00
MagicNet 8 Port 10BT Hub $149.00
Dayna Etherprint Plus $399.00
Dayna Pathfinder $575.00
Farallon Etherwave $99.00
Farallon Timbuktu 5.0 $119.00

MODEMS & FAXES

Supra 14.4 Mac Package $215.00
Supra 14.4 LC Package $159.00
Supra 14.4 PB Package $219.00

PRINTERS

Stylewriter II $349.00
Apple Laser Pro 630 $2,075.00
Apple Laser Pro 810 $2,075.00
TI Pro 600 PS23 $1,349.00
HP Deskwriter $340.00
HP 4MP $1,475.00
DEC Laser 1152 $649.00
Kodak Color Essex IS $699.00
Kodak 450 GL $1,545.00

VIDEO SOLUTIONS

Supermatch 20TXL $2,479.00
Supermatch Hires $2,699.00
Supermac 177 Trinitron $1,045.00
Thunder II $2,299.00
Thunder II GX $2,699.00
Digital Film $2,649.00
E-Machines T-161 $1,149.00
E-Machines T-20 $2,499.00
Futura II SX $425.00
Ultra LX $1,119.00
Radius 20i Intelligor $2,199.00

ACCELERATORS

Daystar 040 33Mhz 128 $739.00
FastCache Turbo $165.00
Daystar 50 PowerCache $430.00
Daystar 040i 33Mhz $739.00
Radius Rocket 33 $949.00
Radius Rocketshare $299.00

DRIVES

Magic/TW DAT 2GB $999.00
Magic/TW DAT 8GB $1,199.00
NEW! TW DAT 16GB $1,399.00
Fujitsu 1.2GB $1,199.00
Quantum 4MB $499.00

INPUT

Abacus Keypad $89.00
Apple Extended Keyboard $158.00
Mac Pro Keyboard $115.00
DGR Extended Keyboard $79.00
Kensington Turbo Mouse $99.00
Wacom ArtZ $279.00
Wacom UDI212R $509.00

MacProducts USA THIRD WAVE 800 622 8721

606 West 22nd Street Austin, Texas 78705 USA Tel 512 476 5295 Customer Service 512 472 8881 ext 403 Fax 512 499 0869 Canada 512 622 8721

Circle 186 on reader service card
## Got questions?

### Displays & Cards

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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<tbody>
<tr>
<td>RasterOps 20&quot;</td>
<td>$2379</td>
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<td>Magnavox 14&quot; Color Sharp, brilliant color</td>
<td>$389</td>
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<tr>
<td>GCC SelectPress 600</td>
<td>$3799</td>
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<td>AVEG Colour</td>
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### Scanners

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<tr>
<th>Product</th>
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<tr>
<td>RasterOps UC630LE/UC630</td>
<td>$699/829</td>
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<tr>
<td>ASPUC610</td>
<td>$929/1229</td>
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<td>AGFA ScanStar ScanStar Trans. Option</td>
<td>$1099</td>
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<tr>
<td>RELYS RELY 2600DFI 600/300 dpi, interpolates to 2/400 dpi w/ Photoshop LE and free OCR Software</td>
<td>$849</td>
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<td>RELY 9600DFI Interpolates to 9600 dpi, w/ full Photoshop and Free Transparency Option</td>
<td>$2999</td>
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<td>SelectPress 1200 12/19/2000, 600/1200 dpi</td>
<td>$5999</td>
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<td>PLP11 300 dpi, w/ free ATM</td>
<td>$529</td>
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<tr>
<td>Eclipseplus, 4ppm, w/ Ethernet</td>
<td>$259</td>
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<td>NEW Eclipseplus, 8ppm, w/ Ethernet</td>
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<td>WideWriter, oversized printing</td>
<td>$499</td>
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<td>SelectPress 600, 11x17, 600 dpi</td>
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<td>Turbo PS660p, 8 MB RAM, Image Enhancement Technology</td>
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### Accelerators

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<th>Product</th>
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<td>POWER Macintosh Power Mac upgrades</td>
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### Multimedia

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<th>Product</th>
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<td>PLI New!</td>
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<td>New Turbo 040</td>
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<tr>
<td>Fast Cache Optima</td>
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<td>Imaging Accelerators</td>
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### Storage

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### Modems

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<td>Supercache Enhanced Modem</td>
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### Networking

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<td>EtherLAN Hub 1</td>
<td>$499</td>
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<tr>
<td>EtherLAN Hub 2</td>
<td>$229</td>
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<tr>
<td>EtherLAN Cards, All Models</td>
<td>$229</td>
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**Macs News**

1-800-723-7744

Apple Mac are trademarks of Apple Computer. Prices subject to change without notice. All returned orders may be subject to a minimum 15% restock fee plus return shipping. Call for manufacturers' RMA before returning. Software, unless defective, cannot be returned after it has been opened. All warranties on Macintosh or Apple brand products sold by MacNews will be honored by MacNews or its authorized agents only. All other manufacturer's warranties still apply.

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- 220v Products In-stock
- Resellers Welcomed
- Low-cost International Shipping Rates
- International Orders Shipped Daily

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**IBM**

- 220v Products In-stock
- Resellers Welcomed
- Low-cost International Shipping Rates
- International Orders Shipped Daily
Get Answers!

FOCUS

$449

Focus 88R/W/44 MB Removable Drive
Includes free cartridge.
Speedy 20 ms access time.

Adobe Illustrator 5.0
Software $369

Adobe Photoshop 2.5
Adobe Premiere 3.0

Aldus Frame 6.0
Aldus Enchant

Special Bundles

New! $699

Specular Collage and Adobe Photoshop 2.5 Bundle
Specular Collage $249
Specular Logo Motion $149

Special Bundles

New! $699

Specular Collage and Adobe Photoshop 2.5 Bundle
Specular Collage $249
Specular Logo Motion $149

Kai's POWER TOOLS

$89

Kai's Power Tools
2.0 with free ColorIt!
& StuffIt Space+Save
33 plug-in filters and extensions for
Photoshop - now includes ColorIt!
and award winning compression software.

StuffIt Deluxe 69
StuffIt Space+Save 39
Maxa Alert 99

$99

Alladin StuffIt and Maxa Alert
Choose award winning compression software
with archiving and security features & get
free hardware diagnostic software.

Systems

Apple

POWER Macintosh
We've got the answers.
Call us today!

Mac Quadra 610 Color Desktop Publishing System $2,449
610 w/CD, FPU, 8 MB RAM/230 MB HD,
14" Sony Trinitron, extended keyboard
& System 7.

Mac Quadra 650
Publishing System $3,899
650 w/FPU, Ethernet, 8 MB RAM/230
MB HD, 16" Color Trinitron Display,
24-bit video accelerator card, extended
keyboard & System 7.

• Add Legend Multimedia Super System.
Includes CD ROM drive, stereo speakers,
headphones & 9 popular CD ROM titles
all for only $499

Mac Quadra 660 AV
Multimedia System $3,399
660 AV w/CD Rom Drive, FPU, Ethernet,
8 MB RAM/230 MB HD, 16" Color
Trinitron Display, extended keyboard,
System 7 & Wayland CD 7-Pak.

