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JULY 1996

Macworld

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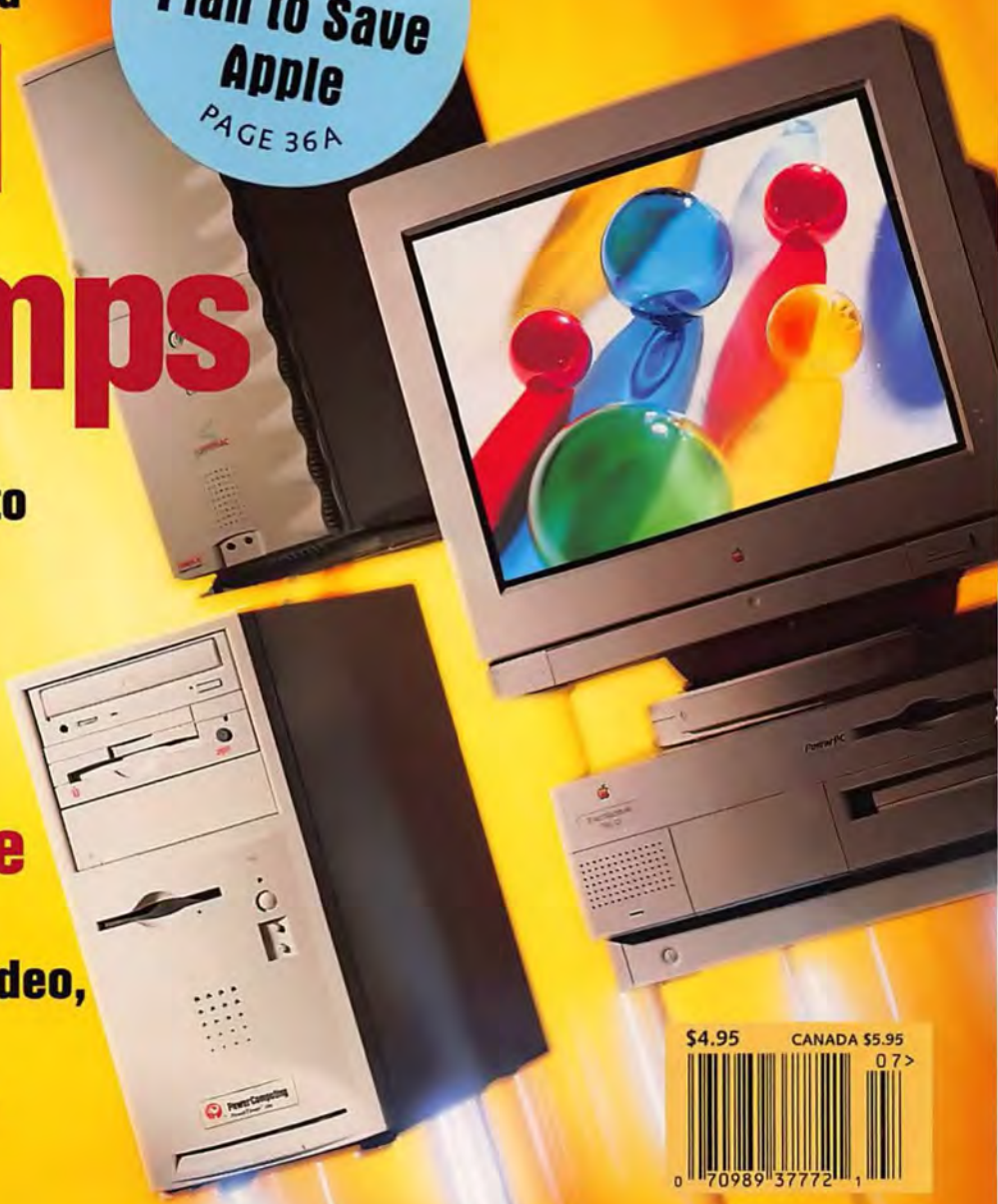

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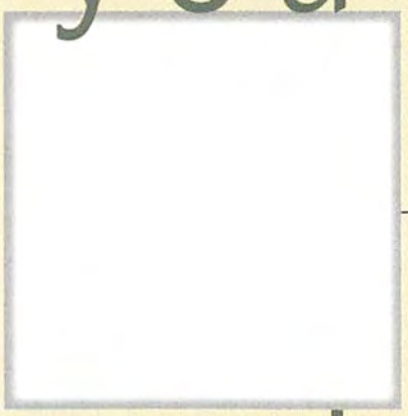

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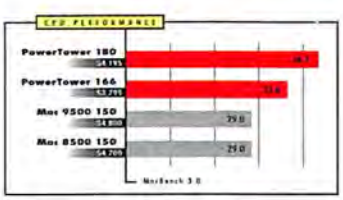

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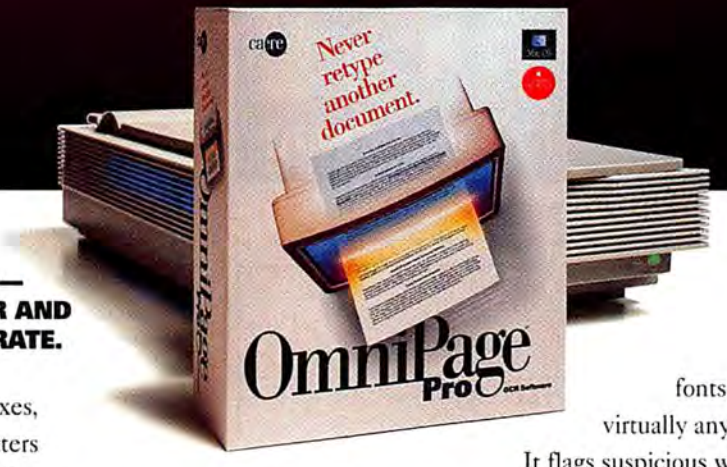

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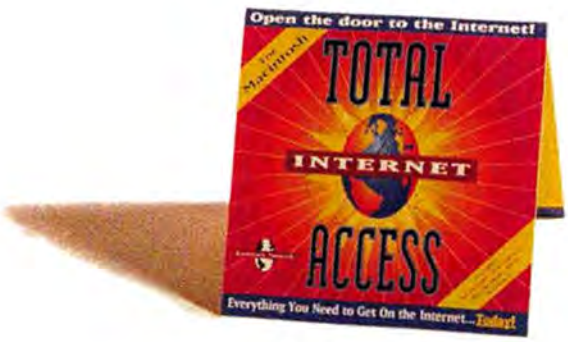

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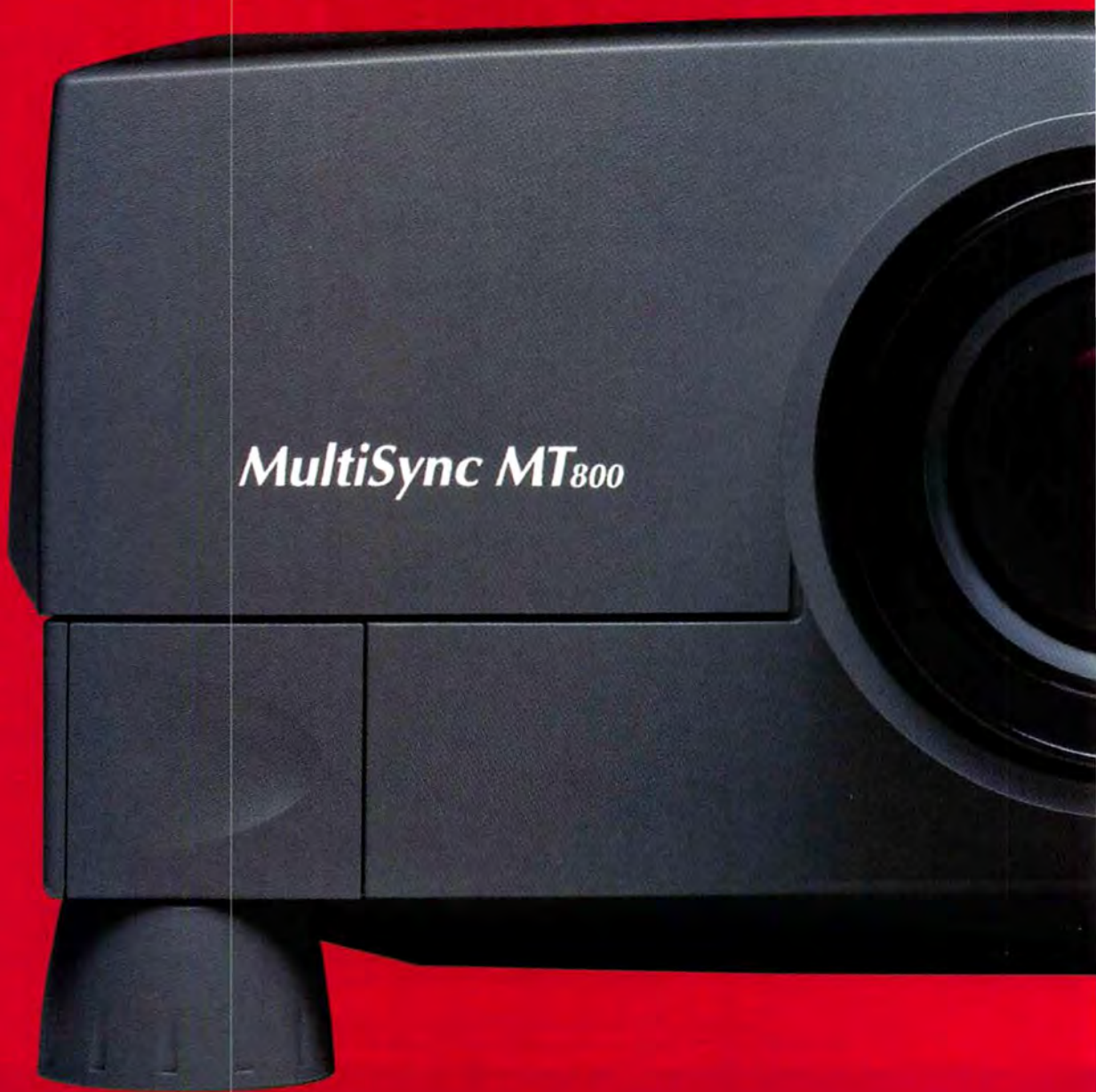

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Letters

Up-to-the-Minute

AS A MAC OWNER, I'VE FOLLOWED the flurry of recent activity at Apple with interest. On more than one occasion, I've wondered how *Macworld* would cover the fast-paced developments at Apple. To my pleasant surprise, I found your coverage in the April issue to be superb. I was able to read your article on the February 2 appointment of new CEO Gilbert Amelio on February 20! I'm impressed that you were able to produce such a story, publish it, and get it in my hands so quickly! I count on *Macworld* to keep me informed about Apple, and it's good to know that your staff is up to the task.

SCOTT POHL
via the Internet

Go, Apple, Go

I COULD NOT AGREE MORE WITH Adrian Mello's article "Apple Leadership: Chain of Fools" (*State of the Mac*, April 1996). As an Apple developer, I'm used to hearing how poorly Apple is doing from friends and colleagues. I can patiently explain that Apple makes lots of money, routinely jostles with IBM and Compaq for the top of the heap in units shipped, and so on, for only so long. More important, how long can a highly successful company survive when everybody talks about how badly it is doing?

JOHN ANGER
Calgary, Alberta, Canada

IT'S BEEN VERY HARD FOR ME LATEly to convince people that Apple isn't on the verge of bankruptcy. A coworker, who had been reading the *Wall Street Journal*, insisted that Apple stock was reduced to junk status and that they had

GORDON STUDER

filed Chapter 11. Of course, his delusions ended when I insisted he read April's *State of the Mac*.

MICHAEL GOLEBIEWSKI
via America Online

See The Desktop Critic *in this issue for some pro-Apple ammo.—Ed.*

Error Codes Anonymous

I COULDN'T GET ANY STRAIGHT INFO on the "FPU not installed" and "Bad F-line" errors, so I, like many others, was forced to learn the causes of the Mac's cryptic error codes by trial and error. Reading "Comedy of Errors" (*Secrets*, April 1996) was absolutely worth the cost of a year's subscription. Maybe you should give complimentary copies of this article to Apple's technical-support staff.

JEREMY WILLIAMS
Roanoke, Virginia

Web Savers

I JUST WANTED TO PASS ALONG MY thanks to you for posting Apple's System 7.5 Update 2.0 on the Macworld Web site (*http://www.macworld.com*). I tried for three days to get it at various sites without success. I was able to download it on my first attempt from your Web site.

ALLEN W. SHERIDAN
Bellevue, Nebraska

Copland-Friendly PowerBooks

SHOULD I BE WORRIED? WHEN I WENT to the local techno-emporium to pick out a new PowerBook, I knew that Copland wouldn't work on 680X0-powered motherboards. I was also well aware that it won't operate with the 500-series PowerBook processor upgrade. But I was told that the 190cs can be upgraded to PowerBook 5300 status, with a 100MHz logic board that will let me run Copland. Was I misinformed, or did you just leave the 190 off your list of machines (*Letters*, April 1996) that will be Copland-friendly with the right upgrade?

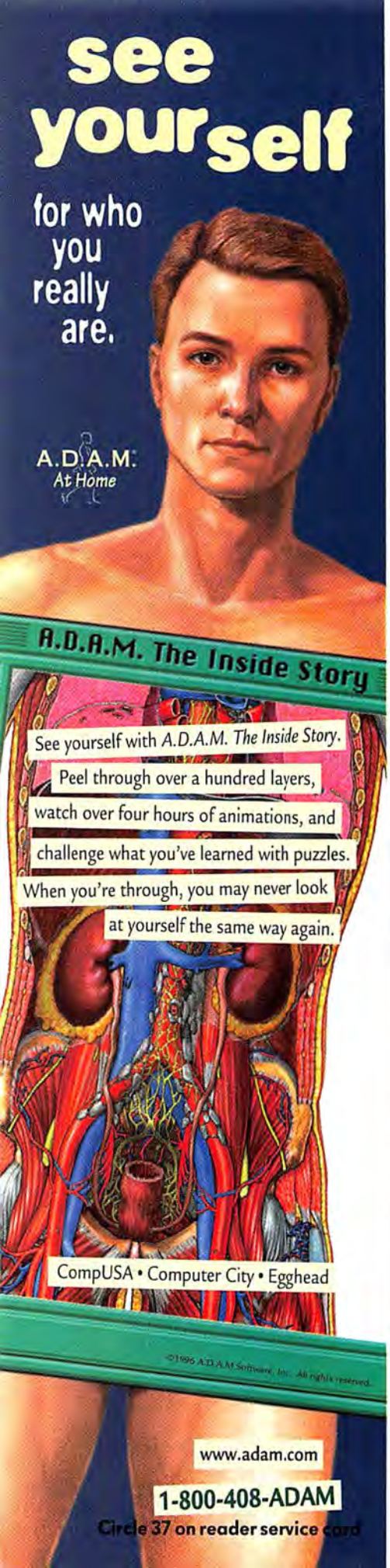
JOSEPH ROSE
Ellensburg, Washington

A PowerBook 190 upgraded with a 5300 motherboard is close enough to a PowerBook 5300 to run Copland without difficulty.—Ed.

Caffeine Generation

STEVEN LEVY HIT THE NAIL ON THE head (*Viewpoint*, April 1996). It takes my Power Mac longer to boot up in the morning than it does to subsequently dial my local ISP, check my E-mail, and

continues



CORRECTIONS

- *The phone number for Looking Glass Technologies is 617/441-6333 (*News, *April 1996).*
- *Several errors appeared in "Heavy-Duty Printers" (June 1996). For general use with essentially no speed penalties, the HP LaserJet 4MV performed closely behind the HP LaserJet 5Si MX.*

  The HP LaserJet 4M Plus offers marginally better print quality than the Apple LaserWriter 16/600 PS.

  In the benchmark "A Few Printers Dominate in Quality," the HP LaserJet 4MV's total output-quality score was higher than the Xanté Accel-a-Writer 8200's.

download the 20 or so waiting messages.

As I'm typically already caffeinated by this time, the wait can become tiresome.

KENNETH FINNEGAN
Biloxi, Mississippi

You know Apple engineers—no one's ever had too much caffeine.—Ed.

THERE IS A SOLUTION OTHER THAN brewing coffee or growing coffee beans. Don't shut off your Macintosh, just the monitor.

DALE DEUTSCH
Stony Brook, New York

AMEN TO STEVEN LEVY'S PIECE ON the Mac's slow start-up. I have owned Macs since 1984 and this has always been my biggest gripe. However, I have yet to use a machine in my work environment (PCs) that is any faster. I currently have the top-of-the-line Pentium 133 and it takes me two trips to the coffee machine before it's ready to go.

JAE D. MARKHAM
via the Internet

STEVEN LEVY CAN TAKE A SNAPshot of the Finder, then use a paint program to save it as a "startupscreen." The next time he turns on his Mac, within five seconds his desktop will be on screen. Of course he can't use it right away, but think of the envious looks he'd get from Windows users. He doesn't have to tell them it's fake.

DAVE REYNOLDS
Yuma, Arizona

AT WORK, I SOLVED THE PROBLEM by using the Auto Power On/Off feature of my Power Mac 8100/100. I set it to awaken about ten minutes before I get to work. That gives it time to wake up and be ready to go when I arrive.

MICHAEL SALSBURY
Sewickley, Pennsylvania

HUH? IS STEVEN LEVY JOKING WHEN he states that it took his Power Mac 9500 over two minutes to start up? I realize that was the April issue, but really.

My Performa 6220CD takes exactly 45 seconds to start up, even with third-party extensions and control panels. I've never had to brew coffee while waiting for my computer to start up from a cold start. The day that happens, Apple will be getting my computer back.