• Add Vue 2400, 600 dpi color scanner
with Photoshop LE and OCR Software for
only $599

Mac Quadra 840 AV
Multimedia System $7,799
840 AV w/CD ROM drive, FPU,
Ethernet, 8 MB RAM/1 GB HD,
RastorOps 20T, 30" Color Trinitron
Display, Lighting 24-bit video accelerator
card, extended keyboard & System 7.

Call for pricing on custom configurations.

Memory

Legend Memory Upgrades
For all Macintosh Computers. Lifetime
Warranty—Call for prices.

AGFA

$1,099

Agfa StudioScan
600x300 dpi, interpolates to 2400 dpi,
with Free Photoshop LE,
Photo Tune LE & PhotoSnap

We know our products inside and out. We'll
help you choose exactly the right products for
your needs and budget.

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departments that stand behind our products, help is
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Circle 172 on reader service card
**Precision Color 17"**

For the Best Price

Call BottomLine

---

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>Color Pivot E in Rembrandt Cart</td>
<td>$349</td>
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<tr>
<td>IntelliColor Display 20i</td>
<td>$219</td>
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<td>LeMans GT</td>
<td>$229</td>
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<tr>
<td>Precision Color 20V</td>
<td>$167</td>
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<td>Precision Color Pro 24X</td>
<td>$125</td>
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<td>Precision Color Pro 24XP</td>
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<tr>
<td>VideoVision Studio</td>
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<table>
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<tr>
<th>Device</th>
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<tr>
<td>12x12 UD + Painter</td>
<td>$689</td>
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<td>12X18 Electrostatic</td>
<td>$999</td>
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<td>ArtZ</td>
<td>$279</td>
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<tr>
<td>ArtZ Bundle</td>
<td>$468</td>
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<td>Painter v2.0 w/Tablet</td>
<td>$199</td>
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<tr>
<td>Painter X2</td>
<td>$71</td>
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<tr>
<td>Two Handed Input</td>
<td>$115</td>
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<th>System</th>
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<tr>
<td>DataProducts LRZ1580</td>
<td>$3069</td>
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<tr>
<td>DEC Laser 1152/5100</td>
<td>$649</td>
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<tr>
<td>Deskwriter 500C/310</td>
<td>$393</td>
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<td>Faro Primera</td>
<td>$890</td>
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<tr>
<td>IBM Optical</td>
<td>$3175</td>
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<td>128 IBM Optical</td>
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<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tr>
<td>Horizon 24</td>
<td>$2333</td>
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<tr>
<td>HP 4ML/4MP</td>
<td>$1099</td>
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<tr>
<td>LaserWriter Pro 630/610</td>
<td>$2075</td>
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<td>LaserWriter Select 360</td>
<td>$1525</td>
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<tr>
<td>Page Printer</td>
<td>$6695</td>
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<tr>
<td>QMS 860 Plus</td>
<td>$299</td>
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<tr>
<th>INPUT DEVICES</th>
<th>Price</th>
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<tr>
<td>DGR 105 keyboard</td>
<td>$99</td>
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<tr>
<td>Gravis GamePad Mac</td>
<td>$29</td>
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<tr>
<td>MacPro Plus 105</td>
<td>$115</td>
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<tr>
<td>Other Language Keyboards</td>
<td>$109</td>
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<tr>
<td>PowerKey Remote</td>
<td>$35</td>
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<tr>
<td>Turbo Mouse AOB V4.0</td>
<td>$9</td>
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<tr>
<th>NETWORKING</th>
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<tr>
<td>Ethernet for llsi, Nubus, LC, &amp; SE</td>
<td>$99</td>
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<tr>
<td>UPS</td>
<td>$400</td>
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<th>SOFTWARE</th>
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<tr>
<td>Quicken 4.0</td>
<td>$41</td>
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<tr>
<td>Touchbase Pro</td>
<td>$42</td>
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<tr>
<td>Database Development</td>
<td>$559</td>
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<td>47 Dimension v3.0</td>
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<th>PRINTERS</th>
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<tr>
<td>Sony Monitors</td>
<td>$575</td>
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<tr>
<td>CPD 1430</td>
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<td>CPD 1730</td>
<td>$219</td>
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<tr>
<th>BOTTOM LINE DISTRIBUTION</th>
<th>1-512-472-4956</th>
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<tr>
<td>210 May 1994 MACWORLD</td>
<td>24-Hour Fax 1-512-476-6599 • 1219 West 6th Street • Austin, Texas 78703 USA</td>
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<p>| Circle 63 on reader service card |</p>
<table>
<thead>
<tr>
<th>Product Description</th>
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<tbody>
<tr>
<td>1MB TI Memory</td>
<td>$40</td>
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<tr>
<td>57 Foot Upgrade for TI</td>
<td>$55</td>
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<tr>
<td>MicroWriter P57</td>
<td>$67</td>
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<td>MicroWriter PS65</td>
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<td>MicroLaser Pro 500 PS65</td>
<td>$1525</td>
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<tr>
<td>PowerStep 40 MHz Upgrade</td>
<td>$325</td>
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<td>630LE Flatbed</td>
<td>$575</td>
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<td>840 Flatbed</td>
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<td>1240SE 3000dpi printer</td>
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<td>Auto Document Feeder</td>
<td>$399</td>
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<td>Transparency Adapter</td>
<td>$675</td>
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<td>TI Pro 600 PS23 $1299*</td>
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<td>1260 Flatbed $1399</td>
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<td>Power cache SE/30</td>
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<td>Power cable 50MHz</td>
<td>$335</td>
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<td>Power PC 66/60 MHz</td>
<td>$599</td>
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<td>Quadra 400</td>
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<td>Turbo 404 40</td>
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<td>Turbo 404 33MHz $975</td>
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<td>Spectrum Power 1152</td>
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<td>SuperMatch 20 TXL</td>
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<td>SuperMatch Hi Res 28' Trim</td>
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<td>Suitcase v2.1</td>
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<td>Super ATM</td>
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<td>Fontographer v4.0</td>
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<td>Illustrator v5.0</td>
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<td>Kai’s Power Tools 2</td>
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<td>* MacDraw Pro</td>
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<td>MS Excel v4.0/Word 5.1</td>
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<td>Pagemarker v5.0</td>
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<td>Photoshop v2.5</td>
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<td>Quark XPress 3.3</td>
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<td>Showplace/Renderrman v2.0</td>
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<td>StudioPro</td>
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<td>SummamatchFx</td>
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<td>AutoDouble2 v2.0</td>
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<td>Disk Doubler v3.7</td>
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<td>Disney Collection Screen Savers</td>
<td>$32</td>
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<td>FontoManager v5.0</td>
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<td>MacLink Plus v7.0</td>
<td>$59</td>
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<td>MacTools v 3.0</td>
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<td>Norton Utilities v2.0</td>
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<td>QuickKeys v3.0</td>
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<td>Disney Collection Screen Savers</td>
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<td>FontoManager v5.0</td>
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<tr>
<td>Accelerators</td>
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<tr>
<td>DGR Technologies is committed to the excellence that has made us the industry leader. Each drive is shipped in an all-steel case with a universal 40 watt power supply, double shielded SCT cable, external terminator and three free cartridges*. (All for PCs!)”</td>
<td></td>
</tr>
<tr>
<td>DGR Power Raid Storage System</td>
<td></td>
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<tr>
<td>High speed RAID technology at a real world price. The DGR Power Raid Storage System provides 128 bit and 512 bit raid at real world prices. It includes a RAID 0 and 1 and/or level 0,1,4, and 5 array system. Access times 4ms with transfer rates up to 10 MB/Sec (Sync) at RAID levels 0 and 1 and a 1.0 GB array on a 2MBx. The system is compatible with SCS 1 and 2 and SCS Manager 4.3 (AnyMac) and will work with all Power PC and Mac AV platforms. RAID enclosures are all metal construction complete with all cables and software. The Power Raid Storage System provides its own SCS chain via a Nabbot 2 card, allowing you to add more RAID enclosures as you need them.</td>
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<td>Jet Inc. Ink Jet Refills</td>
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<tr>
<td>Jet Inc is the most economical way to refill your ink jet printers. It provides over 50% savings, and incorporates recycled materials that are environmentally conscious. (for Mac and Macintosh)</td>
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<tr>
<td>MODEMS &amp; FAX MODEMS</td>
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<tr>
<td>Data link PA 4.4 INT. V.32 BIS</td>
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<td>Globalfax Duo Software</td>
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<td>Power/TelePort Bronze II</td>
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<tr>
<td>Power/TelePort Silver</td>
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<tr>
<td>Supra V.32bis LC Mac Package</td>
<td>$155</td>
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<tr>
<td>ColorBlaster LC</td>
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<tr>
<td>Blazing 16-bit color graphics on monitors up to 14” using the VRAM slot of the LC, LCI and the Performa 400, 404, 430. Bundled with ColorBlaster!</td>
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<tr>
<td>DGR Optical Drives</td>
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<td>DGR Technologies is committed to the excellence that has made us the industry leader. Each drive is shipped in an all-steel case with a universal 40 watt power supply, double shielded SCT cable, external terminator and three free cartridges*. (All for PCs!)”</td>
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<tr>
<td>DGR Business Software</td>
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<tr>
<td>Collegiate Business Software has functions such as appointment calendar, client/prospect file invoicing, job tracking, checkbooks, general ledger, sales, expenses, and accounts receivable reports. MacWorld Editor’s Choice award and 4.1/2 mice in MacUser.</td>
<td></td>
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<tr>
<td>DGR Technologies</td>
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<tr>
<td>Upgrade your LC, LCI, LCIII and Performa 400 with the LC MAX. Increase the single expansion slot to four, add another hard drive and supplement your LC with an additional 40 watt power supply. Conflicting cards can be easily switched on or off as needed. Enter the world of Multimedia with the Multi MAX! Equipped with a multi-sessional, double spin CD-ROM, and amplified stereo speakers, you can access the vast library of CD-ROMs available or listen to your favorite music.</td>
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<td>Multi MAX $849.00</td>
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<td>LC MAX $349.00</td>
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<td>LC MAX $349.00</td>
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</table>
Now is the best time to accelerate your Macintosh with the Speedster 040. Starting at just $399, you can upgrade to '040 power and get blazing, 100% compatible performance from the Mac you already own.