WADE MOLINE
Durand, Michigan

AS ANYONE WHOSE COLUMN APPEARS at the back of the magazine should know: the most important part of the race happens at the finish line.

CHRIS STROM
New York, New York

Where Is Canvas 5.0?

TWO EXPOS AGO I WAS ENTICED INTO purchasing Canvas 3.5 because I could later upgrade to Canvas 5.0 for free. The demonstration of version 5.0 was very impressive.

At the January Expo I was assured Canvas 5.0 would be out in March. It is now well into spring and I have yet to receive my free upgrade. When will Deneba send out 5.0 to those of us who have been patiently waiting?

WILLIAM MACK
via the Internet

According to Deneba, Canvas 5.0 will ship July 1. Users who purchased version 3.5 after July 1, 1995, can upgrade for free; otherwise it's $149.95.—Ed.

Performas' Color Performance

IN YOUR COMPARISON OF PERFORMAS and Power Macs (*Consumer Advocate*, April 1996) you missed at least one very important consideration—and the reason

continues

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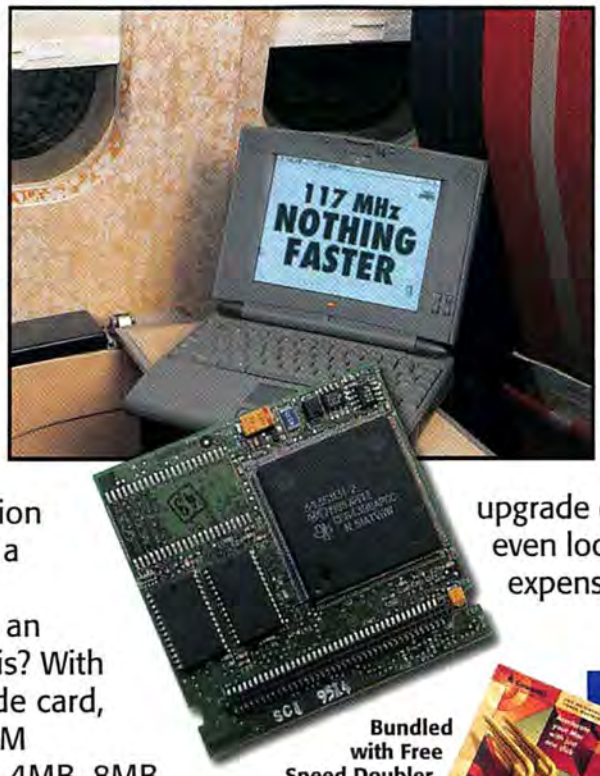

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Circle 4 on reader service card

why, when it was time for me to buy a new Mac, I had to go with a Power Mac: no Performa is capable of supporting 24-bit color, even on small monitors.

THOMAS TWIGG
Kasilof, Alaska

The Littlest Web Server

YOUR ARTICLE ON WEB SERVERS WAS very good, but don't be so quick to rule out a server's running at 28.8 Kbps using standard phone lines and modems ("Get On the Web," April 1996).

Such a system, set up very carefully, can provide an inexpensive Web site and will certainly be enough for many small companies' or personal pages.

I have been running one such server for almost a year. It is a rather popular site and receives about 20,000 visitors (over 100,000 hits) a month.

FRED KRUGHOFF
New York, New York

Ever-Growing Utility Belt

I KNOW YOU GET LOTS OF "BUT what about . . . ?" mail with any article like "The Right Tools for the Job" (April 1996), but I can't believe you failed to include QuicKeys! No slights on the ones you did single out—you included some great ones—but this is the one utility that saves me the most time and aggravation of all. I can send or fetch E-mail, log on to my home page, or clean up a bunch of raw text in my word processor—with *one* keystroke in QuicKeys. And I can create new shortcuts on the fly for ad hoc tasks.

Now I'll just hit control-option-M and send this message off . . .

PETER BRIGHAM
Cambridge, Massachusetts

I USE POPUPFOLDER 1.5.1 AND AM interested in the apparent upgrade you described in "The Right Tools for the Job." I called the phone number listed and was told that Inline Software no longer exists and that the new company did not license the rights to sell PopupFolder. How can I contact Highware?

DAVID TOPPER
via the Internet

When Focus Enhancements acquired Inline Software, PopupFolder went back to its developer. The latest version, 2.0.1, is available from Highware at http://www.highware.com, *or send E-mail to* info@highware.com.*—Ed.*

Everyone's a Critic

DAVID POGUE'S COLUMN "YOU, TOO, Can Become a Millionaire Overnight" suggests that whoever produces a music program that uses QuickTime 2's built-in MIDI synthesizer will make a million (*The Desktop Critic*, April 1996).

Well, there is something that does this, and can use any of the existing music sequencers. It is a shareware extension called MidiQT, and it routes data intended for the MIDI port to QuickTime. The registered version allows use of all the available instruments; the unregistered version restricts you to just the piano.

I don't know whether the author, Tim Rand, is a millionaire, but he should be!

DAVID MORRISON
Callaghan, New South Wales, Australia

Many readers wrote to tell us of music-sequencing programs that use QuickTime's Musical Instruments as a synthesizer. Alongside MidiQT ($20), we heard about QuickTime Midi Player 1.3.1 (Terry Greeniaus, $15); Master Tracks Pro 6.0 for the Mac (Passport Designs, $149); Music Shop, Vision, and StudioVision Pro (Opcode Systems; $149, $145, and $995 respectively); Cubase Standard 2.8 (Steinberg/Jones North America, 818/993-4091; $349); and upcoming versions of Mark of the Unicorn's music software line. You can download the shareware programs from America Online (keyword Macworld*) or from* Macworld*'s Web site (*http://www.macworld.com*).—Ed.*

THE IDEA FOR CONCATENATOR PRO is great, especially if dragging Open Transport's plethora of extensions onto it would make Open Transport work.

JOHN P. KNIGHT
Seattle, Washington

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 (keyword *Macworld*), AppleLink (*Macworld1*), or via the Internet (*letters@macworld.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*. m

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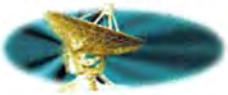

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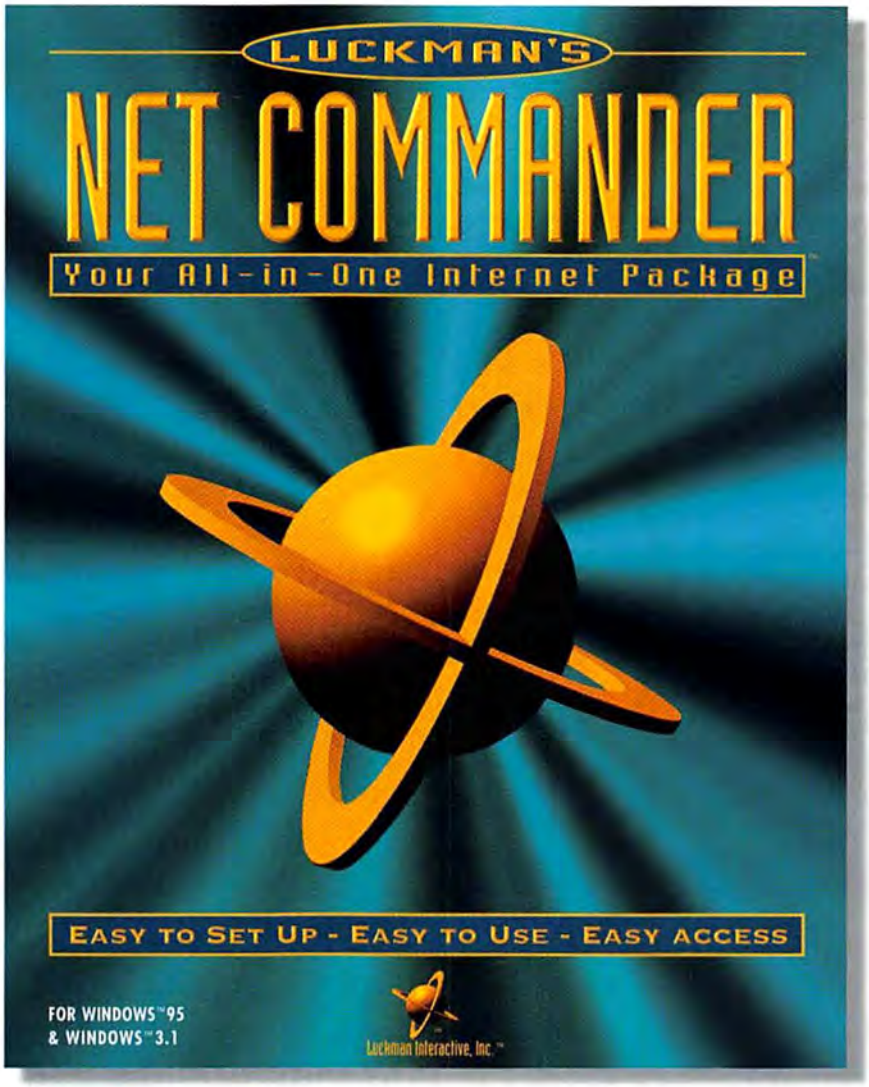

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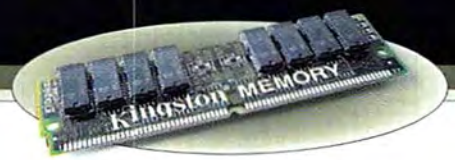

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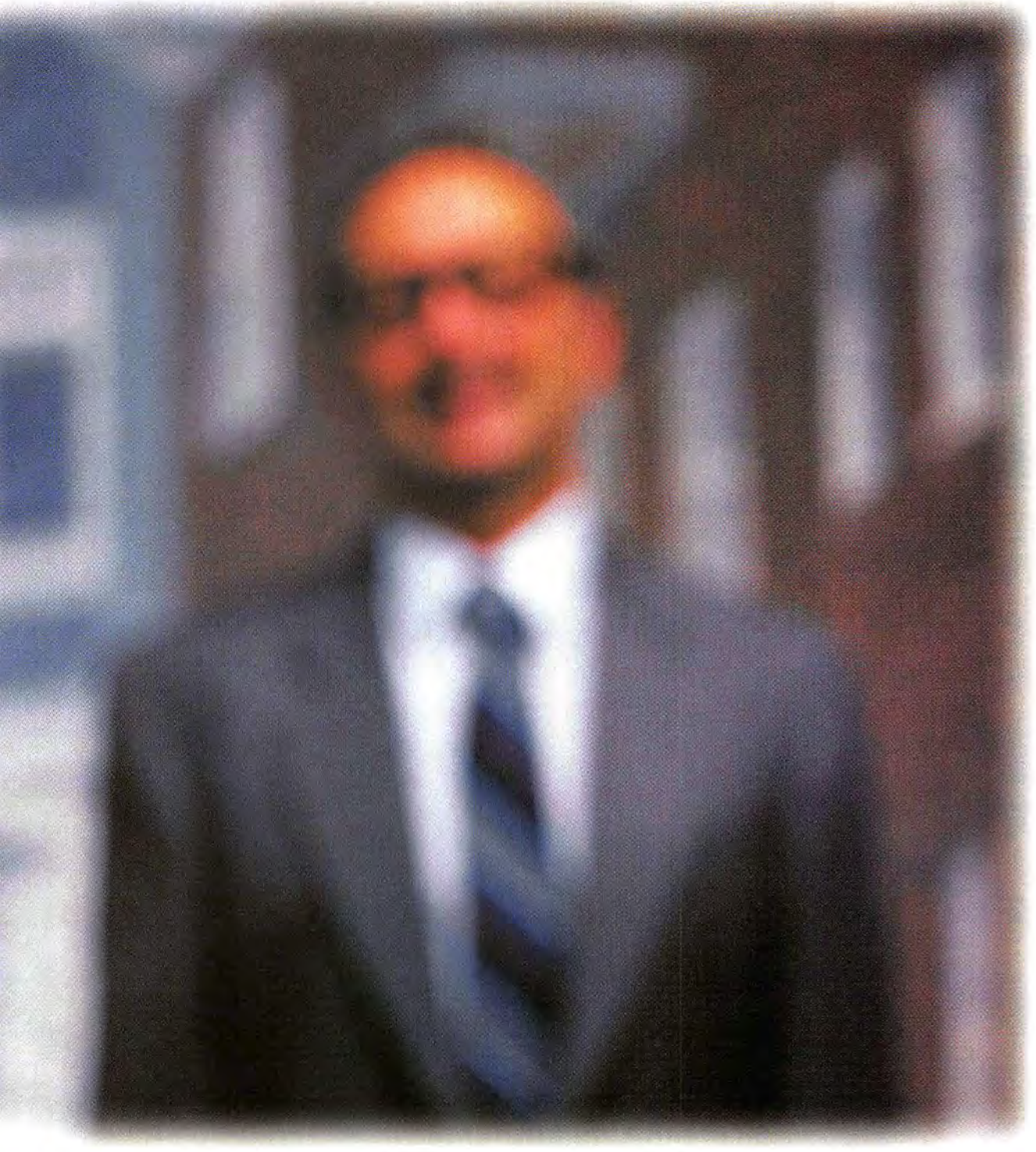

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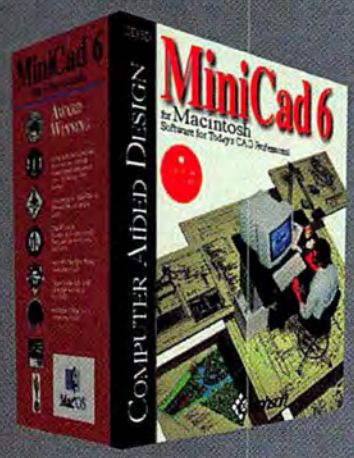

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State of the Mac

by Adrian Mello

Coping with Accelerating Technological Change

TIMING IS EVERYTHING IF YOU WANT TO KEEP UP

ONE OF THE THINGS I ENjoy most about working with computers is all the amazing innovation I get to experience firsthand. It's fun to be on the endless voyage of discovery, charting the new waters of computer technology and products. New technologies—not just new products—are introduced and popularized in what seems like the blink of an eye. And that pace of innovation shows no sign of slackening.

Consider just a few of the hardware peripherals technologies that have debuted in the last few years and have already migrated to the desktops of ordinary computer users. Digital cameras; color laser and ink-jet printers; dye-sublimation printers; recordable CD-ROM drives; low-cost, high-capacity removable storage; color active matrix display screens for laptops; and personal document scanners are perhaps the most recognizable examples. And of course, there's the Mac itself. The Power Mac 7600 you buy today costs about what you would have paid for a Quadra 650 a couple of years back, but the 7600 performs about five times faster than that Quadra.

But the flip side of the progress coin is obsolescence—no sooner do you buy a new product than you're forced to witness the introduction of a new, improved version: added features, better performance, and for that extra sting, all at a substantially lower price. Remember the Mac IIvx, introduced in the fall of 1992? It was a fine machine, but you have to sympathize with those who eagerly bought it, only to feel burned a few months later when its price was slashed as the IIvx was superseded by the still more capable Centris series.

Another hazard of the competitive race to meet the demand for new technologies is that companies sometimes introduce products that are, shall we say, not ready for prime time. (There's a reason why the leading edge is often called the "bleeding edge.") Though there will always be early adopters, consumers have grown wary. Why rush to install a major new version of your software immediately on release? You can almost hold your breath and count until the first inevitable bug-fix comes out.

Sometimes technology customers feel they're on a treadmill they can't get off. Say you want to use the new version of one product. You may need more RAM, a bigger hard drive, or a system upgrade. Whoops, now you need to go back and upgrade your other applications, because their old versions no longer work with the system upgrade you just installed.

HANK OSUNA

It's important for consumers deciding whether to adopt new technology to have some perspective. A look behind the scenes of the hardware industry helps explain the volatile rate of change to products and prices that you experience as a consumer.

Hardware: New, Big, and Cheap

A few years ago hardware products were developed over the course of years; now, it's a matter of months. Not long ago, when a product was introduced you could count on its being in the market for at least a year or so. Product life cycles are also now measured in months. In some product areas—storage is one—it's not unusual for a product to be discontinued within six months of introduction. As hard as this is on consumers, it's the vendors who really feel the pressure.

Running a successful hardware company requires an acute sense of timing. Vendors are forced to make a tremendous number of decisions—most of them educated guesses—on the fly. They must evaluate the promise of each innovation and decide when (or if) it's ready to bring to market. They must weigh the advantages of being first to market in a field of aggressive competitors against the risks of offering a cutting-edge product that may not provide the reliability of the last proven technology. They must forecast consumer demand and when it will peak. They must decide when to reduce the inventory of existing products. They must figure how quickly prices will drop for their products and how to get the word out to their workforce, dealers, and customers. A bad guess in any one of these areas can dramatically affect profitability.

A few years ago, for example, Toshiba, rushing to develop its 3½-inch–mechanism business, released two early high-capacity drive products. The designs seemed solid, the componentry was first-rate, and initial testing positive. Unfortunately, the 830MB drive turned out to have one of the highest failure rates in the market, eventually causing Toshiba to completely abandon the lucrative 3½-inch market.

Prices also drop at an astonishing rate. Two years ago you could buy a 1GB

continues

hard drive for around $1000; a year ago the price had dropped to around $600; today they're going for $200 to $300. One vendor told me that the way his company keeps up with the continual price pressure is to cut prices automatically on certain products by a set amount every month.

How should you as a consumer respond to constantly changing prices and technologies? Every vendor I spoke with advises the same thing: Don't get caught in the waiting game. Buy for your needs today, and don't worry too much about projecting far into the misty future.