**Speedster 040 runs all your software up to 6X faster!** Plus, its universal, low-cost design uses custom chips, saving you up to 50% over the competition. At Mobius, we stand behind you with a 3-year warranty, 30-day money-back guarantee, and unlimited technical support rated "Excellent" by MacWorld Magazine.

Call today to order and receive your free Macintosh Performance Handbook.

<table>
<thead>
<tr>
<th>Compare and Save!</th>
<th>Speedster 040</th>
<th>Daystar Turbo 040</th>
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<tbody>
<tr>
<td>Speedster 25i</td>
<td>$399</td>
<td>$799</td>
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<tr>
<td>Speedster 33i w/cache</td>
<td>$599</td>
<td>$1,098</td>
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<td>Speedster 33f w/FPU &amp; cache</td>
<td>$799</td>
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<td>Speedster 40f w/FPU &amp; cache</td>
<td>$1,099</td>
<td>$1,498</td>
</tr>
<tr>
<td>128K Cache Option</td>
<td>FREE!</td>
<td>$199</td>
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</table>

**The Choice Display for all your work.**

Why settle for scrolling around on a tiny 13" monitor when you can **view your entire document** on a award-winning Mobius Display. You'll have over three times more desktop! Just plug it directly into your Macintosh and view up to 256 gray-levels* on the bright, razor-sharp screen. **Now available for over 50 Macs**, Mobius Displays are rated at over 80,000 hours MTBF—the most reliable in the industry. And starting at just $399, the best value you'll find anywhere. So choose the display that MacWorld named "Editor's Choice." Call us today to place your order, and get the Choice Display for all your work.

<table>
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<tr>
<th>Mobius Monochrome Displays</th>
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<tr>
<td>Mobius Two Page Display GS</td>
<td>$699</td>
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<td>Mobius One Page Display GS</td>
<td>$399</td>
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<tr>
<td>Mobius Mono Video Card</td>
<td>$99</td>
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*For Macs supporting built-in video; video card may be req. call for info. †When purchased with display. **How to Order: We accept Visa, MasterCard, Bank's and Discover. Corporate and Education PO's. Cache is free with Speedster 33, 33f, and 40f models only. Compatible pricing as of 2/21/94. All trademarks are property of their respective holders. Mobius, 5835 Doyle Street, Sunnyvale, CA 94088, (408) 654-6556.
**BEST BYTE FOR MACS!**

**ELS Series**
- **Capacity**: 127 MB, 170 MB
- **Seek**: 17 ms, 17 ms
- **Ext.**: 280 MB, 270 MB, 340 MB, 540 MB
- **Ext. Seek**: 245 ms, 305 ms, 295 ms, 475 ms
- **Low Profile, Low Power Drives**
- **30 Day Money Back Guarantee**

**GO Drive Series**
- **Capacity**: 42 MB, 127 MB, 170 MB, 256 MB
- **Ext.**: 17 ms, 17 ms, 17 ms, 17 ms
- **Ext. Seek**: 99 ms, 230 ms, 255 ms, 345 ms

**LPS Series**
- **Seek**: 10 ms
- **Ext.**: 240 MB, 270 MB, 340 MB, 540 MB
- **Ext. Seek**: 25 ms, 25 ms, 35 ms, 35 ms

**Empire and Pro Series**
- **Ext.**: 10 ms
- **Ext. Seek**: 77 ms, 83 ms, 96 ms, 102 ms
- **Ext. 1000 MB**: 1083 ms

**Music & Multi Media Apps. Novell Certified**

**DISK ARRAYS**

**PDI 2 GB Array**
- **Model**: M4110 Low Profile
- **Capacity**: 1.2 GB, 1.2 GB, 1.7 GB, 2.4 GB, 3.6 GB
- **Seek**: 5.9 ms
- **Ext.**: 6.3 ms
- **Ext. Seek**: 180 ms
- **Ext. 240MB**: 185 ms
- **Ext. 245MB**: 190 ms
- **Ext. 256MB**: 195 ms

**PDI 3.2 GB Array**
- **Model**: M2210
- **Capacity**: 1.2 GB, 1.7 GB, 2.4 GB, 3.6 GB
- **Seek**: 5.9 ms
- **Ext.**: 6.3 ms
- **Ext. Seek**: 180 ms

**PDI 4.2 GB Array**
- **Model**: M1926
- **Capacity**: 1.2 GB, 1.7 GB, 2.4 GB
- **Seek**: 5.9 ms
- **Ext.**: 6.3 ms
- **Ext. Seek**: 180 ms

**Optical Drives**
- **Model**: C2247, C2490, C3010
- **Capacity**: 2.4 GB, 2.4 GB, 3.35 GB
- **Seek**: 5.9 ms
- **Ext.**: 6.3 ms
- **Ext. Seek**: 180 ms

**QMS PRINTERS**

**Model**
- **PS 410 4PPM, 300DPI**
- **Price**: $1399
- **Features**: 2 MB, Hot Form, PCL 5a, 45 Fonts
- **PS 860 8PPM, 600 DPI, 11x17**
- **Price**: $3825
- **Features**: 12 MB Exp. 16x12, RISC Processor
- **PS 1725 17PPM, 600 DPI, New Price**
- **Price**: $4399
- **Features**: 8 MB Exp. 12 MB, PCL 6, 2 RISC Processor

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- **Circle 135 on reader service card**

- **Dealers Welcome**
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- **P.O.’s Welcomed - Educational, Government, Corporate**
- **Please Specify For: Mac, HP Workstation, SUN Sparc or IBM RS6000**

- **ZERO FOOTPRINT**
  - 40 watt shielded power supply, 110/220 VAC. Works with all 3.5" and 5.25" HH Drives.

- **MICROCAP Vertical Stacking**
  - 110/220 VAC, Works with any 3.5" Drive

- **FULL HEIGHT**
  - 40 watt shielded power supply, 110/220 VAC. Works with all 5.25" Drives.

- **19" RACKMOUNT**
  - Two, Four, Six, and Eight Bay Cabinets available. CALL FOR QUOTE. All cabinets come with a 25-foot pin Mac system cable. One year warranty on all cabinets.
"In the fiercely competitive world of the humble desktop hard drive, nobody sweats the details more than APS. Elegant design, quality components, and rock-solid construction distinguish the compact APS SR 2000 Case."
—Editors of MacUser

### APS HARD DRIVES

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Internal</th>
<th>SR2000</th>
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<tr>
<td>122MB</td>
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<td>APS Q 1271</td>
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<td>APS Q 1702</td>
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<td>APS MX 2402</td>
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<td>APS Q 2702</td>
<td>257MB</td>
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*Internal drive for Quadra 800 and Centris 600 available.

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<th>Model</th>
<th>Capacity</th>
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<td>APS MX 3452</td>
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<td>516MB</td>
<td>529</td>
<td>619</td>
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<td>APS MS 1.2AV 465MB</td>
<td>Quantum 516 mechanism</td>
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<td>1089</td>
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<td>APS MS 1.2V 1001MB</td>
<td>Millennium 2210 mechanism</td>
<td>899</td>
<td>989</td>
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<td>APS MS 4110V 1029MB</td>
<td>Millennium 2210 mechanism</td>
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<tr>
<td>APS Q 1080V 1029MB</td>
<td>Quantum 516 mechanism</td>
<td>859</td>
<td>949</td>
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</tbody>
</table>

### APS SR2000

The APS SR 2000, with built-in DaTerm™ can-stop "SCSI Voodoo" with its E, controlled, digital active termination. DaTerm's patent-pending technology eliminates SCSI line pulse fluctuations, as well as confusing signal and voltage reflections. Its unique impedance-matching characteristics provide superior signal-to-noise ratios. DaTerm decreases SCSI retries, allows more reliable data transmission and improves SCSI chain stability. The SR 2000 is the best external 3.5" drive enclosure available on the market today.

**SR 2000 StacKIT™ $24**
- End Cable Baggage Forever!
- Minimize SCSI Chain Lengths
- Heavy Metal Shielding
- Protects SCSI Signal
- StacKIT Includes Four Concave Stacking Feet
- StacKIT Includes Exclusive APS SCSI C "Connector"

### APS Companion II

-Exclusive Digital Active Termination
-Drastically Reduces SCSI Retries
-Regulates SCSI Line Voltage
-Saves Bus Impedance Issues
-LED Activity Indicators Diagnostic Tool

### APS MS 1.2

The APS MS 1.2 provides the best mix of performance and price in its class. The 5400 RPM spindle speed of its MicroPulse 2210 mechanism delivers spectacular sustained transfer rates and seeks times averaging 9.1 ms.

**Benefits**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1. Optimized Overall Performance</td>
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</tr>
<tr>
<td>2. Digital Active Termination</td>
<td>-200% gain in performance at 100% full load</td>
</tr>
<tr>
<td>3.麸ExtendTime</td>
<td>-200% gain in performance at 100% full load</td>
</tr>
<tr>
<td>4. Digital Termination Power</td>
<td>-200% gain in performance at 100% full load</td>
</tr>
<tr>
<td>5. Regulates SCSI Line Voltage</td>
<td>-200% gain in performance at 100% full load</td>
</tr>
<tr>
<td>6. Reduces SCSI Timing Issues</td>
<td>-200% gain in performance at 100% full load</td>
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<tr>
<td>7. LED Activity Indicators Diagnostic Tool</td>
<td>-200% gain in performance at 100% full load</td>
</tr>
</tbody>
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**APS Technologies**

1-800-874-1428

**SCSI Sentry™**

Now you can "stop SCSI Voodoo" on your SCSI Chain, even when you're not ready to buy a new drive. Our new SCSI Sentry™ gives you all the benefits of APS' acclaimed DaTerm technology in the form of an external SCSI performance monitoring instrument.

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**M-F 6AM-12Midnight CST, SAT & SUN 9AM-9PM CST, International: 1-800-483-3077 (24 Hours), For a Free Catalog, call APS Sales: 1-800-874-1428 Fax: 1-800-374-5802**

**Powerbook Drives**

- Exclusive on the SR 1000 Case
- Drives Available in the SR 1000 Case
- 4 Hour Battery!
**APS SyQuest is Best!**

**APS SyQuest Drives • NEW LOW PRICES!**
Only APS brings you SyQuest with all the benefits of the SR 2000 & Digital Active Termination

**APS SQ 3105**

$429

**APS SQ 5110c** & **SQ 3105**
These removable cartridge drives are based on SyQuest's award-winning removable cartridge mechanism. Available in 5.25" 44 and 88MB and 3.5" 105 and 270MB configurations, only APS SyQuest drives give you the great performance and exceptional economy of a time-proven removable cartridge drive system in our award-winning SR 2000 enclosure with D.A.T.