Modular Architecture: The New Software Diet

Software companies used to count on periodically spitting out ever more powerful versions of their software and selling them to their existing customers. But bigger and newer don't always mean better. A balanced set of features is more important than having every feature imaginable. Many software vendors have pointed this out for years, yet they've also felt compelled to go ahead and throw in the kitchen sink to address customer demands. A number of recent upgrades have really been *downgrades*, unless you consider a sloth a step up from a jaguar. (The best-known software sloth, Microsoft Word 6.0, may have been singlehandedly responsible for popularizing the term *bloatware*.)

One of the smartest approaches to software development is plug-in architecture, well implemented in programs such as Adobe Photoshop, Netscape Navigator, QuarkXPress, and Macromedia FreeHand. With plug-ins, you pick just the feature additions you need, avoiding unnecessary bulk. This has led to a terrific new class of products from companies such as MetaTools, Extensis, and Xaos Tools that add new abilities to existing applications. Similarly, products that support OpenDoc will permit you to add new capabilities in a modular fashion.

This modular development environment is a healthy one for innovation, particularly for small developers. It should also allow developers of the workhorse applications (called "containers" in OpenDoc parlance) to focus on creating efficient engines with an elegant set of core features, without worrying about the program's being all things to all people. As an added bonus, modular architectures afford developers a very efficient way to disseminate solutions over the Internet.

Plug In to Macworld

One of *Macworld*'s biggest challenges is keeping pace with the changes in the industry we report on. We continually review our own production cycles, looking for ways to reduce our lead time so that we can test and evaluate products on a timely basis. To make sure that the products we report on are the same as the ones that you're considering buying, we test only shipping products. But I'm curious to hear your views: Are you interested in reading about unreleased products, even though they may not accurately represent final products? Let me know. Also, we choose to emphasize effective feature balance rather than simply noting long laundry lists of features. You can help by telling us which features matter most to you and which ones you'd be willing to sacrifice in the interest of running lean. Contact me at *mello@macworld.com*. m

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QuickTime movies. Digital videos so realistic that the only thing missing from taking the Z3 roadster for a test-drive is the wind in your hair.

To serve up their web site, BMW uses the Apple® Internet Server Solution, one of the easiest ways to put a site on the Net and powerful enough to handle over 200,000 hits per day.

Once again, BMW showcases some of the world's best technology.

Only in this case we're talking about BMW's amazing new web site. The web site that actually lets you test-drive the Z3 roadster in the comfort of your living room. And how did BMW put one of the most innovative web sites on the Internet? With Apple technology, of course. As Jim McDowell, VP of Marketing at BMW of North America, puts it, "*We wanted our web site to have the same performance and excitement as our BMW products. Apple was the perfect partner.*" So visit www.bmwusa.com to check out some technology that really moves. Oh yeah, and while you're at it, check out the car.

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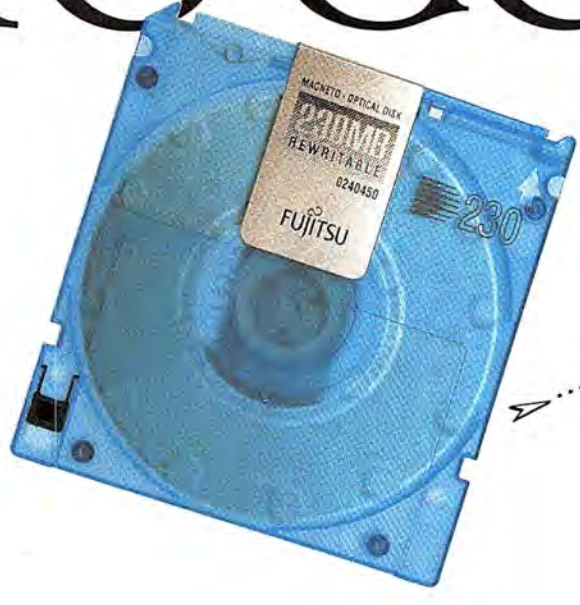

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by David Pogue

Clip-'n'-Save Apple: The Numbers Nobody Knows

SNAPPY ANSWERS, SNAPPY STATISTICS FOR THE NAYSAYERS IN YOUR LIFE

FROM THE ARTICLES WE all read early this year, you would have thought that Apple had already burst like a soap bubble and completely vanished. "Apple has no future," decided *Time* magazine. "The fall of Apple," gloated *Business Week*. Never mind that those same publications are designed on Macs. Never mind that Apple actually made a $424 million profit in 1995. Never mind that a sales slump has hit *all* computer companies.

Normally, I wouldn't really care how much those articles exaggerate. I mean, I don't panic when I see headlines like "An Alien Fathered My Two-Headed Baby," either. But the trouble with those Apple articles is that they became self-fulfilling. Sure enough, Apple's second-quarter loss was ten times bigger than the first quarter's.

I'm no professional analyst. And I admit that Apple's having the mother of all bad hair days. But Wall Street munches facts and figures like so much Chex party mix, and the popular press has been offering some pretty one-sided perspectives. I loved *Time*'s bizarre statement that Mac clones won't appear until fall 1996. What are Power Computing's clones, chopped liver? Then there's the *Wall Street Journal*'s calculation that there are only 15 million Macs out there. What are the other 7 million of us (as reported by *Fortune*), baloney?

But that's the beauty of statistics: you can find some to back up any argument. Because concerned citizens approach me daily asking if Apple will be OK, I'd like to publicize the more cheerful numbers—the ones you don't hear much of these days. On the following pages, I've listed the Apple Bad Publicity clichés we, as Mac users, are most likely to hear, along with some facts and figures to fuel our replies. Clip this article, pass it around, tape it to your fridge.

JOHN RITTER

"Apple can't survive with such a small market share."

According to *Automotive News* (October 1995), Saab, Mercedes, Infiniti, Volvo, Lexus, and BMW have less than 1 percent of the world car market each. And even the big guns, like Mitsubishi and Chrysler, have less than 2 percent of the market apiece. The bottom 16 car companies *put together*, in fact, constitute only 9.8 percent of the market. Does that mean these companies won't survive? Hardly. They are prospering companies that would kill for Apple's 9 percent market share. (So would almost any individual PC clone maker.)

OK, so I'm a contrarian heretic (what else is new?). But I say, who cares if Apple sells only 9 percent of all computers each year, if it's 9 percent of a pool that itself is growing 15 to 20 percent a year (says International Data Corporation [IDC])? Furthermore, the Mac's market share is much higher where it really counts; see "Market Share, Schmarket Share."

Small market share would matter only if it discouraged software companies from writing for the Mac. Read on.

"Software companies are abandoning the Mac."

If this were true, the Mac really would croak. Fortunately, this point, so popularly parroted in the press, turns out not to be true at all.

At Agenda '96, a cross-platform software-industry trade show, 65 percent of developers said they'd be writing Mac programs this year—compared with 57 percent last year. Attendance at the 1995 Apple Worldwide Developers Conference increased 40 percent over the previous one; 34 percent of the programmers were there for the first time. The number of software companies applying to Apple's developer programs tripled in the first quarter of this year (compared with the same quarter last year)—and renewals doubled.

Software companies, like most of us, are in business to make money. And according to the Software Publishers Association (SPA), Macintosh users buy twice as much software as Windows users—in 1994, we bought 18 percent of all software. What company would be dumb enough to say, "Hmm, maybe I'll eliminate 18 percent of my sales this year"?

It's also much cheaper to write Mac programs; because the Mac requires less technical support, the average cost to develop and support Windows programs is 50 percent higher (per dollar of revenue) than for the Mac (says Dataquest). In other words: Earns more, costs less.

"Windows programs come out first."

True—half the time. The other half, the Mac version comes first. Same as it ever was. To this day, according to Apple mar-

continues

Market Share, Schmarket Share

Articles about Apple frequently point out that, of all PCs in the United States, Apple sells fewer than 10 percent. But in a number of fast-growing areas—and overseas—the Mac is much more prevalent, as the following collection of statistics indicates.

- 76 percent of color-prepress customers use Macs (source: Griffin Dix Research Associates).
- 63 percent of all multimedia applications are written on a Mac (Dataquest).
- 63 percent of the computers in U.S. schools (K through 12) come from Apple (QED).
- 47 percent of commercial publishing customers, and 50 percent of scientific and engineering customers, use Macs (sources: Apple and others.)
- 29 percent of full-time college students with computers have Macs—11 percent more than have the nearest competitor (Roper College Track).
- 19 percent of PCs purchased by higher education institutions in 1994 were Macs (Computer Intelligence InfoCorp).
- Apple is the #1 U.S. computer vendor in Japan (IDC and Dataquest).
- Apple is the #1 computer company in Australian business, education, and consumer markets (IDC).
- Apple is the #1 computer company in Canada (A. C. Nielsen).
- The Macintosh is the #1 World Wide Web authoring machine, and 41 percent of Web graphics are created on the Mac (Mirai Consulting).
- The Mac is the second most popular computer for World Wide Web servers; over 20 percent are Macs (Georgia Institute of Technology).
- 25 percent of all Web browsing is done from a Macintosh (META Group).

ket research, 900 programs are still available *only* for the Mac.

For every example you give me of a program developed first for Windows, I'll give you one that came first (or only) on the Mac. Adobe PageMill and SiteMill. Alias Sketch. Marathon. CodeWarrior. Quark Publishing System. Now Up-to-Date. Now Contact. Panorama. Adobe AfterEffects. KPT Bryce. Cinemation. Pixar Showplace. MegaPhone. VideoShop. Poser. Retrospect. SpeedDoubler. Final Draft. Nisus Writer. Don't get me started.

"I was gonna buy a Mac. But will Apple survive?"

Come on—Apple? Are you kidding?! This is a huge company—bigger than McDonald's, bigger than FedEx—a company that, before catching the Bad Press Flu, was raking in about $1 billion *monthly*. Furthermore, having eaten a slice of humble pie the size of Montana, Apple is a newly chastened company, taking all the right steps for a course correction.

Besides, even if you believe the Apple empire can evaporate overnight, you'd have a hard time imagining that the *Mac*

continues

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will disappear. Macintosh users—56 million of us—buy $12 billion in computers and $1 billion in software each year (says the SPA); critical industries like publishing, science, movies, education, and music rely almost completely on Macs. This is not a computer platform that can be canceled like a TV show.

"Apple has stopped innovating."
Last year, Apple was awarded 53 technology patents, more than any other computer company (says *Information Week*). And the list of this year's fresh ideas will keep the Microsoft Copycat Engineers scrambling for decades: OpenDoc (the end of software bloat); Copland (fast, stable, neat); QuickTime 2.2 (one word: *karaoke!*); PowerPC-platform computers (a biggie). In this magazine alone, you've read about dozens of fresh, worthwhile advances in personal computing from Apple. Fact is, Apple's IQ (inventiveness quotient) has never been higher.

"Apple doesn't matter anymore."
Jake Kirchner wrote in *PC Magazine* (April 9, 1996): "[I]t's doubtful that the great majority of us will feel any effect from Apple's fall from greatness. Its operating system . . . has been matched for the most part by Microsoft's Windows. The next version of the Apple OS has been so long in coming that no one cares anymore."

Jake doesn't get it. Almost every desirable component of the PC he used to write that article—the mouse, 3½-inch disks, CD-ROM, icons, menus, fonts, PostScript printer, balloon help, control panels, Trash ("Recycle") can, digital movies—was introduced by Apple. Without clever technologies continuing to debut on the Mac, Jake would have no more clever technologies on *his* computer. In the Apple-less world he apathetically imagines, we could look forward to decades of bleak, uninspired, multimegabyte Microsoft glop for the rest of our computing lives.

"I will find it hard to weep for the organization that sold so much hooey to unsophisticated end users," writes Jake. Fortunately, Apple will recover, and Mr. Sophisticated won't have to find out how wrong he is.

The Upshot
Why do the magazines pick on Apple? Sure, Apple's got problems to fix. But according to *Fortune*, they're nothing like the troubles at Zenith (3 percent market share, lost $100 million last year) or Packard-Bell (verged on bankruptcy twice in the last three years). *Where are those obituaries?*

Ah, well, I can't blame the mass media; it's much more fun to report bad news than good. And because of the aura of cockiness it's had since the days of Steve Jobs, Apple's a target as big as the Goodyear blimp.

But personally, I believe that Apple is reinventing itself as a humbler, smarter, better-managed company. And I tell my statistics to anyone who'll listen.

It's out of pure self-interest that I do so, actually. No, not because I write about the Mac—but because I'd have no fun computing on anything else. **m**

Contributing editor DAVID POGUE is a novelist, composer, and theater conductor. His techno-thriller, *Hard Drive*, has just been rereleased as an Ace paperback.

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P. 36A Amelio Reveals His Plan to Save Apple
P. 36B Apple's Internet Strategy
P. 36C The First 100 Days
P. 36D Analysis of the New Plan

Amelio's Apple

Apple's New CEO Gets Tough

APPLE'S TOP GUN TO SIMPLIFY PRODUCT LINE, AIM COMPANY AT THE INTERNET

by Cameron Crotty

Facing a hostile audience of Wall Street analysts expecting miracles and cynical developers expecting nothing, Apple Computer chairman and CEO Gil Amelio painted the broad strokes of his strategy in the opening address of Apple's Worldwide Developers Conference in San Jose, California.

Amelio outlined new directions for Apple's hardware and software groups, identified the Internet as a key strategic focus, unveiled a new corporate structure, and attempted to woo developers by appealing to their hearts *and* their wallets.

Selling the Software

Above all, Amelio said, Apple must tend to its core Macintosh business: the Mac OS. Amelio will consolidate Apple's scattered system software resources into a single group. The company will also release system software technologies as they become available, moving away from what Amelio called system software "mega-events." The first developer release of Copland will ship this summer, but Mac OS 8, as Copland is now called, won't be available until mid 1997. In the meantime, Apple will release elements of Copland in a 7.X upgrade, code-named Harmony, sometime this year. Jim Gable, Apple's senior director of system software product marketing, said the release will likely include human-interface enhancements and possibly V-Twin, Apple's search and summary technology.

Amelio reiterated the need to "aggressively license the Mac OS to serious players," stating that the system software group would have its own marketing resources to promote the OS as a product. "We've separated the hardware and the software," Amelio emphasized, saying the individual divisions within Apple would have to be competitive in their own right. Apple's hardware division will have competition from a heretofore unheard-of wing: Amelio announced that Apple and IBM are cooperating on a Mac OS notebook that both companies intend to sell.

AP/WIDEWORLD PHOTOS

HOW GIL SLICES APPLE

NEW APPLE DIVISIONS:

- **Macintosh Group**
- **Information Appliances**
- **Alternative Platforms**
- **Imaging**
- **AppleNet**
- **AppleSoft**
- **AppleAssist**
- **Advanced Technology Group (ATG)**

Streamlining the Hardware

Amelio said he intends to reduce Apple's costs not by abandoning markets or cutting divisions but by simplifying the Macintosh product line, halving the number of models by the end of 1996. Further, Amelio said he will reduce the number of Macintosh motherboard designs from five to two and consolidate Apple's six hardware architectures into one core Mac system. Apple will make its machines more immediately useful by increasing the minimum DRAM configuration to 12MB and by shipping all machines with the hardware needed for Internet connectivity—either high-speed modems or built-in Ethernet, depending on the model.

Attacking the Internet

Amelio aimed Apple directly at the Internet, quoting statistics about the Mac's disproportionately large share of the client, server, and authoring markets. He painted Apple's Internet strategy in broad strokes, announcing a division focused on the Internet—AppleNet—and repeating his desire to make the Mac the premiere Internet client. Apple will build seamless Internet services into the OS using OpenDoc, Cyberdog, and Java. "We don't want [users] to have to *log on*," said

continues

Amelio, "[the Internet] should just be there."

Apple's Internet strategy extends beyond Mac systems: This year Apple will build and sell an Apple-labeled Web-browsing device based on the company's Pippin architecture. He also announced a system extension for the Newton that will simplify Internet connections; the Newton Internet Enabler consists of a TCP/IP stack, a dialer, a domain-name resolver, and PPP/SLIP support. Apple's vice president of Internet platforms and chief scientist, Larry Tesler, followed Amelio's address with a speech further detailing Apple's plans.

A New Organization

Perhaps sensitive to Apple's history of strategy by reorganization, Amelio unveiled his redrawn Apple in bits and pieces, focusing on the tasks of the individual divisions rather than the overall structure. Nevertheless, Apple again finds itself divided in some new ways. The biggest change is the separation of Apple's hardware and software resources into two divisions: the Macintosh group and AppleSoft. Amelio also announced a new division, tentatively called AppleAssist, focused on customer service and experience after the initial purchase.

A newly formed Alternative Platforms division will focus on platforms beyond the core Mac hardware and software, including CHRP and non-Mac operating systems such as AIX. The Information Appliances group will house the Pippin team and is charged with creating easy-to-use information access devices that cost less than $1000. Employees working on Internet technologies will be part of the AppleNet group. Only the Advanced Technology Group, Apple's R&D arm, and the Imaging group, which designs and sells peripherals (printers, scanners, and monitors), remain relatively unchanged. As part of the reorganization, Amelio will implement "professional management techniques" to further streamline operations, but he wouldn't elaborate. Further details on Apple's new organization are expected later in May.

Winning Over Developers

Apple's new CEO pitched hard to the wary developer crowd, opening his speech with some disparaging comments about Apple's at times arrogant and unhelpful attitude toward its developer community. Amelio promised "an era of honesty and cooperation" and pledged to help smaller developers find venture capital. Saying that improving developer relations is a priority, Amelio offered two action items: a reduction in developer prices on Apple equipment, and a $20 million fund (under the direction of Heidi Roizen, vice president of developer relations) intended to increase marketing opportunities for Mac developers. In addition, Apple will attempt to reignite its languishing Apple-only dealer program by providing incentives for dealers that stock only Apple-related products.

Amelio leavened his all-business approach with appeals to Mac loyalists. He sprinkled his speech with references to Jobs-era Mac slogans ("The Power to Be Your Best," "Insanely Great Computers"), remarked briefly on Apple's vision and "rendezvous with destiny," and announced a limited-edition Macintosh created for Apple's 20th anniversary.

Developer reaction to Amelio's speech was mixed. While most wanted Amelio to

provide more specifics, many were not surprised by the Apple CEO's high-level overview. "Realistically, what's he going to do in 100 days?" shrugged Metrowerks president Jean Belanger. "You've got to step in and stop the bleeding before you can do open-heart surgery."

Many were reassured by Amelio's attitude and candor and felt he offered a viable road back to happier times for developers, end users, and shareholders. Craig Isaacs, vice president of sales and marketing for Dantz Development, applauded both the early release of system software technologies and the move to a less complicated hardware base. Power Computing CEO Steven Kahng was optimistic about Apple's ability to cut costs in its manufacturing processes, saying that Apple "needs to do more just-in-time manufacturing and use more industry-standard parts"—two achievable goals, according to Kahng.

Not surprisingly, developers continued to sound familiar notes of caution about Windows and express frustration with Apple's previous lack of follow-through. Dantz's Isaacs summed up the developer community's simmering impatience with Apple: "I give [Amelio] a thumbs-up . . . there's a possibility that his organization could work. But this destiny stuff is nuts. You either do it or you don't."

Tesler Attacks Internet

APPLE'S INTERNET STRATEGY RELIES ON OPENDOC, JAVA IN MAC OS

by Cameron Crotty

You can do three things with content on the Internet: create it, access it, and deliver it. Larry Tesler, Apple Computer's vice president of Internet platforms and chief scientist, thinks Apple can own all three. In a speech at Apple's Worldwide Developers Conference, Tesler unveiled some of Apple's Internet strategy.

On the client side, Apple will ensure that by the end of 1996 every Mac is equipped with the hardware and software necessary for Internet access. All Macs will ship with at least 12MB of RAM and a fast modem or on-board Ethernet. Apple will also bundle AOL access software; the Apple Internet Connection Kit; and Cyberdog, Apple's OpenDoc-based Internet access tools—depending on the intended environment.

Apple will rely on OpenDoc and Java to integrate Internet services into the Mac OS. Apple previously announced it had licensed Java, and sources are now saying that Apple will license Natural Intelligence's Java bytecode interpreter to improve Java applets' performance. OpenDoc will soon ship as a standard part of the Mac OS, and Cyberdog (which is currently shipping) isn't the only

ILLUSTRATIONS BY JOHN BLECK

Internet application that will use it. Tesler demonstrated two OpenDoc parts, running in an early version of ClarisWorks, that will be available later this year: one that will run Netscape Navigator plug-ins and one from ResNova that will run Java applets.

Tesler touted Apple's server line for Internet content delivery and announced that the company will bundle Adobe's Amber, the latest version of Acrobat. But the real buzz came when he stated that Apple would integrate personal Web server software into the Mac OS. Users will be able to drag documents into a folder and publish them on the Web simply by turning on a software switch, in a process similar to the current File Sharing mechanism.

In the area of content creation, Tesler provided little beyond a demonstration of an Apple authoring product for kids. Code-named Cocoa, the product relies on programming by demonstration—"showing" the software what should happen if certain conditions are met—to let children create animated simulations. Stepping into the breach, Symantec demonstrated its graphical interface builder for Java during Tesler's speech. Code-named Ninja, it features side-by-side source code and sample interface windows, both of which are updated in real time as changes are made. Also, Netscape's chief technology officer, Mark Andreesen, announced work on Netscape servers for Mac and Navigator support for OpenDoc, but no time frame was given.

Apple continues to rely on its QuickTime Media Layer (QuickTime, QuickDraw 3D, QuickTime VR, and QuickTime Conferencing) technologies and will release future versions simultaneously for Windows and the Mac OS. Tesler also demonstrated an Apple conferencing application, code-named Janus, that lets users to hold a (very jerky) videoconference and work on shared documents over the Internet.

Tesler's few surprises, such as Apple's server line and its QuickTime Conferencing technology, aren't new but have languished due to lack of active marketing or user adoption. Obviously, Apple hopes that creating a single division will focus its Internet attentions more effectively.

The First 100 Days

AMELIO'S CLEARING THE DECKS TO MAKE WAY FOR REAL CHANGE

by Tova Fliegel

His first 100 days can't have been easy for Apple's new chairman and CEO, Gil Amelio. He has had to do some hard, even unpleasant work—from revamping executive staff down to eliminating failed technical implementations. And there's much more work to be done, as he outlined on May 13 at the Apple WWDC, and as the mishandling of the latest PowerBook recall showed.

But with the work already begun, several newly forged licensing alliances in place, personnel changes, and a new emphasis on what Amelio calls "megatrends" in technology (the Internet and multimedia), the signs are coming clear: Apple is poised for a turnaround. Amelio says the company will return to profitability within 12 months. Here are the steps he has taken so far to achieve that goal.

Swallowing a Loss Even the $740 million loss for the quarter that ended March 29 demonstrates that such a turnaround is possible. The loss—more than three times analysts' predictions—included $388 million in inventory write-downs for unsold Macs

and after-tax restructuring charges of $130 million. "The right thing to do is to make it as ugly as possible this [second fiscal] quarter," says Eric Lewis, manager of personal systems research with International Data Corporation. "This quarter they are washing all the dirty laundry at once, rather than spreading it out."

Reducing Costs Amelio's other actions involve liquidating assets and reducing head count. Apple will lay off 2800 employees over the next 12 months, a figure that includes the reduction of 1300 the company announced in January.

The April sale of Apple's Fountain, Colorado, manufacturing plant accounts for 1100 of the layoffs, although the new owner, SCI Systems, says it will retain most of the employees. "This activity is not about body count," Amelio says. "It's about producing a breakeven. We're going to pull every lever we need to, to do that." Another outsourcing arrangement is likely.

Out with the Old Apple has renounced older technologies and services that were never widely adopted, including eWorld, PowerTalk (an architecture for integrated communications and mail), Dylan (a scripting language), Taligent (an operating environment developed with IBM), and Kaleida (a multimedia scripting language also developed with IBM).

And, in an ironic twist, Apple has delayed the release of the next-generation Copland OS, ballyhooed as Apple's savior at last year's Apple WWDC. Copland has been under development for three years, during which time the Internet has increasingly importance, requiring some rethinking of Copland's capabilities, Amelio says. The latest target release date is mid-1997.

Renewed Ties Apple has reinvigorated alliances with IBM and Motorola that will free it to do what it does best—the Mac OS. The recent IBM agreement opens the market to clone makers, letting them license the Mac OS and PowerPC platform (known as CHRP) without Apple's permission, reversing Apple's tradition of restrictive behavior (see "IBM Reveals Its Ambitious Mac Plans," *News*, in this issue). And Apple was oddly in tune with the rest of the industry in licensing Sun's Java for inclusion in Copland and OpenDoc.

Managing Management As Amelio came on board Apple, senior executives were streaming out. Rather than promote the next level of managers, Amelio brought in a new team to direct Apple's new direction. Amelio's first hire, George Scalise, an associate from his National Semiconductor days, was brought in as chief administrative officer in February. Scalise's role is vast; he handles human resources, corporate services, legal affairs,

continues

and investment planning.

Soon after, Amelio brought in Fred Anderson as chief financial officer. Anderson is former CFO of Automatic Data Processing, a large payroll company, and had been president at MAI Systems, a computer services company.

Chief scientist Larry Tesler was promoted to vice president of Internet platforms in March. A longtime researcher and developer, Tesler will spearhead Apple's Internet technology plans. Before this promotion, Tesler had been Apple's chief scientist for three years and a vice president there for more than nine.

Tesler reported to David Nagel, the senior vice president of worldwide research and development, who has since departed. Amelio is assuming Nagel's position in the interim. While many respected Nagel's research abilities and saw his departure as part of Apple's continued "brain drain," analysts and other industry observers often held him accountable for the company's failure to release products on time, with an R&D cycle that did not match market demands.

Like Tesler, Jane Risser was promoted from within Apple's ranks to vice president and treasurer, a position she had filled since Mary Ann Cusenza's February resignation. Risser joined Apple in 1986 as manager of investor relations and was director of corporate finance from 1991 to 1996.

Former T/Maker cofounder and CEO Heidi Roizen, a popular figure among Mac developers, now heads a reorganized Developer Relations Group. Roizen reports to CAO Scalise, a change that Apple has said will ensure developer concerns are heard on a corporate level, as well as within the R&D ranks. The reorganization effort echoes CEO Amelio's comment that "developers are the lifeblood of the Mac."

Out in Front Unlike his predecessor, Michael Spindler, who was often perceived as reclusive, Amelio mingles. At Macworld Expo Tokyo and Seybold Boston, he talked with reporters. He has been present at teleconferences for major press events, including the second-quarter loss announcement, the closing of the Fountain facility, and the Mac OS licensing announcements with IBM and Motorola. Amelio even greeted employees outside the R&D1 facility on the day of a companywide meeting. And he has spent a lot of time talking to key developers.

While Amelio works on reinvigorating Apple, the company has continued to introduce new technologies: its Pippin game player/Internet surfer, its Unix-based Internet servers, and advances to both the Newton and QuickTime. Although these projects were well under way when Amelio joined Apple, he has capitalized on them to show Apple's continuing commitment to forward-thinking but profitable technologies.

It's this type of thinking and action that shows that Amelio has looked squarely at some of Apple's past errors—namely an excessively complex product line, which he says does not translate into perceived customer value, and a failure to invest in future technologies—and that he does not want to make the same mistakes. He does want to leverage Apple's existing strengths—the education, multimedia, publishing, and Internet markets. And perhaps as important, he stresses that Apple products should be "delightful," seeming to recognize that much of the Mac's user loyalty comes from its spirit, not just its technology.

All in all, not bad for 100 days' work. Let's hope the next 100 continue the trend.

ANALYSIS: MOVING APPLE FORWARD

Adrian Mello

Shortly after greeting the audience at his first WWDC and sensing that expectations were running precipitously high, Gil Amelio mused that he felt as if he must part the Red Sea. The expectations, however, were the result of Amelio's self-imposed deadline to provide a strategy within his first 100 days. Here's a brief analysis of his plan.

Apple's biggest problem has been a lack of focus and coherence. Amelio gets high marks for articulating an appropriate sense of purpose—one that understands what makes Apple products great. Much of Amelio's plan defines the values and objectives that will guide Apple's efforts to satisfy customers. These guidelines were evident in Apple's new Internet strategy—to make the internet as easy to use and media-rich as the Mac itself.

Amelio's plan to vastly reduce product variations will save money and eliminate needless confusion. After two quarters of financial loss, Apple must return to profitability. As bold and wise as simplifying Apple's product lineup is, Amelio's strategy alone is incomplete and won't sufficiently reduce. Expect to see other cost-cutting measures in the coming months.

Amelio has done the right thing by dividing Apple into a number of independent divisions. The extent to which each division will be held accountable as a business is unclear. It appears that at least some of the new divisions will be run on the basis of their profitability. The ultimate success of this new organization depends on whether this is just another paper-shuffling exercise. Most but not all of the groups make sense. A stand-alone imaging group is long overdue. Spinning off Newton and Pippin makes sense but probably won't significantly increase revenues for years. AppleAssist reminds me of failed projects such as eWorld and Software Dispatch. Content and services are not Apple's core competencies.

Amelio's most important decision is the separation of Apple's Mac hardware and software businesses. This is a long-overdue act of courage from Apple's executive suite. A separate system-software business lays the foundation for a credible and viable OS licensing operation—one unhindered by the considerations of selling Apple-labeled hardware. Amelio appears fiercely committed to an aggressive licensing role for AppleSoft when he threatens to "kick their posteriors to make it happen."

Although Amelio enunciated a broad strategic outline, the plan was short on business implementation. I had the distinct impression that he wanted to say more but felt it would compromise Apple's business transformation. Late in his speech Amelio referred to the need to put in place a number of professional management practices. He also mentioned that shortly after joining Apple he was frustrated by deficiencies in the company's organization and product, and pointed out the need for more humility at Apple. It appears that Amelio has learned how hard it is to move Apple forward with a culture marred by years of indecision. He has taken some big steps in the right direction, but he'll need another 100 days to complete the journey.

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systems

The PowerPC's New Heights

180MHZ NOW, AND AN ENHANCED BREED OF 603 AND 604 THIS SUMMER

by Tim Warner

HANK OSUNA

Enviously eyeing the 166MHz Pentium your neighbor has? Envy no more. This summer, Motorola and IBM Microelectronics—who jointly design and produce the PowerPC CPU family—plan to ship variants of the PowerPC 603 and PowerPC 604—the 603e and 604e—as fast as 166MHz; and expect 200MHz CPUs by the end of the year.

Apple, Power Computing, and others are hopeful that these chips will provide needed speed boosts on two fronts where they face strong competition from Intel's Pentium: top-of-the-line desktop computers and home computers.

In late April, IBM began shipping 166MHz and 180MHz versions of today's PowerPC 604, which Power Computing is using in its new line of Macs (see "The New Speed Champs," in this issue). "The objective is to get out ahead," says Bill Goins, product marketing director at Power Computing.

Although 200MHz Pentiums are expected by the summer's end, and the next-generation Pentium Pro soon after, Goins believes that the forthcoming PowerPC 604e stands a good chance of keeping pace.

Design Improvements The chief enhancements to the 604e are 32K data and instruction caches, twice as large as the caches in the 604, and an extra integer unit. (Adding a fourth unit to the 604's three means the 604e can do more integer calculations simultaneously than the 604 can.) While the real effect of the larger cache and extra integer unit is not yet established, Motorola claims they should improve integer calculations by 20 percent, making the 166MHz 604e roughly 50 percent faster than the 133MHz 604.

Michael Slater, editor of the respected newsletter *The Microprocessor Report*, says the 166MHz 604e is "clearly faster than the Pentium 166MHz."

Motorola and IBM will fabricate the 604e and the 603e with 0.25-micron-wide circuitry that lets the chips run at 2.5 volts, thus requiring less power and generating less heat. (A micron is a millionth of an inch.) This compares to 0.5-micron circuitry and 3.3V operation for the 604.

Despite the 1.8-million additional transistors in the

604e's cache, the chip's size is only 148mm², versus the 604's 196mm². Its small size and lower voltage mean that the 604e consumes only 10 watts of power, versus 16.5w for the 604. The 603e's 3w make it even more attractive for note-

continues on page 45

systems

Opal Opens Up OpenDoc

EX-WORDPERFECT GROUP BEGINS AGGRESSIVE EFFORT

by Cameron Crotty

The main problem with OpenDoc is that no one has figured out how to use it. But Digital Harbor, a small company consisting mainly of the old Novell WordPerfect for Macintosh team, is out to show the world how it's done.

An Application, an Environment

The company describes its forthcoming product, code-named Opal, as a *work processor*. More than simply an editor, Opal is that most flexible of OpenDoc players: a text-editing root part. Simultaneously a container and a part, it can both be embedded in other container applications and have other parts embedded within it. Opal files sport a task bar across the top. If a part editor embedded in an Opal file supports Opal's API (programming interface), Opal adds a folder tab with the part's name to the task bar. When you select an embedded part, the task bar displays tools for that part, plus its creator's logo.

Task bars can be repositories for drag-and-drop clippings, from text to pictures to URLs. Opal also includes a Parts Bin bar that lists all the part editors contained in the Editors folder; users can embed parts simply by dragging icons from the Parts Bin bar to an Opal document.

Opal is only the third publicly announced OpenDoc container, after ClarisWorks and B&E Software's RagTime—large applications that are both adding OpenDoc part support. In contrast, Opal is small (300K to 500K), having been written from scratch as an OpenDoc part. Digital Harbor also claims to have avoided the conflicts and compromises inherent in grafting new technologies onto legacy code.

Cleaning Up After OpenDoc

But beyond abstract notions of architectural cleanliness, Opal attempts through its task bar to solve two major OpenDoc problems. First, the task bar provides users with a consistent and comprehensible interface, as well as a way to organize what can otherwise be a confusing welter of embedded parts. Gina Centoni, an OpenDoc product manager, acknowledges the ongoing problem: "User interface is kind of a black hole, and always being perfected. The OpenDoc [user interface] is different, and users are going to have to get used to it."

Second, by prominently presenting developers' logos,

Opal gives credit where credit is due, intending to ease parts developers' fears that embedded editor parts will be perceived simply as pieces of the container program. It remains to be seen whether the need to implement Opal's proprietary API above and beyond the OpenDoc spec will prove a significant obstacle to developer adoption.

Digital Harbor, which expects to ship Opal in July, is intent on becoming the standard bearer for OpenDoc development. Explains Roger Bell, a Digital Harbor principal, "We're saying that we're going to give you the first true-to-life component application. We're going to show you how this works."

storage

Removable-Drive Wars Flare

SYQUEST AND IOMEGA RAISE THE STAKES

by Cary Lu

For years, SyQuest Technology's removable-media drives have outsold Iomega's higher-priced, more reliable Bernoullis—making SyQuest 44MB and 88MB cartridges the standard for sending large files to service bureaus.

In spring 1995, Iomega fought back with its 100MB Zip drive, based on modified floppy-disk technology. Iomega has convinced only a few computer makers (including Power Computing, which offers it as an option) to build a Zip drive into their premium models, but the momentum behind the Zip is clear. For example, Seiko Epson is producing Zip drives under license. Sony, Fuji, and Maxell now sell the same Zip disks under their own brand names.