**SYQUEST**

<table>
<thead>
<tr>
<th>Model</th>
<th>Without Bundle</th>
<th>B.Y.O.B.*</th>
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</thead>
<tbody>
<tr>
<td>APS T 3401</td>
<td>$499</td>
<td>$399</td>
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<tr>
<td>APS SQ 555</td>
<td>44MB</td>
<td>$299</td>
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<tr>
<td>APS SQ 5110c</td>
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<td>459</td>
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<td>APS SQ 3105</td>
<td>105MB</td>
<td>429</td>
</tr>
<tr>
<td>APS SQ 3270</td>
<td>270MB</td>
<td>659</td>
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</tbody>
</table>

+ Does not format 44MB cartridges
+ 44MB cartridges — $65 unformatted, $70 formatted
+ 88MB cartridges — $165 unformatted, $170 formatted
+ 105MB cartridges — $95 unformatted, $100 formatted
+ All SyQuest Drives include 1 FREE Cartridge

**MAGNETO OPTICAL**

**Model**

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Internal*</th>
<th>SR 2000</th>
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<tr>
<td>APS 128MB MO</td>
<td>128 MB</td>
<td>SR 2000</td>
<td>$799</td>
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<tr>
<td>APS T 155 MB Tape Backup</td>
<td>128 MB Tape Backup</td>
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<td>$479</td>
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*Only Available in EN Config.

**POWERBOOK STUFF**

<table>
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<tr>
<th>Model</th>
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<tr>
<td>APS SCSI DOC w/PowerMerge</td>
<td>$39</td>
</tr>
<tr>
<td>APS SCSI BOY</td>
<td>$29</td>
</tr>
</tbody>
</table>

- Fitted PowerBalls 25-30 PowerBook SCSI Adapters include a docking adapter for PowerBook and terminate power indicator. Receive Power-Merge Lite Free with every APS SCI! SCI?

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Rapid Repair Return
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**CD ROM BUNDLES**

<table>
<thead>
<tr>
<th>Model</th>
<th>Without Bundle</th>
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<tbody>
<tr>
<td>APS SQ 555</td>
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<tr>
<td>APS SQ 3270</td>
<td>270MB</td>
<td>659</td>
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**TAPE DRIVES**

<table>
<thead>
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<th>Model</th>
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<tr>
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<td>APS ProDAT 2</td>
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<td>APS TurboDAT</td>
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<tr>
<td>APS HyperDAT</td>
<td>8.1 GB</td>
<td>SR 2000</td>
<td>1449</td>
</tr>
</tbody>
</table>

* Actual data compression and tape capacity vary greatly depending on the type of data recorded, other system parameters and environment.

**Circle 62 on reader service card**

**MACWORLD May 1994**

**Great Products, Priceless Support!**
QUANTUM DRIVES

2.5" POWERBOOK DRIVES

Capacity | External | Internal
--- | --- | ---
85mb | $199 | $319
127mb | $235 | $355
170mb | $259 | $379
256mb | $339 | $459

3.5" LOW PROFILE, LOW POWER

Capacity | External | Internal
--- | --- | ---
170mb | $185 | $245
240mb | $239 | $299
340mb | $289 | $349
540mb | $479 | $539
1080mb | $829 | $889

PowerBook Drives - Battery Powered Portable Drive

QUANTUM DRIVES

The Quantum Gro•Drive series is fast, lightweight, and small. Each model has a full-height or low-profile casing with a simple bolt-on design. The Gro•Drive series is available in 170, 240, and 340 MB versions, all of which are compatible with Apple Macintoshes. The drives feature a 3-year warranty, and all models include a battery and a 3-year warranty.

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CLUBMAC DAT DDS & DDS-DC DRIVES

Provide up to 5.2 Gigabytes of off-line and high-density data storage in a compact and reliable format. Available in three models: CLUBMAC DAT DDS-DC, CLUBMAC DAT DDS, and CLUBMAC DAT DDS-DC Annex. These drives are ideal for off-line backup and storage, and come with a 3-year warranty. The CLUBMAC DAT DDS-DC Annex includes a removable DDS-DC tape cartridge.

Capacity | Model | Format | Media | Internal | External
--- | --- | --- | --- | --- | ---
520mb | M2624 | DDS-DC | 60m, 90m | $619 | $689
1.2GB | M2694 | DDS-DC | 60m, 90m | $999 | $1049
2.4GB | M2654 | DDS-DC | 60m, 90m | $1329 | $1379

CLUBMAC DAT DDS-2 DRIVE

Provide up to 8.2 Gigabytes of high-performance, cost-effective, and reliable data storage in a compact and reliable format. Available in two models: CLUBMAC DAT DDS-2 and CLUBMAC DAT DDS-2 Annex. These drives are ideal for off-line backup and storage, and come with a 3-year warranty. The CLUBMAC DAT DDS-2 Annex includes a removable DDS-2 tape cartridge.

Capacity | Model | Format | Media | Internal | External
--- | --- | --- | --- | --- | ---
440MB | M2695 | DDS-2 | 60m, 90m | $899 | $949
880MB | M2696 | DDS-2 | 60m, 90m | $1329 | $1379

DAT TAPES

Capacity | Tape Type | Internal |
--- | --- | ---
3.5" 128mb Optical | DAT Tapes | $89
5.25" 650mb Optical | DAT Tapes | $759

CLUBMAC OPTICAL DRIVES

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Unequaled design flexibility and more color & graphics support than before. Make QuarkXPress the page-layout application favored by publishers. Create innovative design-intensive publications. You can create variable-shaped text boxes, undo multiple-tier deletions, and much much more! Publisher: Quark. DTP 0110. $589

Power User Pro
3X CD-ROM Drive
Stagger speed CD-ROM drive is the fastest available. 200 more access times and 55% faster transfer rate deliver superior performance. Other features include: autocurate lens cleaning, slider-based optical pick-up, S/2.2 interfaces, easy playback, capabilities and more. CDR 0089. $499

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BrushStrokes combines a sophisticated 256-bit color paint program with a clear, fully illustrated How To Paint Guide. This rich collection of customizable tools, filters, and special effects allow you to transform your ideas from your computer monitor/ClearChoice. GRA 0045. $49

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SoftPC's award-winning emulation technology lets you run more than 50,000 DOS and Windows applications on your Mac. Includes MS-DOS 5.0 pre-installed, SoftNode and CD-ROM extension. Publisher: Insignia Solutions. COM 0156. $219.95

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White Knight
11 award-winning telecommunications programs package—perfect for e-mail, voice and video to every Mac telecommunications needs. Offers power associated with products comes hundreds monitor and easier to learn, and priced in a precision communication. Booklet: White Knight. Publisher: White Knight. COM 0066. $85

Marvel Comics
Screen Posters
Join Spider-Man, Wolverine, the X-Men, and your favorite Marvel Comics super heroes in the fight against evil. This computer boredom buster includes: classic images of comic book heroes, comic book company's comic book covers, comic book original artwork, and more. Publisher: TeenDesign. USD 1976. $129.95

VST ThinPack
Complete
The battery for the Powerbook 100-188c runs for 5-9 continuous hours. Requires 20 pin cord. Publisher: VST. ACC 1286. $199.95

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<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
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</thead>
<tbody>
<tr>
<td>MICROTEK / SCAN AV</td>
<td>ScanMaker II/AV</td>
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<td>ScanMaker I/ixe/AV</td>
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<td>ADF</td>
<td>$395</td>
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<td></td>
<td>Transparency/AV</td>
<td>$395</td>
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<td>UMAX / SCAN AV</td>
<td>UC840/AV</td>
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<td></td>
<td>UC1260/AV</td>
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HARD DRIVES

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<td>Fujitsu</td>
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<td>1200MB</td>
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<td></td>
<td>2400MB</td>
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Quantum

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<th>MODEL</th>
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<tr>
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<td>42 MB</td>
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<td>240 MB</td>
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<td>340 MB</td>
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<td>450 MB</td>
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<td>1800 MB</td>
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<td>$1,155</td>
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SyQuest Drives carry a 5 year warranty. / The rest carry a 2 year warranty.