EZ Come, EZ Go? While Iomega was touting its Zip, SyQuest was scrambling to

finish its 135MB competitor, the EZ135, by the end of 1995. Based on true hard-disk technology, the EZ135 easily outperforms the Zip, but it costs so much more to make that SyQuest loses money on each drive it sells

Meanwhile, Compaq, 3M, and Matsushita have entered the fray—with the LS-120, a 120MB floppy drive that can read and write standard floppies. The LS-120 is much slower than the Zip, and analysts say it's costlier to make. But since it can double as a 1.4MB floppy drive, its effective cost to users may actually be a little less than the Zip's.

On to Higher Ground

Spurred on by its victory in the low-capacity arena, Iomega has now set its sights higher. Delivering the Mac version of its 1GB Jaz cartridge drive this spring, it once again shot ahead of SyQuest, whose 1.3GB SyJet drive is not due before July. Both drives use two-platter cartridges; the SyJet, derived from 700MB hard-drive components, costs more to build than the Jaz, which uses more widely available 540MB hard-drive parts.

None of these drives is economical enough to replace the floppy drive. Only the Zip and LS-120 can be made thin enough for notebooks, although the current versions are too thick. The EZ, Jaz, and SyJet drives simply cannot be made to fit into small notebook computers—especially when PC makers start releasing so-called slate notebooks, which

continues

JOHN BLECK

Systems WATCH

BY GALEN GRUMAN AND TERHO UIMONEN

Tatung Prepares to Make Macs

At the first-ever Macworld Expo in Taiwan, held in mid-April, the question on everyone's mind was, Who will be Taiwan's next Mac OS licensee? The answer is likely to be Tatung, says W. S. Lin, president of the Taipei-based computer and consumer electronics maker. Tatung is still in negotiations with Apple about the final terms of a licensing agreement, but Lin says that an announcement is likely to be made "within the next couple of months." (Last November, Umax Data Systems became the first Taiwanese vendor to license the Mac OS. The company plans on shipping its SuperMac S900 system this month; in Taiwan, the S900 is known as the Pulsar 1500.)

Tatung plans to sell Mac clones in Taiwan, Hong Kong, and China, and the company is considering marketing Tatung-branded Mac systems in the United States, where the company enjoys some name recognition due to its Sun clone business.

QuickTime for Video Pros

In its continuing push to make QuickTime a standard for all segments of video, Apple (408/996-1010, *http://www.info.apple.com*) is announcing QuickTime 2.5, which will add video-production enhancements, including a fully interchangeable, standard Motion-JPEG file format that will let video professionals work with M-JPEG files independent of the hardware that originally captured the media. QuickTime 2.5 will also have a software-interchangeable M-JPEG codec for viewing M-JPEG compressed files on any Power Macintosh, with no additional hardware required. Apple expects to deliver QuickTime 2.5 by summer.

Power Mac Blowout

Apple's recent $740 million quarterly loss is partly due to Power Macs it couldn't sell. Apple's loss is your gain: several mail-order companies have been selling Power Mac 7100/80's, Power Mac 7200/75's, and PowerBook 190's for $1000. While most of these would need extra RAM or bigger hard drives to be really useful, they're still a steal. Among those clearing room for the next set of Macs (see "The New Speed Champs," in this issue) are MacWarehouse (800/255-6227, *http://www.warehouse.com*), MacMall (800/560-6800, *http://www.macmall.com*), and Mac Zone (800/248-0800).

are even thinner than today's PC (and Mac) models.

Shaky Finances After reporting a $33.8 million loss in the last quarter of 1995 and laying off 60 percent of its employees (mostly in Asia) early this year, SyQuest saw its stock plummet by two-thirds from its 1995 high. But Iomega has its own financial problems—ironically, due at least in part to the Zip's popularity. Its stock rose tenfold—far above actual sales—forcing Iomega to cancel a stock offering to raise capital needed to expand Zip production.

SyQuest's contention that the market can accommodate competing formats is less true today as more buyers look for compatibility. SyQuest has now joined forces with former nemesis Nomai—which it once sued for daring to make low-cost SyQuest-compatible cartridges—as well as with Kao, Maxell, and Polaroid, to make a 3.5-inch cartridge. But this standard may not be enough, since Iomega now has the momentum.

communications

Apple Calls It Quits in Telephony

SCALES BACK GEOPORT, ABANDONS VERSIT

by Howard Baldwin

Apple, its nose bloodied once again in the battle of desktop standards, is retreating from the telephony field. Overwhelmed by Intel's ability to put its competing universal serial bus (USB) on every PC motherboard it manufactures, Apple has given up on making GeoPort—its built-in adapter for telephony applications—a standard for desktop computers, and is bowing out of its membership in Versit, the telephony consortium it created in 1994 with IBM, Siemens, and AT&T.

The reasons for the withdrawal are "complex," insists Phac Le Tuan, the newly appointed director of Apple's communication and collaboration group, but boil down to a budgetary choice: promoting GeoPort as a technology in the Intel marketplace versus implementing products for the Macintosh platform.

The upshot is unfortunate. Versit could have given Apple a much-needed entrée into an increasingly cross-platform world. Apple's withdrawal hurts Apple more than it does Versit, says Chris Thompson, telephony analyst for market-research firm Dataquest. "Apple needs to focus on developing tools that are viewed as open and standard and working with multiple vendors."

Even more important, Thompson believes, Apple is missing out on a strong opportunity in the corporate call-center environment, where high training costs and turnover can be ameliorated by an easy-to-use computer.

Apple has not given up on the GeoPort architecture, Tuan says. But although there have been rumors that the long-promised 28.8-Kbps version of the GeoPort adapter—now limited to 14.4 Kbps—will finally be available in June, there is still no official release date. And at least three employees working on telephony at Apple, including the GeoPort product manager, have left or gone on sabbatical.

JOHN BLECK

David L'Heureux, director of marketing at Big Island Communications and developer of the YoYo call-management application, praises GeoPort technology but notes that GeoPort adapters are available only on Quadra 840AVs and Power Macs, giving developers a limited market in which to recoup their investment.

systems

IBM Reveals Its Ambitious Mac Plans

MAY PRODUCE A STRONG MAC-CLONE MARKET

by Galen Gruman

Getting back into the Mac game after a falling out with Apple last summer (see "Apple Says No to IBM's Macintosh," *News*, October 1995), IBM has secured Apple's approval for a scheme that should make it easy for any computer company to make Mac clones.

IBM now has Apple's permission to sell a Mac OS license to any company that buys a PowerPC CPU from IBM. IBM is putting together an array of component makers—including VLSI Technology, which makes board-level components, and FirmWorks, which makes a ROM instruction set—to offer the parts needed to make Common Hardware Reference Platform (CHRP) systems.

Datatech (DTK) Enterprise and Tatung will be among the first companies to sublicense the Mac OS from IBM, although IBM and Apple officials did not detail those manufacturers' plans. (See "Systems Watch," in this section, for more on Tatung's Mac-clone plans.)

A CHRP system will run the Macintosh OS unmodified, so any company that builds a CHRP system and gets its PowerPC CPU and Mac OS license from IBM can make a Mac—no license from Apple is needed. (A license is still needed from Apple to use the current Mac hardware design.)

IBM says it has no plans to make its own Macs, unlike Motorola, but has not ruled out the possibility.

A Real Commitment "This is another major step in Apple's transition to broadly open the license for the Mac OS," says Apple's new chief administrative officer, George Scalise. While Apple has long said it was committed to open licensing, the company has not had the support infrastructure in place, he says. But the IBM license changes that: as part of the agreement, IBM will open three Mac OS support centers in the United States, Taiwan, and Europe. IBM will also try to use its vast sales force to propel the broad licensing of the Mac OS.

If successful, IBM's move—bolstered by a similar deal between Motorola and Apple—will let Apple concentrate on the Mac OS and on its own CHRP-based system designs, while giving IBM and Motorola more control over the basic hardware design, as well as more profits from increased PowerPC CPU sales.

Joint Subnotebook? In describing the agreement, IBM and Apple officials also alluded to the joint development of a subnotebook, although they referred to no specific product plans.

Additional reporting by TOVA FLIEGEL.

GIBSON

Piloting a New Pocket Organizer

Betting that the Newton is more PDA in size, price, and capabilities than most people need, Palm (415/949-9560, *http://www.usr.com*) made its new Pilot organizer smaller in every way. Using Palm's Graffiti text-entry system, the Pilot supplies quick access to names and addresses downloaded from a desktop Mac via a serial cable or modem link. It also keeps to-do lists, a calendar, and short notes. (A simple alphabet of pen strokes enters text.) For $299, you get 128K of memory, enough for 500 names and addresses; $399 buys a 512K version. Palm says several companies will offer data synchronization with desktop personal information managers. The Newton is much more capable than the Pilot, but it generally runs more slowly, costs more, and won't fit in your pocket.—CARY LU

publishing

Tame Those Unruly Fonts

NEW UTILITIES MAKE TYPE EASIER TO LIVE WITH

by Erfert Fenton

Fonts: love 'em. Font management: hate it. As digital fonts multiply and prices drop, many users are ending up with unwieldy font collections. Add to this a myriad of formats (Type 1, TrueType, GX), identical or similar font names from different vendors, old and new versions of the same fonts, and a shortage of font ID numbers, and you have the makings of a font-induced nightmare.

But help is on the way. Publishers, designers, font collectors, service bureaus, and their clients can all benefit from a new crop of font-management utilities.

continues on page 44

Special REPORT

The Play's the Thing

APPLE'S NEWFOUND GAME SUPPORT IS GARNERING RESULTS

How ironic that for years, Apple discouraged games for fear of being perceived as a toy-computer maker, only to see games drive many of the PC's technological leaps. Last year, Apple switched gears to embrace Mac game development. Developers are now returning that embrace.

New API to Woo Game Developers

by Matthew Hawn

Apple's playing games again. After years of denying the Mac's potential as a gaming and entertainment computer in favor of a more serious business image, Apple is finally coming around to the idea that we're not just crunching numbers.

At the recent tenth annual Computer Game Developers conference, Apple's Gaming Technology group rolled out a suite of ready-made tools for game developers that the company hopes will spark a renaissance in games made for the Mac. Called GameSprockets, the six APIs (programming interfaces) standardize the implementation of key features to games made for the Power Macintosh.

GameSprockets improve performance, add support for accelerated 3-D graphics via the QuickDraw 3D RAVE engine, and introduce a new kind of 3-D sound. They standardize joystick support, add speech recognition to games, and expand network game play across multiple protocols, including the Internet.

Knowing that the real way to a developer's heart is right through the bottom line, Apple is distributing GameSprockets over the Internet at no charge. While developers at the conference were happy to see Apple's renewed commitment to the Mac, most experienced Macintosh game companies had already created their own ways to add these features to their games.

"The real benefit of GameSprockets will be to companies new to the Mac games market and shareware authors," says Bill Dugan, head of Mac games at Macplay. Dugan is impressed by GameSprockets, noting that the standardized resources and interfaces make adding network play much easier.

Nick Foley, a senior developer at Presage, writes code to port PC games to the Macintosh; he, too, is cautious but enthusiastic about the new APIs. He notes that because GameSprockets are designed around the PowerPC chip set, 680X0 Mac games won't really benefit from them. Presage will implement the APIs slowly so it can continue to offer games for as many Macs as possible.

But in the game world, the mantra is "faster, brighter, cooler"—that's what keeps thumbs and eyeballs twitching—and so as the number of Power Macs in circulation increases, you can expect more and more games to bear the label *Power Mac Only.*

Apple's GameSprockets are available to developers at *http://dev.info.apple.com/evangelism/games.*

Great Games a-Poppin'

by Cameron Crotty

Mac gamers might not see the results of Apple's GameSprockets APIs until next year, but there's no need to pine away, as 1996 promises its own crop of gaming goodies.

If you dream of piloting highly armed high-tech machinery at vicious speeds, just pick your venue. MacPlay (714/553-6655, *http://www.macplay.com*) is hustling to ship the Macintosh version of Descent II, the sequel to its action-packed 3-D spaceflight game Descent.

Returning briefly to Earth, Mac gamers will be able to pick their flight simulator: Interactive Magic (919/461-0722, *http://www.imagicgames.com*) is bringing over its highly regarded Apache sim, from the PC side. And Domark (415/513-8929, *http://www.domark.com*) will be releasing

GHOST IN THE MACHINE
It may be pretty, but nothing is easy in I Have No Mouth and I Must Scream, Cyberdreams' game adaptation of the Harlan Ellison story.

Flying Nightmares II, a fixed-wing sim, in November (Domark also says it has plans for a chopper sim in 1997).

By the end of this year it'll be time to head for the stars once again, as LucasArts (415/472-3400, *http://www.lucasarts.com*) releases X-Wing versus TIE Fighter, a multiplayer combat simulation that puts you in the cockpit of the hottest craft the Empire and Rebellion have to offer.

GT Interactive (212/726-6500, *http://www.gtinteractive.com*) will appeal to both the quick- and slow-firing synapses this year. GT's port of the controversial fighting game Mortal Kombat III, complete with secret kodes, fatalities, and babalities should be hitting the streets as you're reading this; and for the first time, Kombatants will be able to go head to head in network play.

For the more contemplative gamer, GT's 9, slated for a June release, focuses on puzzle-solving and character interaction as players quest to restore the mysterious MUSE machine.

For gamers interested in cerebral challenges, Cyberdreams' (818/223-9990) two adventure games—Dark Seed II, and I Have No Mouth and I Must Scream—present puzzles to be solved and mysteries to be unraveled.

JOHN BLECK

APPLE CRISP

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Circle 261 on reader service card

Internet WATCH

BY CAMERON CROTTY

Round Two for PageMill

The HTML layout tool that took the Web by storm last year is about to receive its first upgrade. With PageMill 2.0 (price not set at press time), Adobe Systems (415/961-4400, *http://www.adobe.com*) looks to answer criticisms that the 1.0 release lacked the flexibility and power required to build cutting-edge pages. Version 2.0 supports more HTML tags, including much of the (still changing) HTML 3.0 feature set. Adobe has emulated Netscape's plug-in architecture, providing in-line preview and playback of Acrobat, QuickTime, and ShockWave page elements.

Adobe Systems' PageMill 2.0 does graphical tables.

Page designers will appreciate the new graphical table editor, as well as the ability to edit their HTML source code directly. PageMill 2.0 also features improved text-handling tools, which include a spelling checker, the ability to find and replace text strings, and import filters. Adobe has made PageMill 2.0 available for public beta testing; the shipping version should be available in mid-July.

E-Mail's Spring Spruce-Up

Qualcomm (619/658-1291, *http://www.qualcomm.com*) is also unveiling part of its spring line this month: version 3.0 of its $89 Eudora Pro E-mail client. The new Eudora Pro tries to do more work for you with enhanced mail filters. With 3.0, users can automatically redirect a message, send a reply, or send a copy of a received message. They can also limit the size of messages that Eudora Pro will automatically download from the server.

Eudora 3.0's new address book.

Users can decorate their message text with multiple fonts in different sizes and colors. Eudora Pro 3.0 supports drag-and-drop, and if you receive a message with an embedded URL, a single ⌘-click launches your browser.

Qualcomm hopes that its newly published Translation Services API will encourage developers to plug into Eudora—for example, makers of security applications that would automatically encrypt and decrypt messages. Eudora Pro 3.0 is available as a public beta and should ship in July.

A New Approach Probably the most powerful program is Font Reserve, due from DiamondSoft (415/381-3303) later this year (pricing not set). Font Reserve creates a database of your fonts and organizes them in nested folders by format, vendor, family, and individual fonts. The program also eliminates duplicate fonts, reports missing printer or screen fonts, checks for corrupted font files, lets you view fonts by style, and gives on-screen typeface previews.

A Spiffier Suitcase Symantec's (408/253-9600, *http://www.symantec.com*) $70 Suitcase 3.0 has a new interface. Fonts linked to a program open automatically when you open that program. The new version also detects and fixes font ID conflicts.

Troubleshooting Help Besides arranging fonts by family, Insider Software's (619/622-6900, *http://www.theinside.com*) Font Box finds damaged fonts, flags missing printer fonts, removes duplicates, and fixes ID conflicts. The personal version costs $30. Rascal Software's (805/255-6823, *http://www.rascalsoft.com*) $70 theFONDler does all that, as well as diagnosing many ills, from PostScript design flaws to missing kerning tables.

Two utilities locate fonts within QuarkXPress. The $57 Font Corral from French & French (603/431-1615, *http://www.bluefin.net/~ffcorral*) rounds up the necessary fonts—even those in imported EPS files—and lets you copy them for a service bureau. NRG Software's $100 Font Fetch XTension (available through XChange, 970/229-0620) works with Suitcase 3.0 to find and open missing fonts.

display

Projectors to Go

FIRST MICROMIRROR-BASED PROJECTION SYSTEMS DEBUT

by Cathy Abes

Making a bid to enhance brightness, image clarity, and color accuracy, two companies have introduced all-digital portable projector systems using a new kind of mirror-based projection technology called digital light processing, or DLP (see "Mirror, Mirror on the Wall," *News*, March 1996, for details).

Proxima's (619/457-5500, *http://www.prxm.com*) Desktop Projector 4100 combines DLP with Adobe's MediaExpress—sort of Acrobat-on-a-chip—to eliminate the need for a computer connection. You can put your presentation (in the Acrobat PDF format) on a floppy, stick it in the projector's optional floppy drive, and be ready to go. The Proxima projector also has an interactive pointer system, wireless stereo audio, and various multimedia connections. Due by the end of the year, the DP4100 will list for $9495. A version with a zoom lens, the DP4100Z, will cost

KEVIN CANDLAND

No Mac is needed for this projector.

$9995. The optional MediaExpress floppy drive is $1495, and an option that adds both a hard drive and the MediaExpress costs $1995. Networking capabilities are expected by early next year.

InFocus's (503/685-8888, *http://www.infs.com*) LitePro 600 series also uses DLP, as well as a four-speaker JBL audio system and the Kodak Color Matching System. Its CableWizard device lets you connect the Mac, mouse, audio, and monitor loop-through to the projector via one cable. The complete 620 system—which offers 800-by-600-pixel resolution—will cost $10,000 to $12,000, while the 610 system (640-by-480-pixel resolution) is expected to cost $8000 to $9000.

"THE POWERPC'S NEW HEIGHTS" *continued from page 39*

books. The new Pentiums are expected to consume 20w.

Clear Road for Adoption Success for the 604e and 603e will depend on how quickly Apple and clone manufacturers can integrate them into current designs. Fortunately for Mac owners, no major engineering hurdles seem to exist. Each of the new PowerPCs retains its processing core, so neither CPU should require major changes to the Mac OS, and both CPUs fit in the same motherboard sockets as their predecessors.

Ross Ely, Apple's Power Mac product marketing manager, says the 604e will be used in Apple's products as soon as high enough volumes of CPUs are available. Indeed, with the April introduction of PowerPC 604 upgrade cards for the Power Mac 7500, 8500, and 9500, it is expected that Apple will standardize on the 604 across its desktop product line, making the 604e the natural successor.

The forthcoming PowerPC 604e should outperform today's PowerPCs and Pentiums.

During the Comdex show in November, Apple hopes to announce Macs based on the Common Hardware Reference Platform (CHRP) that may include 604e and 603e processors. CHRP "is independent of the chip. The design supports the 601, 603, and 604. . . . The 604e will drop right in," Ely says. He adds that Apple plans to continue using the 603 line of chips in its portables and Performa systems.

Motorola and IBM's new designs also support clock multipliers of 2, 2.5, 3, 3.5, and 4. (A Power Mac's CPU runs faster than the Mac's bus; the 80MHz Power Mac 8100/80 has a multiplier of 2, since its bus runs at 40MHz, while the 100MHz Power Mac 8100/100 has a multiplier of 3, since its bus runs at 33.3MHz.) Support for a clock multiplier of 4 means that Apple's current 50MHz motherboards (used in the Power Mac 7500, 7600, 8500, and 9500) will be able to use a 200MHz CPU. If Apple asks for higher multipliers, it is a trivial matter for Motorola and IBM to add them, says Power Computing's Goins.

While Apple won't say whether it plans to introduce faster motherboards this year, Power Computing has already based its PowerTower computers on a 60MHz bus. That should give the PowerTower series a slight advantage once the 604e is available. Still, Goins admits that, based on Power Computing's tests, "bus speed will be heavily outweighed by [CPU] speed."

With so much clear demand for the new chips, will Motorola and IBM be able to keep up? Motorola and IBM would not say specifically when they expect to reach volume production, but Goins, who was a member of IBM and Motorola's PowerPC start-up team, believes that yields for the new chips will start at nearly the same volume as those for the current CPUs.

PrintGear to the Rescue?

COST-CUTTING MEASURES MEAN MORE CHOICES

Dog eat dog—not a very appealing picture, is it? But in a crowded field like today's printer market, it's an all-too-common sight. Several years ago, when the printer market was expanding, companies could survive in their own little niches, but that's not true anymore—the big guys rule.

The market has matured—laser printer sales actually declined 1 percent in 1995—and companies are scrambling to hold on to their slice of the pie. Some have given up and pulled out—for example, NEC Technologies, stung by lukewarm reactions to its last Mac printer, is taking a leave of absence from the Mac market to refocus its printer product line.

The High Cost of PostScript Another obvious way to cut costs is to offer PostScript as an option rather than as a standard feature—a tactic just announced by Hewlett-Packard. With a large percentage of its sales concentrated on the PC platform, HP plans to replace PostScript in LaserJets for the PC with the next version of its own page-description language, PCL6.

That decision would appear to be a big blow to PostScript's creator, Adobe, which gets a licensing fee for every printer sold with PostScript. But Adobe isn't taking this move lying down. Last year, Adobe announced PrintGear, a lower-cost, simpler alternative to PostScript that could potentially deliver better-quality printing and networking at a faster speed than the generally unsuccessful QuickDraw-equipped printers.

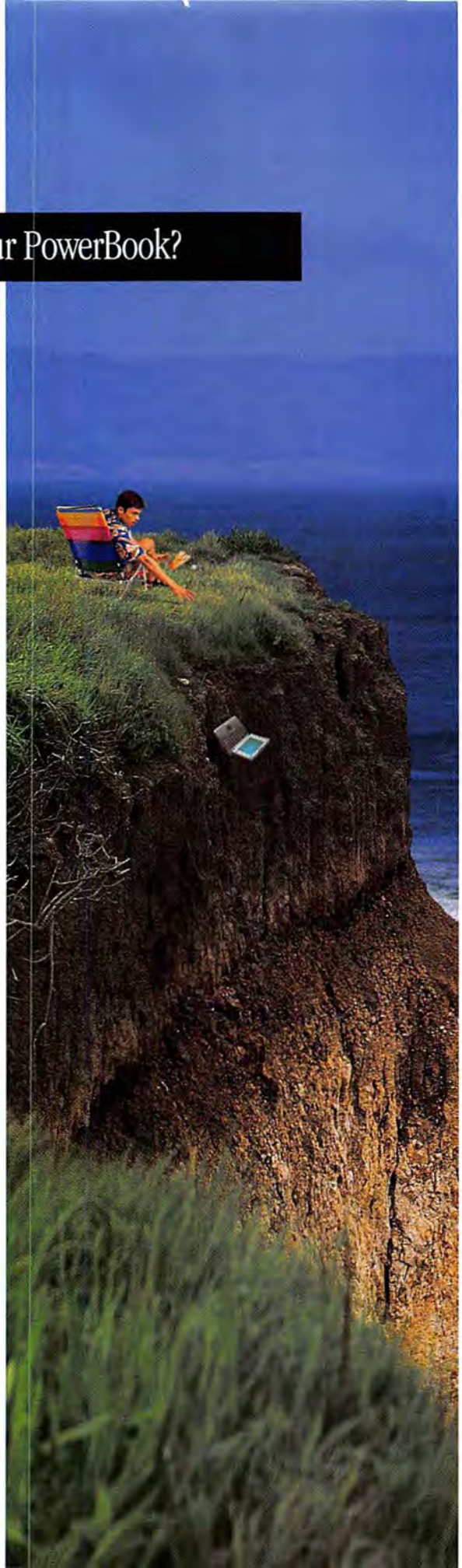
Companies like Digital Equipment and Texas Instruments have tried to offset the high cost of PostScript by using cheaper 68000 processors—resulting in much slower printers. PrintGear offloads a lot of routine printing functions from the Mac, so in addition to being cheaper to license than PostScript, PrintGear is faster. The cheaper licensing will let printer makers go back to better, more expensive processors.

Where's PrintGear? Now, if anyone were actually to ship a PrintGear product, we'd be in business. Except for one abortive try from Texas Instruments, no printer manufacturer to date has released a PrintGear printer. NEC wouldn't discuss its plans for any new printers, saying only that its next offering would be another PC-based printer, to be followed later in the year by a Mac product—likely to be a midrange printer equipped with Adobe PrintGear.

With PrintGear's relatively inexpensive licensing fee and cross-platform support, expect other companies to announce PrintGear products by late this year—good news for anyone needing a midrange laser printer for small workgroups or home-business use. The increased competition will mean better, less-expensive printers.

—SUZANNE COURTEAU

What *was* on your PowerBook?



Amazing where you'll find PowerBooks these days. On the road. In the air. At the beach. Everywhere.

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Circle 26 on reader service card

New Products

THE LATEST MACINTOSH RELEASES

BUSINESS

Management over the Net

Big Business 2.0, from Big Software (415/919-0200, *http://www.bigbusiness.com*), adds Internet access, enhanced ease of use, security, and internal usage to the accounting and management software's sales, marketing, inventory, report-writing, and payroll features. Big Business 2.0 lets Internet users create their own Web-page catalogs by automating the export of items, item descriptions, prices, and pictures into HTML-formatted documents. Big Business 2.0's price ranges from $395 for a single user to $1999 for ten users.

Improved Charting

DeltaPoint (408/648-4000) offers version 4.0 of its graphics and charting program, DeltaGraph. The new release provides greater drawing speed, support for Microsoft Excel 5.0, the ability to process more than 30,000 rows of data, and 10 new chart types. DeltaGraph 4.0 also provides 360-degree text rotation, draggable axes, and grid placement over 2-D data graphs. It costs $195.

Simpler SQL Access

Brossco Systems (415/943-1330, *http://www.brossco.com*) has released a new version of its Macintosh data-analysis tool that accesses SQL databases. Voyant 3.0 lets nonprogrammers create multidimensional data-analysis charts without scripting, providing managers with immediate access to complex information. The $1295 Designer version of Voyant lets users build databases and reporting systems. The $995 Analyst version lets users build reporting systems, but does not let them modify the structure or contents of existing databases.

Powered-Up Sales Aid

Software Solutions (812/477-3181) has made its Territory Manager Power Mac–native with the new $295 version 2.5. The contact-management software for sales reps also adds forecast analysis and several interface enhancements.

COMMUNICATIONS

Plug-in ISDN

Sagem (408/446-8690, *http://www.satusa.com*) has made adding ISDN easy with its $495 Planet-ISDN GeoPort Adapter, which adds 128-Kbps ISDN to all Macs based on 68020 or faster CPUs. Although the Planet-ISDN uses the faster GeoPort serial port on newer Macs, an adapter lets the device work on non-GeoPort Macs.

GRAPHICS

A Sharp New Camcorder

With digital cameras turning up everywhere, we knew it was only a matter of time before digital camcorders began to follow. Sharp Electronics (201/529-8731, *http://www.sharp-usa.com*) has introduced the Viewcam VL-D5000UP, the latest in its Viewcam line. Featuring a 5-inch

Sharp's Viewcam VL-D5000UP

LCD monitor, the VL-D5000UP records images at 500-line resolution. Other features include a 12× optical zoom lens, 16-bit 48kHz PCM stereo recording, built-in time code, and digital image stabilization. The $4596 Viewcam uses a 30- or 60-minute mini digital-videocassette and records for one hour on its LiIon battery.

Scanning—from High to Low

Once considered tools of graphics professionals only, scanners have now entered every segment of the market. These three new models run the gamut.

• At the high end is ScanView's (415/378-6360) $40,000 ScanMate F8, which scans both transparencies (8 by 10 inch) and reflective art (11

ScanView's ScanMate F8

by 17 inch), capturing 42 bits per pixel (48 bits with ColorQuartet, ScanView's scanning, correction, and separation software). Optical resolution ranges from 700 to 4000 dpi via continuous zooming, depending on the size of the original media.

• Polaroid's (716/256-4436, ext. 509) SprintScan 45 digitizes 35mm to 4-by-5-inch color slides and negatives at 2000-dpi optical resolution. The 24-bit SprintScan ships with five accessory film holders: 35mm, a four-35mm-slide holder, 6cm by 6cm, 6cm by 7cm, and 4 by 5 inch. Due by June, the SprintScan will list for $9995.

• The 30-bit, $8495 Pro Imager 7100 from PixelCraft (510/562-2480, *http://www.caprel.com/pixel/craft.html*) offers 400-dpi optical resolution, DSP acceleration, and an 11.7-by-17-inch scan bed for large originals. Other features include thresholding controls for line art, automatic tone control for continuous-tone scanning, and sharpening and descreening on the fly.

Turning 2-D Type into 3-D

For those who want three-dimensional text, StrataType 3d 2.5 from Strata (801/652-5246) imports existing PICT or EPS vector graphic files for extrusion into 3-D objects. The $49 StrataType 3d lets you bend and stretch character shapes and adjust their extrusion profiles for specific bevels and radii.

Microspot (408/253-2000, *http://www.microspot.com*) is introducing a 3-D text plug-in that will be included with its $139 3-D design package, 3D World. Once you've created your three-dimensional text, you can apply colors, textures, images, and sound to it, as well as move, resize, and rotate it.

MULTIMEDIA

QuickTime Virtual Reality Tools

Apple (408/996-1010, *http://qtvr.quicktime.apple.com*) has made available betas of Make QTVR Object and Make QTVR Panorama for creating QuickTime virtual reality environments. With it, Web-site creators, graphics users, and photographers can create virtual reality content more easily for their sites and CD-ROM titles.

Audio-Video at the Low End

Truevision (408/562-4200, *http://www.truevision.com*) is shipping the $3295 Targa 1000 for PCI Power Macintosh, delivering audio and video capture and JPEG compression at up to 5 Mbps. Occupying a single PCI slot, the Targa 1000 supports NTSC and PAL video; S-Video input/output; 16-bit 44.1kHz and 48kHz audio; and QuickTime. The component-video upgrade costs $1500.

Enhancing Your Audio

Even the best CD-ROM loses its realism if its sound falls flat, so why not invest in some high-powered speakers? Here are three new systems to enhance your listening.

• Labtec's (360/896-2000) newest Space-Saver model, the $50 LCS-1020, has 3-inch Max-X drivers, offers a frequency response of 50Hz to 20,000Hz, and generates 9 watts RMS while offering a very compact design.

continues

New Products

• The $100 YST-M15 speakers from Yamaha (714/522-9011) provide 10 watts RMS per channel and produce extended low-end bass response to 70Hz. They also incorporate a subwoofer output jack with volume control for additional low-end power and performance. Dual stereo eliminates the need to switch wires, while plugging headphones into the headphone jack automatically mutes the speakers.

• The SP-3d from Nakamichi America (310/538-8150) incorporates SRS (Sound Retrieval System) 3-D stereo technology for clear, panoramic sound. The $199 three-piece system is self-powered and biamplified, with two speakers and a subwoofer for bass frequencies. A bypass switch lets you control both volume and balance through many multimedia programs.

Regal's CDC-4X

CDs on Demand

Need access to several CDs for playback, plug-ins, or documentation? Regal Electronics (408/988-2288) has the five-CD, 4× CD-ROM jukebox. The CDC-4X costs $495.

NETWORKING

Bye-bye, Unix Mail Server

CE Software (515/221-1801, *http://www.cesoft.com*) has released QM-Internet Gateway, an SMTP gateway for connecting QuickMail to the Internet. The gateway lets users send and receive mail via the Internet, eliminating the need for a Unix mail server. It can run on the same Macintosh as an in-house QuickMail server. In addition to supporting SMTP, the QM-Internet Gateway supports POP3, is MIME-compliant, and recognizes non-MIME character sets. The gateway also supports file enclosures, aliasing, group addressing, and QuickMail user–defined forms. It costs $2495 for unlimited users.

High-Speed Routers

Compatible Systems (303/444-9532, *http://www.compatible.com*) is shipping a high-speed Ethernet-to-Internet firewall router, the MicroRouter 1220i, and a multiprotocol high-speed WAN router, the MicroRouter 2220R. The 1220i connects two 10BaseT Ethernet segments to the Internet over wide-area links that run at a variety of speeds—from phone-line speeds to T1 and E1 rates. Similarly, the 2220R connects Ethernet networks over a range of wide-area links. The 1220i costs $1695; the 2220R costs $1895.

ISDN Router Goes Analog

ZyXel (714/693-0808, *http://www.zyxel.com*) has announced the Prestige 2864I Remote Access Router, which includes both ISDN and V.34 modem support, and combines analog and digital communications. The Prestige includes IP, IPX, and AppleTalk routing; mobile-user support; a single-user Internet account; network management; and security. It connects to TCP/IP, IPX, or AppleTalk LANs via Ethernet and handles up to eight on-site users and an unlimited number of remote users.

ONLINE

Better Sound for Web Sites

RealAudio System 2.0, including the RealAudio Player 2.0 and RealAudio Server 2.0, is now available from Progressive Networks (206/447-0567, *http://www.realaudio.com*). The latest version offers improved sound and music quality, integration with Netscape Navigator, open architecture, bandwidth negotiation for varying modem speeds, and firewall support. For corporate intranets, RealAudio Server 2.0 costs $495 for the 5-stream/10-seat Entry Server, $1895 for the 50-stream/50-seat Standard Server, and $3995 for the unlimited-stream/100-seat T-1 Server. RealAudio continues to offer a free player for personal use.

3-D Web Tool

If you want to add navigable 3-D worlds to your Web site but don't want to struggle with the programming that VRML sometimes requires, then 3-D Website Builder from Virtus (919/467-9700, *http://www.virtus.com*) may be for you. The $149 3-D Website Builder eases the creation of VRML worlds through its drag-and-drop user interface and its library of 500 prebuilt objects.

PRINTING

Full-Bleed Printers for Pros

If you're a graphic artist or prepress professional, Seiko (408/922-5800) is after you. Three new ColorPoint PS dye-sub-and-thermal-wax printers offer a range of sizes in full-bleed printers. The $7999 ColorPoint 820 PS makes letter-size prints, and the $14,999 ColorPoint 830 PS makes tabloid-size prints, while the $16,499 ColorPoint 835 PS does tabloid pages with room enough for registration, crop marks, and color bars. Features include a 256MB hard disk, PostScript Level 2, optional Ethernet (standard on the 835 PS), and cross-platform and auto-switching support. The ColorPoint 835 is due in May, the 820 and 830 are due in June.

PUBLISHING

Production Manager in a Box

QuarkXPress or PageMaker may do the trick for publication designers, but what about the magazine publisher or production manager who needs to see the overall view? That's where the $4995 Proteus 2.1 from nth Degree Software (702/588-4900, *http://www.nthzone.com*) comes in. Functioning like a visual database, Proteus shows your layout in either

nth Degree's Proteus 2.1

press or dummy view and lets you track authors, deadlines, ad requirements and positioning, and story placement. It calculates printing costs, including what-if scenarios for cost comparisons; calculates ad-edit ratios; manages regional editions; and supports gatefolds and inserts.