Quantum

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<thead>
<tr>
<th>MODEL</th>
<th>CAPACITY</th>
<th>SPEED</th>
<th>PRICE</th>
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<td>3400 MB</td>
<td>5.25H 11ms</td>
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<td>$1,165</td>
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Seagate Drives carry a 1 year warranty. 5.25" Drives carry a 2 year warranty.

MULTIFUNCTIONAL

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MAC/Kit</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SyQuest 88C &amp; 650 Optical Drive</td>
<td>$309</td>
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<tr>
<td>SyQuest 88C &amp; Photo 5CD-ROM, 500 Hard Drive</td>
<td>$309</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
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<tbody>
<tr>
<td>O950 9270</td>
<td>17&quot; Monitor, X Keyboard</td>
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<td>14&quot; Monitor, X Keyboard</td>
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<td>14&quot; Monitor, X Keyboard</td>
<td>$3,929</td>
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<tr>
<td>O950 9270-CD</td>
<td>14&quot; Monitor, X Keyboard</td>
<td>$3,799</td>
</tr>
</tbody>
</table>

Call for more information.

SUPERMICRO

5.25" & 3.5" OPTICAL DRIVES

<table>
<thead>
<tr>
<th>MODEL</th>
<th>CAPACITY</th>
<th>SKEG</th>
<th>MAC/Kit</th>
<th>PRICE</th>
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<tbody>
<tr>
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<td>575G</td>
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<td>Ricoh-502</td>
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<td>PL-650/130G</td>
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SALE

SALE

3.5" OPTICAL DRIVES

<table>
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<th>MODEL</th>
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</thead>
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<td>57G</td>
<td>$399</td>
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<tr>
<td>Fujitsu-200MB</td>
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<td>57G</td>
<td>$399</td>
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<td>Sony-P-301</td>
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<td>$1,049</td>
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<td>Most-256</td>
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SALE

SALE

PRESENTATION COMBO

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
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<th>PRICE</th>
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<tr>
<td>Syquest 128MB</td>
<td>88.144 External Onve 3</td>
<td>$45</td>
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<tr>
<td>Sony-7528</td>
<td>14MB, 300MB</td>
<td>$75</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
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<td>SyQuest 88C &amp; Photo 5CD-ROM, 500 Hard Drive</td>
<td>$309</td>
<td></td>
</tr>
</tbody>
</table>
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Albert Eisenstein

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  - 950 8/230: $2750
  - 800 8/230: $2050
  - 840av 8/525: $3100
  - 605 8/230: $2050
  - 605v 8/230: $2000
  - 605UV 8/230: $21575
  - 610v 8/230: $2035
  - 650 8/230: $2000
  - PowerBooks 100v: $1640
  - PowerBook 140v: $1650
  - PowerBook 165v: $2000
  - PowerBook 180v: $2000
  - PowerBook 650v: $1650
  - PowerBook 100v: $2000

- **NoteBooks**
  - PowerBooks 100v: $1640
  - PowerBook 140v: $1650
  - PowerBook 165v: $2000
  - PowerBook 180v: $2000
  - PowerBook 650v: $1650
  - PowerBook 100v: $2000

- **Displays**
  - Apple 14" Color Display: $930
  - Apple 14" AV Color Display: $970
  - Apple 14" Color Display: $990
  - SuperMac 20-Pin Flat-Panel: $1250
  - SuperMac 15-Monitor (Header) $1250

- **Printers/Scanners**
  - Apple LaserWriter Pro 810: $3100
  - Apple LaserWriter Pro 820: $3170
  - Apple LaserWriter Select 307: $1290
  - Hewlett Packard 710: $1200
  - Hewlett Packard 4100: $1500
  - RADIUS VIDEO VISION: $3050

### Add On's

- PowerBook Upgrades
  - PowerBook PowerBook Upgrades: $350
  - Duo Accessories: $350

- Apple Macintosh
  - Apple PowerBook: $1250
  - Apple Extended: $1250

- Global Village
  - Global Village BNC: $1250
  - Global Village S-Video: $250

- Macintosh
  - Macintosh Power Supply: $200

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- Sony 8300: $2799
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- Sony 9000E: $5999
- Sony 1200: $899

### Power Supplies

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- 3650E: $1999
- 3650F: $2299
- 3650G: $2499
- 3650H: $2699

### Prices are Subject to Change Without Prior Notice
### QUADRA
- **PowerBooks**
  - 145 B 8/40, 80 - 1055/1165
  - 160 8/40, 200 - 1350/1550
  - 165 4/40, 160 - 1455/1555
  - 180 4/40, 180 - 1505/2050

- **PowerPC**
  - 180/180C 14/240 - 259/269
  - 180C 4/40, 160 - 2150/2395
  - 180C 4/40, 240 - 2599/2699

- **PowerBook Duo 250**
  - 4/80, 200MB $1595/1745

- **PowerBook Duo 330**
  - Removable Hard Disk Cartridge 44/88MB $59.79

### SPECIALS
- **Printers & Scanners**
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### MONITORS & CARDS
- **RosterOps**
  - Horizon 24 W/DSP — CALL
  - MoviePak 2 — 1549
  - MoviePak Presenter — 1399
  - 2421LY — 2399

### CENTURION
- **Mac**
  - 160/330CD — 3799
  - 840 4MB/1.7DGIG — 2849

### SPECIALS
- **PowerBook DUO 250**
  - 4/80, 200MB $1595/1745

- **PowerBook DUO 330**
  - Removable Hard Disk Cartridge 44/88MB $59.79

### MONITORS & CD ROM Drives
- **NEWGEN**
  - DeskWrlter 500 — 295
  - HP 451 MX — 4250
  - HP LaserJet 4MP — 1345

### MEMORY UPGRADE
- **FPU**
  - USB 3.0/4.0 Opt. — 3199

### PRINTERS & DRIVES
- **WACOM**
  - Pen & CD ROM Drives

### SPECIALS
- **APPLE Color Printer** $495
- **LaserWriter Select 310** $655
- **PowerBook DUO 250** 4/80, 200MB $1595/1745
- **Removable Hard Disk Cartridge 44/88MB** $59.79