Better HTML Conversion

Astrobyte (303/534-6344, *http://www.astrobyte.com*) is shipping BeyondPress 2.0, an upgrade to its QuarkXTension for HTML conversion. The upgrade adds support for the latest HTML features, such as converting tabular data into HTML tables; background tiles; colored links; and styled text. Advanced image controls include the ability to crop and scale images and to choose a custom color palette for images. The single-user version is $595, and site licenses are available.

Giving Acrobat a Boost

Navigating and managing PDF files can get tricky, and who wouldn't mind a little help? Now there's the $80 Aerial from Software Partners (415/428-0160, *http://www.buckaroo.com*), an add-on tool that makes it easier to browse, search, and print within Acrobat.

Billboards 'R' Us

The venerable large-format publishing program, S. H. Pierce's (617/338-2222, *http://www.posterworks.com*) $495 PosterWorks, has gone through a major upgrade. Version 4.0 has been accelerated for Power Mac and adds panel-composition tools, color-management options, and an electronic layout guide.

continues

A RUNNING START.

(Kevin Irby on Adobe® Photoshop®)

Artist, Kevin Irby mixed contemporary and archival images to enter a whole new dimension. His tool of choice: Adobe Photoshop. "The cool thing about Photoshop," says Irby, "is that the tools really give you a running start. Using filters, I created a smooth harmony between the two main images. Layers helped me experiment and tweak the work to get the effect I was looking for." In fact, any graphic artist who can work with a computer can easily work with Photoshop. If you want to jump start your work, whether it's print, the Web, or CD-ROMs, add Adobe Photoshop to your essential list of tools. For more information, call 1-800-492-3623 Extension F1277, or visit us at http://www.adobe.com.

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Circle 251 on reader service card

New Products

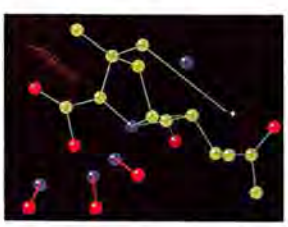
SCIENCE/ENGINEERING

C++ Gets a Boost

Symantec's (408/253-9600, *http://www.symantec.com*) new version of its Power Macintosh C++ development environment lets users work with Pascal, Java, and C++ code in the same development environment. Among the improvements and new features are drag-and-drop text editing, a 40 percent reduction in memory requirements, Apple Guide tutorials, and full support for OpenDoc 1.0 development. The update also includes Caffeine, Symantec's Java development environment. Symantec C++ Version 8 Release 5 costs $399.

CodeWarrior Adds Java

Metrowerks (512/305-0403, *http://www.metrowerks.com*) now offers the $99 Discover Programming with Java, a Java-only version of its popular CodeWarrior programming environment. Speaking of CodeWarrior, the $399 version 9 is now available, covering C, C++, Pascal, and Java.



Interactive Simulations' Sculpt 3-D

Simulation on Your Desktop

Tempted by a Silicon Graphics workstation? Don't be. Interactive Simulations (619/658-9462, *http://www.intsim.com*) has ported its Silicon Graphics–based Sculpt 3-D molecular simulation software to the Power Mac. Sculpt costs $1195.

STORAGE

MO Drives Galore

It's clear by the rash of announcements that 2.6GB magneto-optical drives have hit their stride. Among the new external-drive offerings:

- FWB (415/325-4392, *http://www.fwb.com*) is shipping the $2699 HammerDisk2600.
- MicroNet Technology (714/453-6100) offers the $2995 SB-TMO-2600, available as an external drive or as a module for Pinnacle's DataDock removable-drive system.
- Olympus Image Systems (516/844-5000, *http://www.olympusamerica.com*) has released the $2199 Power-MO 2600.
- Pinnacle Micro (714/789-3000, *http://www.pinnaclemicro.com*) offers the $1495 Vertex.
- Plasmon Data (408/474-0100) has the Cheetah series, with prices starting at $1999; an internal version costs $100 less.
- Sony (408/432-0190, *http://www.sony.com*) offers the OSL-2001 and OSL-6000 MO jukebox systems. The OSL-2001 stores as much as 52GB, and a dual-drive version costs $10,995. The OSL-6000 stores as much as 152GB, and a dual-drive version costs $17,995. Other configurations are available, as is an upgrade kit that lets 1.3GB versions of these MO jukeboxes accept 2.6GB drives.

RAID Comes On Strong

MO is not all that's hot—disk arrays also continue to proliferate, as media-authoring software gets more popular. Recent products include:

- FWB (415/325-4392, *http://www.fwb.com*) has several new arrays, including the SledgeHammer Pro line, which is tuned for digital-video capture and playback and is available in two-, four-, and eight-bay configurations. FWB also has the $1799 hammerJaz Duo 2000PCI, a two-drive array; four- and eight-drive versions are available.
- La Cie (503/520-9000) offers a variety of RAID systems using the Adaptec 2940W PCI-based SCSI accelerator card; a 4GB RAID system costs $1499.
- Rorke Data (612/829-0300, *http://www.rorke.com*) has the Maxarray, a PCI-based family of RAID systems that also accept CD-R, DLT, DAT, and MO drives.

TITLES

Type beyond the Obvious

Good branding means creating the right identity, and typeface selection is a significant part of that identity. *Branding with Type*, edited by E. M. Ginger ($18; Adobe Press, 317/581-3500), shows you how to do it right.

Typography used to be a craft nurtured by typesetters, a profession that desktop publishing has all but eliminated. Susan and Gary Wheeler's $40 *TypeSense* (International Thomson Computer Press, 617/695-1419, *http://www.thomson.com*) helps teach today's designers that craft.

Plug-ins Demystified

Whether you use Photoshop, FreeHand, Illustrator, or PageMaker, chances are you use a plug-in or two to enhance the program's capabilities. Learn about a wide range of plug-ins—and even how to create your own—in *Macworld* editor Stephen Beale's $28 *Plug-In Power* (Micro Publishing Press, 310/371-5787).

Unleash Your Power Mac

From PCI to native shareware, Ron Pronk's $40 *The Power Mac Book*, second edition (Coriolis Group Books, 602/483-0192, *http://www.coriolis.com*), covers the ins and outs of Power Macs.

UTILITIES/TOOLS

Just StuffIt in the Finder

Although it's numbered 4.0, the new version of Aladdin Systems' (408/761-6200, *http://www.aladdinsys.com*) $130 StuffIt Deluxe primarily improves current features, rather than adding new ones. StuffIt Browser now lets users drag archived files to the desktop to open them, allowing them to skip opening the StuffIt application. The reverse action—dragging a file to an archive folder—

Coriolis Books' The Power Mac Book

compresses the file. Users can also take the files requested in a Find File command and drop them into an archive to compress them.

Mac Files on Your PC

DataViz (203/268-0030) has shipped the $50 MacOpener 2.0, a utility for Windows 95 that lets you read, write, and format Mac 1.4MB disks directly from the Windows Explorer and from any Windows 95 program. And Insignia Solutions (408/327-6000, *http://www.insignia.com*) offers the $55 MacTransfer utility, which does the same thing.

Master Your Documents

Adobe Systems (415/961-4400, *http://www.adobe.com*) has taken a set of document-management utilities from Mastersoft, updated them, and released the package as Adobe File Utilities 1.0. The $149 CD includes the Word for Word file-transfer utility and the DocuComp file-comparison program. **m**

VENDORS: TO HAVE YOUR PRODUCTS CONSIDERED FOR PUBLICATION IN *NEW PRODUCTS*, SEND A PRESS RELEASE WITH PRODUCT DESCRIPTION, PRICE, AVAILABILITY, AND CONTACT INFORMATION FOR READERS, PLUS OPTIONAL PHOTO OR SCREEN SHOT, TO NEW PRODUCTS EDITOR, *MACWORLD*, 501 SECOND ST., SAN FRANCISCO, CA 94107; *NEW_PRODUCTS@MACWORLD.COM*.

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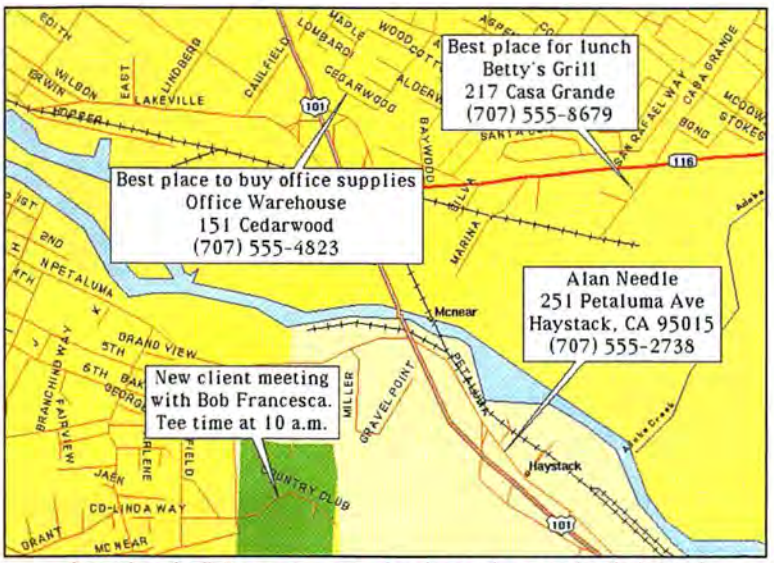

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Reviews

Director 5.0

MULTIMEDIA AUTHORING TOOL GETS POLISH AND A PERFORMANCE BOOST

LARRY GOODE

MACROMEDIA DIRECTOR HAS always been the Orson Welles of multimedia authoring: hard to work with, but the best in the business. It goes beyond simply letting you combine text, graphics, video, audio, and animation into interactive productions; its built-in painting and animation features, powerful Lingo scripting language, and performance-tuning commands make Director the multimedia tool of choice for professional developers.

But if multimedia professionals swear by Director, newcomers are more likely to swear *at* it. Some history may help explain why: Director was designed to produce linear animations (played from start to finish). Macromedia added Lingo to control the playback of a project, but Director's timeline-oriented beginnings are still apparent in the way it forces developers to implement interactivity with a user interface that wasn't designed for it. Director 5.0 does nothing to shrug off that reputation for being difficult, but once you see this new version, you may be willing to overlook its character flaws.

The Director Way

Director stores media elements—bitmapped graphics, text, interactive buttons, and so on—in a database known as a *cast*. You can import elements created in other programs (Director supports more file formats than any other authoring program) or use Director's content-creation tools to generate cast members.

In previous versions of Director, a project could have only one cast. Director 5 supports multiple casts, any of which can be shared—that is, stored separately from the project file. The result is far more flexibility in structuring, developing, and distributing projects.

You do most of your work in the Score window, a timeline made up of frames into which you place media elements (see "In the Director's Chair"). By alternating between the Score window and the Stage, the large window where those elements appear, you can position items, animate them, control when they're present, and define how they interact with other elements. With Director's Control Panel, you can play the project and step through it a frame at a time.

Adding interactivity often means wrestling with Director's instinctive desire to play your project from start to finish. To create a button that branches to a different screen, for example, you assign a name to the frame where the second screen begins, then attach to the button a

RATINGS | Outstanding ★★★★★ = 9.0–10.0 | Very Good ★★★★ = 7.0–8.9 | Good ★★★ = 5.0–6.9 | Flawed ★★ = 3.0–4.9 | Unacceptable ★ = 0–2.9

Lingo script that tells Director to play the named frame. If you want a certain screen to remain visible until a user clicks on an interactive object, you have to add a script that pauses or loops playback.

New and Improved

Although Director 5's basic operating style is unchanged from that of earlier versions, Macromedia has improved the interface. A variety of new tool bars and floating palettes allow fast access to often-used commands; the script window's pop-up menus provide easy access to Lingo keywords; and the new Lingo debugger windows let you track down script problems and monitor the contents of variables.

Lingo itself has also been significantly enhanced, with new keywords that support Director 5's multiple casts as well as enhanced memory management, character-string handling, and control for QuickTime movies.

Director 5 also has tighter links to SoundEdit 16; you simply double-click on a sound to launch SoundEdit 16 (if you have the RAM, that is—Director's preferred memory size is 12MB, while SoundEdit's is 10MB).

To help you work with graphics and lay out screens, Macromedia has added some features you won't find in any other authoring program. For example, the paint window makes animation easier with its onion-skinning mode, which lets you see dimmed versions of the frames adjacent to the active one.

The new version supports Adobe Photoshop filters and lets you create animated filter effects. Director can now preload movies in the background while other tasks are executing. And it has finally caught up with other programs in providing object-alignment features.

Vastly improving on Director 4's bare-bones text-editing window, Director 5 has a built-in word processor complete with a formatting ruler and a tool bar that supports character formatting, variable line spacing, justification, and kerning. Director can also import files saved in Rich Text Format, so you can format text using your favorite word processor.

The moment you finish editing text, Director antialiases it (smooths its edges). To include antialiased text in any other authoring program, you have to create it in a program like Adobe Photoshop. A minor drawback is that text can't be both antialiased and searchable.

In the Director's Chair Director 5's Score window (bottom right) is a timeline that depicts a project's flow. The Stage occupies the largest window, while the new Debugger window (bottom left) lets you step through scripts to snare bugs.

Built for Expansion

Director's new expansion architecture lets you add third-party plug-ins, or Xtras, that enhance the program's features and data-type support. Besides demo versions of many Xtras, the Director CD-ROM includes several functional plug-ins. Macromedia is putting the finishing touches on other Xtras that will let you import and use QuickDraw 3D models and QuickTime VR movies. These Xtras should be available free from Macromedia's Web site by the time you read this.

And since no program these days is complete without hooks to the Web, Macromedia last year released Shockwave for Director. This freeware lets you create Director productions that can be played back from a Web site. Although the original Shockwave isn't compatible with Director 5, the next version promises to support many Director 5 enhancements, including movie preloading. Web surfers will have to download the new plug-in to play Shockwave movies.

How Director Compares

Director 5's closest competitors in high-end authoring are Allegiant's SuperCard and mFactory's mTropolis.

Director 5's animation, screen-layout, and file-import features are vastly superior to SuperCard's. Director also gives you more precise control over media resources so you can optimize performance and memory use, and projects created in Director are faster than their SuperCard counterparts. Macromedia also offers a Windows version of Director for cross-platform support; a SuperCard run-time editor for Windows is still in the works.

To be fair, SuperCard's database capabilities are superior to Director's, as is its support for common Macintosh user interface elements: adding multiple windows, floating palettes, dialog boxes, hierarchical menus, and the Apple menu to a Director project is difficult at best. For projects that rely more on standard user interface elements than on flashy animation, SuperCard may be a better choice—provided you can wait to ship a Windows run-time player.

mTropolis 1.0 is a more formidable contender. Its animation features are impressive (though not as strong as Director's), and its object orientation makes it much easier to learn. mTropolis's groundbreaking ability to assign behaviors to objects can make game development easier than in Director. And you can create Windows run-time players in mTropolis; to create a Windows version of a Director project, you need Director for Windows. But at $4995, mTropolis isn't within everyone's budget. The entire Director Multimedia Studio—which also includes xRes, Extreme 3D, SoundEdit 16 2.0, and Deck II 2.5—is only $1999. And mTropolis's screen-layout and text-manipulation features can't hold a candle to Director 5's.

The Last Word

In the end, many of Director 5's advantages stem from its maturity. This program has been a major-league multimedia development tool for a long time, and Macromedia and third-party plug-in makers have done an excellent job of giving developers what they need.

The linear operating style still takes some getting used to, but Director 5's interface enhancements streamline much of the development process. If you've craved Director's power in the past but opted for an easier authoring program, it may be time to give Director another look. And if you're a Director veteran, Christmas has arrived early.—JIM HEID

RATING: ★★★★/7.2 **PROS:** Allows multiple casts; superb text editing and formatting; supports Photoshop filters; open architecture. **CONS:** Timeline orientation makes interactivity difficult to implement; must purchase Windows version to create Windows run-time players. **COMPANY:** Macromedia (415/252-2000, *http://www.macromedia.com*). **LIST PRICE:** $1195.

Low-Cost Color Scanners

UMAX, HP, AND APPLE RUN THE QUALITY GAMUT

RECENTLY, IT'S BECOME POSSIBLE to get a brand-name color desktop scanner for not much more than you used to pay for a handheld device. Most of the excitement has focused on new low-cost desktop scanners from three big names in color imaging: Hewlett-Packard, Apple, and Umax.

The Apple Color OneScanner 600/27, in addition to having a mouthful of a name, offers a lower price than its predecessor, the original Color OneScanner, and an attractive case design. HP's ScanJet 4p is the popular ScanJet 4c's smaller sibling, and sells for about two-thirds the price. The Vista-S6E rounds out the bottom of the Umax product line, but its speed and image quality are far better than you might expect, given its low price.

Which Bits Are Best?

Like most low-cost scanners, the HP ScanJet and Umax Vista capture 24-bit color: 8 bits each of red, green, and blue. Because of the analog nature of scanners, manufacturers can add more bit depth to capture additional data, affording greater highlight and shadow detail. The "27" in Apple's model designation refers to these extra bits: the Color OneScanner's engine adds one bit to each color, for a total of 27. Some higher-priced scanners offer 30-bit or 36-bit color, which in theory gives even higher image quality. In practice, though, a well-designed 24-bit scanner can rival a higher-bit-depth model.

On the Test Bench

Macworld Lab put these three scanners through the same exhaustive series of tests as the scanners reviewed in our last roundup (see "Scanner Solutions," March 1996). The results were surprising in some respects.