### MONITORS
- **MONITORS & CD ROM Drives**
  - CD 150/300 — 39/309
  - CD 150/300 Ext. — 149/349
  - 11" COLOR Display — 239
  - 14" 16/4" RGB — 979/429
  - AudioVision 14" — 665
  - 11" COLOR RGB — 195

### SPECIALS
- **ICE 105**
  - 510 14.4PB — 1399
  - Supra 14.4LC — 1399

### SCANNERS
- **ScanJet llC/llCX** — 695/945

### CARDS
- **NEWGEN**
  - ScanJet llC/llCX — 695/945

### SPECIALS
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  - Supra 14.4LC — 1399

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  - Supra 14.4LC — 1399

### SCANNERS
- **ScanJet llC/llCX** — 695/945

### CARDS
- **NEWGEN**
  - ScanJet llC/llCX — 695/945

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- 16MB/500/CD: $4195

**Quadra 840AV**
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- 440: $1040

**Quadra 650**
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- 1MB/CD: $3125
- 2MB/CD: $3125

**Quadra 660AV**
- 8MB/160: $1550
- 16MB/320: $2250
- 32MB/320: $3250

**Quadra 610**
- 8MB/160: $1255
- 16MB/220: $1750

**PowerBooks**

**PowerBook 180**
- 8MB/80: $1099
- 16MB/280: $1299

**PowerBook 165**
- 8MB/80: $1299
- 16MB/280: $1599

**PowerBook 150**
- 8MB/80: $1599
- 16MB/280: $1899

**PowerBook 140**
- 8MB/80: $1899
- 16MB/280: $2199

**PowerBook 130**
- 8MB/80: $2199
- 16MB/280: $2499

**PowerBook 120**
- 8MB/80: $2499
- 16MB/280: $2799

**PowerBook 110**
- 8MB/80: $2799
- 16MB/280: $3099

**PowerBook 100C**
- 8MB/60: $2099
- 16MB/120: $2399

**PowerBook 100**
- 8MB/60: $2399
- 16MB/120: $2699

**PowerBook 90**
- 8MB/60: $2699
- 16MB/120: $2999

**PowerBook 80**
- 8MB/60: $2999
- 16MB/120: $3299

**PowerBook 70**
- 8MB/60: $3299
- 16MB/120: $3599

**PowerBook 60**
- 8MB/60: $3599
- 16MB/120: $3899

**PowerBook 50**
- 8MB/60: $3899
- 16MB/120: $4199

**PowerBook 40**
- 8MB/60: $4199
- 16MB/120: $4499

**PowerBook 30**
- 8MB/60: $4499
- 16MB/120: $4799

**PowerBook 20**
- 8MB/60: $4799
- 16MB/120: $5099

**PowerBook 10**
- 8MB/60: $5099
- 16MB/120: $5399

**PowerBook 5**
- 8MB/60: $5399
- 16MB/120: $5699

**PowerBook 0**
- 8MB/60: $5699
- 16MB/120: $5999

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**MONITORS**

- Apple 12” mono: $149
- Apple Basic Color: $169
- Apple color: $249
- Performa Plus (NEW): $299
- Apple ColorPlus: $399
- Apple Color CM1455 (NEW): $499
- Apple 16” color (NEW): $699
- Artisan 17” color (NEW): $999

**PowerBooks**

- 100 2/40: $649
- 100 4/40: $699
- 140 2/20: $899
- 140 4/40: $1199

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- LC 240/240 Plus Colors: $599

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<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
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<tbody>
<tr>
<td>1 Megabyte</td>
<td>40.00</td>
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<td>8 Megabyte</td>
<td>329.00</td>
</tr>
<tr>
<td>16 Megabyte</td>
<td>619.00</td>
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**Video RAM**

- 4 Bit to 8 Bit Upgrade
  - (Mac II/Mac IIx cards) ............................................. 24.00
- 256K Quadra 700/900, Performa 430 VRAM ..................... 25.00
- 256K Quadras, LC 520 VRAM ........................................ 25.00
- 256K Centris, LC III, Performa VRAM ....................... 25.00
- 512K VRAM for LC, LCII, LCIII, LCIV, i12, i13, DuoDock, and Performa .......... 39.00

**68882 FPU Boards**

- 25 MHz for Macintosh LC ........................................ 55.00
- 20 MHz w/2 slots for Mac IIx .................................... 119.00
- 25 MHz for Mac Classic II ........................................ 55.00

**Cache Cards, Etc.**

- 128K Cache Card for LC IIi and Performa 450 ................ 159.00
  - w/25 MHz FPU ...................................................... 239.00
- i12x 64K Cache Card .............................................. 159.00
- i12x 64K Cache Card .............................................. 159.00
- i12x 2-slot Card and 68882 ...................................... 119.00

**Math Coprocessors**

- 68882 16 MHz FPU .................................................. 39.00
- 68882 20 MHz FPU .................................................. 45.00
- 68882 25 MHz FPU .................................................. 49.00
- 68882 33 MHz FPU .................................................. 59.00
- 68882 50 MHz FPU .................................................. 59.00
- 68881 16 MHz FPU .................................................. 45.00

**Miscellaneous**

- LaserWriter Pro 810 4 MB upgrade ......................... 275.00
- LaserWriter Pro 810 8 MB upgrade ......................... 549.00
- T.I. MicroLaser 1 MB ............................................. 39.00
- Mac Classic 1 MB Board ........................................... 75.00
- 68851 16MHz FPMU ................................................ 89.00
  - if requested, MODE 32 software included free w/FPMU
- Mac Portable 3 MB Card ........................................... 369.00
- Mac Portable 4 MB Card ........................................... 399.00
- Mac Portable 5 MB Card ........................................... 449.00

**PowerBook Memory**

<table>
<thead>
<tr>
<th>Size</th>
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<td>2 MB</td>
<td>95.00</td>
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<td>399.00</td>
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<tr>
<td>14 MB</td>
<td>725.00</td>
</tr>
<tr>
<td>20/28</td>
<td>CALL</td>
</tr>
</tbody>
</table>

**DiiMOCache 50MHz Accelerator $445**

- Excel Calculation
- Photoshop Unsharp Mask
- Word Scroll

**Newton PDA Upgrade Products**

- 512K Static RAM Upgrade ....................................... 125.00
- 1 Megabyte Static RAM Upgrade ................................ 140.00
- 2 Megabyte Static RAM Upgrade ................................ 149.00
- 2 Megabyte Flash Card Upgrade ............................... 259.00
- 4 Megabyte Flash Card Upgrade ................................ 425.00
- 8 Megabyte Flash Card Upgrade ................................ 749.00
- 16 Megabyte Flash Card Upgrade .............................. 1375.00

**PowerBook Memory**

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
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<tr>
<td>100</td>
<td>140/170</td>
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<tr>
<td>160/180</td>
<td>165cs/180cs</td>
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</tr>
<tr>
<td>20/28</td>
<td>CALL</td>
</tr>
</tbody>
</table>

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- 16mb 4 x 3 2 2 $599/668
- 64mb 8 x 3 2 2 $1269/1349

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- 259 269 279
- 367 378 299
- 459 478

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CIRCLE 598 ON READER SERVICE CARD

CIRCLE 474 ON READER SERVICE CARD
CIRCLE 579 ON READER SERVICE CARD
## Memory Upgrades

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>1x8x80</td>
<td>$40</td>
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<tr>
<td>2x8x80</td>
<td>$75</td>
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<td>4x8x80</td>
<td>$148</td>
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<tr>
<td>4x8x80 H/Hx</td>
<td>$155</td>
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<td>16x8x70 (Low Profile)</td>
<td>$619</td>
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<td>1x8x90fx</td>
<td>$82</td>
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<tr>
<td>4x8x90fx</td>
<td>$150</td>
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<td>16x8x80fx</td>
<td>$621</td>
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<tr>
<td>4MB 72 pin (70NS/60NS)</td>
<td>$139/$147</td>
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<tr>
<td>8MB 72 pin (70NS/60NS)</td>
<td>$226/$229</td>
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<tr>
<td>16MB 72 pin (70NS/60NS)</td>
<td>$615/$625</td>
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<tr>
<td>32MB 72 pin (60NS)</td>
<td>$1,305</td>
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<tr>
<td>Newton-2MB</td>
<td>$289</td>
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## Powerbook Memory

<table>
<thead>
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<th>Model</th>
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<tr>
<td>PB 100-6MB</td>
<td>$265</td>
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<tr>
<td>PB 140/170-4MB/6MB</td>
<td>$165/$259</td>
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<td>PB 160/180-4MB/6MB</td>
<td>$165/$255</td>
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<td>PB 160/180-8MB/10MB</td>
<td>$325/$415</td>
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<td>PB 165C/180C-4MB/6MB</td>
<td>$165/$269</td>
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<tr>
<td>PB 165C-8MB/10MB</td>
<td>$335/$439</td>
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<tr>
<td>PBDUO 210/230-4MB/6MB</td>
<td>$165/$215</td>
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<tr>
<td>PBDUO 210/230-8MB/10MB</td>
<td>$299/$349</td>
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<tr>
<td>PBDUO 210/230-12MB/20MB</td>
<td>$572/$599</td>
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<td>PBDUO 210/230-28MB</td>
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## Modems

<table>
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<tr>
<th>Model</th>
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<td>Supra 501/6LC 14.4 S/Fax</td>
<td>$165</td>
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<td>Supra 2400</td>
<td>$59</td>
</tr>
<tr>
<td>Supra 32bis Powerbook Fax</td>
<td>$229</td>
</tr>
<tr>
<td>Supra 14.4 S Fax (w/cable/software)</td>
<td>$225</td>
</tr>
<tr>
<td>Zoom AMX 2400 bps</td>
<td>$68</td>
</tr>
<tr>
<td>Zoom FXV 2400/6000 S/Fax</td>
<td>$129</td>
</tr>
<tr>
<td>Zoom FXV 14.4 v.32bis S/Fax</td>
<td>$195</td>
</tr>
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## Accelerators

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAYSTAR Universal Powercache 030 33/33 w/FPU</td>
<td>$289/$379</td>
</tr>
<tr>
<td>Turbo 040 25/33</td>
<td>$779/$949</td>
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<tr>
<td>Turbo 040 40</td>
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<tr>
<td>128K Cache for Turbo 040 Accelerator</td>
<td>$172</td>
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## Optical Cartridges

- 128 MB (Sumsung) | $34
- 650 MB (Sumsung) | $85
- 1.2GB/512K (Verbatim) | $112
- 1.2GB/1024K (Verbatim) | $112

## Media

- Bernoulli Cartridges
  - 44 MB | $97
  - 90 MB | $105
  - 150 MB (5 Pack) | $459

## Shipping

- Overnight/Next Day Delivery | $7
- UPS | $6
- International Orders – 24 Hours a Day | prices vary

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- 1x8x80 | $40
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- 4x8x80 | $148
- 4x8x80 H/Hx | $155
- 16x8x70 (Low Profile) | $619
- 1x8x90fx | $82
- 4x8x90fx | $150
- 16x8x80fx | $621
- 4MB 72 pin (70NS/60NS) | $139/$147
- 8MB 72 pin (70NS/60NS) | $226/$229
- 16MB 72 pin (70NS/60NS) | $615/$625
- 32MB 72 pin (60NS) | $1,305
- Newton-2MB | $289

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The Macintosh Father

What to expect when your spouse is expecting

Around the seventh month, nesting begins. Remember the care you took to prepare your Macintosh work space? A good desk, a comfortable chair, LocalTalk cabling, a mouse pad, the perfectly configured screen saver. Remember saying, "Honey, I need this special chair with an adjustable lumbar support so I can work longer and make more money by writing more columns"?

What comes around goes around. Now you hear, "Honey, we need to create a supportive and stimulating environment for our child." This means buying sleepy suits, bathtubs, pails, hooks, rattles, and strollers. A good rule of thumb is one stroller for each Mac you own. The Right Start catalog replaces the MacWarehouse catalog—and you spend more on baby stuff than you ever did on software. Your wife buys twice as many baby books as you have Macintosh books, and What to Expect When You're Expecting replaces Inside Macintosh as your most-used reference.

The Ultimate Multimedia Machine

Delivery is a miracle. One cannot doubt the existence of God if you've seen a baby delivered (or, for that matter, tried to explain how Apple continues to survive). Delivery is a miracle. One cannot doubt the existence of God if you've seen a baby delivered (or, for that matter, tried to explain how Apple continues to survive). An hour after delivery, the reality that you are now the proud owner of the ultimate multimedia machine sinks in. Your new computer has color, sound, and several forms of output. It is WYSIWYG: What You Smell Is What You Get.

Being a parent means making things work any way you can. Remember when you first got a Macintosh and everything had to be just right? You'd spend hours figuring out which two INITs conflicted. You were a man of principle: This is how a Macintosh should work. Then you adopted a more pragmatic approach: As long as my Macintosh isn't crashing, I'm happy.

The same pragmatic approach develops with a baby: As long as the baby isn't crying, I'm happy. Principles go out the window. I went from "We'll buy cloth diapers, and I'll wash them" to "Let's use a diaper service" to "Let's buy a case of Pampers, and I'll donate money to the Sierra Club" within one week. (Don't even think about sending letters to the editor about why using disposable diapers is a heinous crime.)

This pragmatic approach is necessary because, as with your Macintosh, the reason why a baby cries is usually inexplicable. One day it's no big deal if the formula is warm. The next day it is. One day wet diapers don't matter. The next day they do. Some books say babies cry because it's the only way they communicate. This is like Apple saying your Macintosh crashes to let you know it's alive.

The Bottom Line

The bottom line of using a Macintosh is not the hassle of setting it up, dealing with Apple and software companies pointing the finger at each other, or wondering if you bought the right model. The bottom line is that a Macintosh is a source of wonder, hopes, and dreams. If you were to ask parents about their newborns, they would say the same thing.
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