The Apple Color OneScanner 600/27's previews for both color and grayscale images took around 20 seconds, just a shade slower than the HP ScanJet 4p's, but final scans took an unusually long time to complete (see "Speed and Quality: You Can Have Both"). In the realm of image quality, the Color OneScanner's 27-bit engine gives it a boost over Apple's older model, especially in tonal resolution, which affects highlight and shadow detail. Even so, the Color OneScanner's overall image quality isn't quite up to the competition's: scanned photos tended to be a bit dark and not sufficiently detailed. The ScanJet 4p offered quick scanning speeds and good image quality, with performance surprisingly close to the higher-end ScanJet 4c's in most respects.

The Vista-S6E's test results amazed us. It ran faster overall than many desktop models, including the more expensive Umax we tested in the March 1996 issue, the Gemini D-16. The Vista's grayscale resolution and color quality were barely distinguishable from the Gemini's, putting the Vista among the top desktop scanners we've tested, including some dramatically more expensive 30-bit models. We were especially impressed by the sharp, clear color images and the ease with which the Vista-Scan software lets you tweak scanned artwork.

Number Fudging?

One of the biggest challenges in the low-end scanner market is making sense of manufacturers' resolution claims. Apple describes its scanner as 300 by 600 dpi, Hewlett-Packard says its scanner has 300-dpi optical resolution, and Umax states that the Vista-S6E is capable of achieving resolutions up to 4800 dpi using an interpolation technology called UltraView. In our tests, we continue to see that the actual capabilities of these scanners are best expressed by their optical resolution. Specifically, a scanner's horizontal resolution describes how many pixels the scan head has, and is the best predictor of usable resolution.

But despite the fact that all three scanners offer true 300-dpi horizontal resolution, Umax's claims are somewhat justified: the Vista's measured resolution in Macworld Lab's test was dramatically higher than that of the ScanJet or Color OneScanner, suggesting that its interpolation algorithm is indeed superior.

All in the Software

However good a scanner's engine, it needs software to convert the raw image data into a usable form. Properly designed scanning software extracts the best-quality image from your scanned original and allows you to make minor tonal corrections. The best of the bunch let you apply image-enhancing filters or remove screens from halftones. If the software isn't doing the job, you'll end up having to spend extra time in an image-editing program (like Adobe Photoshop) tweaking the image.

ARNOLD TIOSEJO

Apple Color OneScanner 600/27 (left), HP ScanJet 4p (middle), and Umax Vista-S6E.

HP's PictureScan software does its best to insulate you from the scanning process, reducing scans to one-click simplicity. To scan a photo, you click on the Pictures button; the program crops and adjusts tonal range automatically (although neither PictureScan nor the other scanners' software managed to crop photos quite right). Likewise, to scan text documents, you press PictureScan's OCR button (Visioneer's PaperPort software provides the recognition tools).

Unfortunately, if you want to make your scans look better, PictureScan offers minimal choices beyond the fixed selections. There are few tools available to help you tweak the image, although PictureScan lets you create a custom calibra-

tion profile for your output device.

If you're seriously considering purchasing a ScanJet 4p, think about replacing the software. After we dispensed with PictureScan and used HP's DeskScan II application instead, the ScanJet's images looked even better; the DeskScan II's controls are far more flexible. (HP provides the software free on its Web site, or on disk for the cost of shipping.)

Apple's Dispatcher software also makes the scanning process simple. You do all work from a simple interface, and—like PictureScan—the program automatically adjusts tonal range and cropping. Dispatcher also straightens crooked images. A pop-up menu provides output options, ranging from your computer's screen to an imagesetter (though, curiously, the latter option defaults to 300-dpi resolution even for line art). There are separate tools for adjusting brightness and contrast and for tweaking highlight and shadow detail, but no image-enhancement filters are offered, and the lack of a gamma setting didn't help the Color OneScanner's image quality. Apple uses Xerox's TextBridge for OCR tasks (see *Reviews*, June 1996).

Ironically, the best software comes with the cheapest scanner of the bunch. Umax's software comes in two flavors: VistaScan-AutoSetup offers completely automated scanning, and the standard VistaScan software provides an array of image-tweaking tools for greater control. You can let the program transform your artwork automatically, or manually adjust settings including highlight and shadow histograms, gamma curve, and brightness and contrast. There are image-blurring and -sharpening filters, and a handy descreening tool that effectively removes the dots from halftoned images. Umax uses a program called MagicMatch to provide color calibration (where both Apple and HP rely on Apple's ColorSync technology), and Wordlinx 2.0 from Ocron for OCR.

Reliable Performance

None of the scanning programs supplied with these products misbehaved in any way. Installation was simple, with software setup taking only a few minutes. The rear-panel SCSI-ID controls are readily accessible on all three models, and all three provide convenient mechanisms to lock the scan heads for travel.

All three vendors' documentation is adequate to get you up and running, but Apple deserves special praise. The Color OneScanner's manual provides several illustrated pages and clear instructions to guide you through the minefield of SCSI setups and troubleshooting.

Most scanners look pretty much the same from the outside: a bulky, nondescript beige rectangular box. The Color OneScanner 600/27 represents a decidedly different and appealing alternative. It is several inches smaller than the competition—just a bit over 11 by 16 by 3 inches—and has a sleek, high-tech look.

The Last Word

Considering the wide range of prices for desktop scanners, you probably wouldn't expect to get very much for around 400 bucks. But the Umax Vista-S6E is a pleasant surprise indeed. It provides scanning speeds on a par with models costing several times its price, and comes close in quality to the highest-rated scanners described in our March 1996 feature. The Vista-S6E is a clear best buy, not only among the three units tested here, but for anyone seeking a quality desktop scanner.

The HP ScanJet 4p doesn't fare as well: its only advantage over the Vista is its ability to scan legal-size material—small comfort considering its slower scan times and higher price. The Apple Color OneScanner 600/27 is small and cute, but offers little improvement over its predecessor or its competition.—GENE STEINBERG

Apple Color OneScanner 600/27

RATING: ★★★/5.1 **PROS:** Attractive case design; easy-to-use software; fast setup; strong documentation. **CONS:** Subpar preview and scanning speed; so-so scanning software; doesn't support legal-size documents. **COMPANY:** Apple Computer (408/996-1010, *http://www.apple.com*). **COMPANY'S ESTIMATED PRICE:** $629.

HP ScanJet 4p

RATING: ★★★/6.3 **PROS:** Reasonably fast previews; decent image quality; supports legal-size documents; semiautomatic output-device calibration; easy setup. **CONS:** Scanning software lacks most image-enhancement tools. **COMPANY:** Hewlett-Packard (408/246-4300, *http://www.hp.com*). **LIST PRICE:** $615.

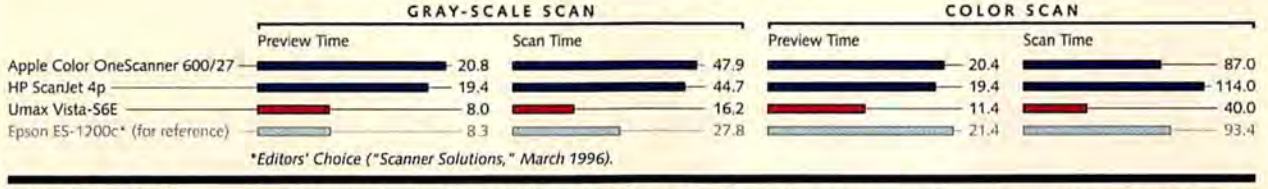
Umax Vista-S6E

RATING: ★★★★/8.4 **PROS:** High-quality color images, comparable to those of higher-cost scanners; good software; fast scanning speed; easy setup; low cost. **CONS:** Doesn't support legal-size documents. **COMPANY:** Umax Technologies (510/651-4000, *http://www.umax.com*). **LIST PRICE:** $445.

MW LAB

Speed and Quality: You Can Have Both

Best result in test. Products are listed in alphabetical order. Times are in seconds. Shorter bars are better.



*Editors' Choice ("Scanner Solutions," March 1996).

Behind Our Tests

Both the Apple Color OneScanner 600/27 and the HP ScanJet 4p offer respectable speed and image quality. But the Umax Vista-S6E's results amazed us. Its performance is dramatically faster than the HP's or the Apple's, and its individual test times are neck-and-neck with the best times recorded in our recent roundup (see "Scanner Solutions," March 1996). What's more, the Vista's image quality remains on a par with that of the best products in this class, including some 30-bit models. Scanners were tested using their best-quality settings. For more information on our methodology, see "Scanner Solutions," March 1996.—**Macworld Lab testing supervised by Jeff Sacilotto**

Hewlett-Packard LaserJet 5M

A GOOD WORKGROUP PRINTER GETS BETTER

HEWLETT-PACKARD'S NEW LaserJet 5M replaces the well-regarded LaserJet 4M Plus. A clear improvement over its predecessor, the LaserJet 5M is fast and delivers high-quality text and graphics at a reasonable price.

The 600-dpi LaserJet 5M comes with 6MB of RAM, upgradable to 52MB. Also standard are network connectors for Ethernet 10BaseT and LocalTalk, a SCSI port for an external hard drive, Adobe PostScript Level 2 (as well as Adobe Memory Booster, which helps that 6MB go further), PCL6 (a new version of the standard printer language for PCs), and the usual complement of built-in PostScript fonts.

The LaserJet 5M can handle paper sizes up to 8.5 by 14 inches (legal size). The main tray holds 250 letter-size sheets and displays a (slightly too small) paper-level indicator; a drop-down tray can be used as a manual feed or as a second tray for up to 100 sheets. Unfortunately, as with many laser printers, the output tray holds less than the combined capacity of the built-in input trays. (The optional 500-sheet legal-and-letter tray and 75-envelope feeder only exacerbate the problem.) Also unfortunate—but also fairly common—is the lack of an optional straight paper path, which makes it impossible to print heavy card stock and envelopes without wrinkling.

The control pad on top of the printer features a job-cancel button (handy for jobs already downloaded), an easy-to-read scrolling display, and a handful of toggle buttons, which allow you to print test pages and easily set a variety of options—such as low-resolution (300-dpi) printing, a toner-conservation print mode, and a power-saving sleep mode that kicks in after a user-defined interval. You can also change option settings, as well as download PostScript files and set security options, with the LaserJet Utility program.

SUZANNE ROADY

Macworld Lab tests (see "Hewlett-Packard's LaserJet 5M Compared") confirm HP's claim that the 5M is faster than the 4M Plus. The 5M was faster than the 4M Plus in all our tests, although the difference was minimal when printing text-only files. For graphics and page layout only, the difference was more substantial, with the 5M averaging about 25 percent faster than the 4M Plus. Compared with other workgroup printers tested in a recent Macworld Lab report (see "Heavy-Duty Printers," June 1996), the 5M's overall speed score is virtually identical to that of Apple's LaserWriter 16/600 PS, which came in fourth in overall speed in those tests. Note, however, that the two printers have different strengths. In graphics and page layout tests, the 5M was slightly faster than the 16/600; in text-only tests, the opposite was true.

Subjective tests also support HP's claims of improved gray-scale transitions and halftones. In comparisons of standard *Macworld* graphics test pages, the 5M's pages were of noticeably better quality than the 4M Plus's, which in turn rated slightly higher than the LaserWriter 16/600's. In text quality the 5M was on a par with the 4M Plus, which tied with a 1200-dpi printer for the highest text quality in our last roundup.

The Last Word

Although the LaserWriter 16/600 narrowly bested the LaserJet 4M Plus in our recent workgroup-printer roundup, the LaserJet 5M's lower price and many improvements have clearly tipped the scale in HP's favor. The 5M delivers faster, clearer printing than its predecessor, at a lower price, and higher-quality text and graphics than the LaserWriter 16/600, its closest competitor in price and overall speed.—ROBERT C. ECKHARDT

RATING: ★★★/5.9 **PROS:** Fast; good-quality text and graphics; many small but thoughtful improvements over the 4M Plus. **CONS:** Output tray could be bigger; lacks straight paper path option. **COMPANY:** Hewlett-Packard (408/246-4300, *http://www.hp.com*). **LIST PRICE:** $2229.

MW LAB

Hewlett-Packard's LaserJet 5M Compared

Best result in test. Times are in seconds. Shorter bars are better.

	Illustration	Bitmapped Image	Spreadsheet	Long Single-Font Text File	Short Multiple-Font Text File	TrueType Text File	Page Layout
Apple LaserWriter 16/600 PS	71.8	119.6	60.2	93.8	58.7	27.4	53.0
HP LaserJet 4M Plus	86.4	130.7	66.1	115.7	82.7	28.1	72.3
HP LaserJet 5M	63.0	99.9	56.9	114.5	72.6	27.6	51.1

Behind Our Tests

All tests were conducted by sending files to printers over Ethernet from a Power Macintosh 7100/80 with 24MB of RAM and a 700MB internal hard drive. Times shown are for the fastest configuration tested—resolution enhancement, use of Apple's printer driver or vendor's driver, and other configuration changes had minor impact on some print speeds. All printers were tested with standard memory. For more information on our methodology, see "Heavy-Duty Printers," June 1996.—**Macworld Lab testing supervised by Lauren Black**

Kodak Digital Science DC50 Zoom Camera

CAMERA COMBINES ZOOM AND AUTOFOCUS WITH GOOD COLOR AND DETAIL

KODAK'S NEW CONSUMER DIGITAL camera, the DC50, belongs to a collection of cameras, including the Chinon ES-3000 (*Reviews*, March 1996) and the Dycam 10-C, that look like squat little *Star Trek* shuttlecrafts and have a decidedly bulky feel. All three offer right-handed shutter release and zoom controls, autofocus (rather than fixed focus like Kodak's DC40 and Apple's QuickTake 150) with a range from 19 inches to infinity, and an optional memory-expansion card. But while the ES-3000 and 10-C are white, the DC50 is black. The midnight casing conceals a few important extras.

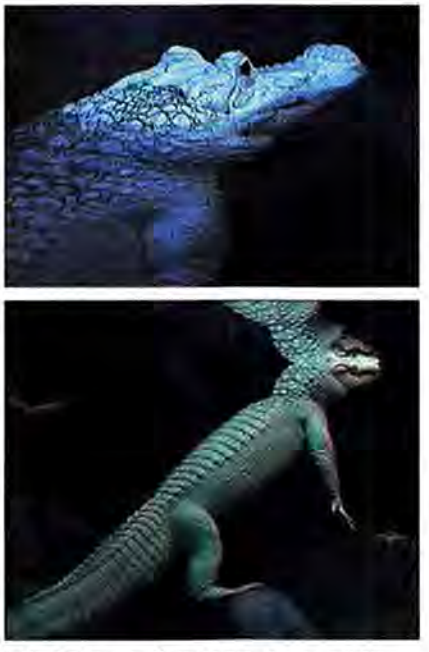
Resolution, Color, and Focus

Like the ES-3000 and 10-C, the DC50 offers three picture qualities: half resolution, full resolution with compression, and full resolution with reduced compression. The last two settings are virtually indistinguishable—your pictures will contain compression artifacts regardless of which setting you use. Without memory expansion, the DC50 can store 22 half-resolution images, 11 full-compressed, or 7 full-res with reduced compression. With a $299 5MB memory-expansion card, the camera saves 90 half-res images, 52 full-res, or 35 full-res with reduced compression.

The ES-3000 and 10-C top out at 640 by 480 pixels, while the DC50 goes 25 percent better with 756 by 504 pixels (a few pixels smaller than the baseline resolution of a Photo CD image). More important, the DC50 also excels in color rendition. Consumer digital cameras are infamous for delivering blown highlights and extreme contrast. Instead, the DC50 underexposes and undersaturates colors. The resulting image is a little gray, but after you correct it inside the PictureWorks PhotoEnhancer utility that ships with the DC50, or with an image editor, the colors spring back to life.

Kodak versus Sony

In testing the DC50, I compared pictures it made with some still frames I shot with a Sony Hi-8 camcorder. If you don't own a digital camera, a camcorder is the next-best thing. It's great for creating still frames at a moment's notice, and it has many advantages, such as better telephoto capabilities, lower light requirements, and a manual-focus ring, in addition to the autofocus. Granted, camcorder footage is interlaced, so horizontal lines may be out of alignment. But if both camera and subject remain still, the interlacing is hardly noticeable.



What Color Is a White Gator? I captured this rare animal from above with a Sony Hi-8 camcorder and from below with the Kodak DC50. The DC50 wins for color and detail. The top image tends toward blue and the bottom toward green because of the differences between lighting above and through water. Even so, the bottom shot appears considerably more colorful, with tactile surface textures and sumptuous contours.

Once again, the DC50's big advantage is color. Some vivid colors—particularly red—are unstable on videotape. But in my tests, the DC50 performed better across the entire spectrum. Even in low-light situations, where the camcorder has the advantage, the DC50 delivered more accurate color with better transitions. As you can see in the alligator pictures, the camcorder overexposed highlights and posterized intermediate shades. Because I suppressed the flash for the DC50 shot, the image was extremely dark before I applied color corrections. Yet the final product provides rich detail and relatively smooth transitions.

The Agony of Downloading

As with the DC40, the DC50's biggest problem is getting the images to your computer. It took me 28 minutes, 29 seconds to download 52 full-res images from the DC50 to a fast internal hard drive via a standard serial connection. The images are saved in a proprietary format you can open only in PhotoEnhancer. If you want to use the images inside any other program, you have to open a slide table of thumbnails and save them to a recognized format. It took me 5 minutes, 36 seconds to convert the 52 images to JPEG. That's a total of 34 minutes to get 52 images into a usable format (the QuickTake 150 takes less than a minute to download 16 PICT images, making it 10 times as fast as the DC50). And your computer is tied up for the duration of the download and conversion; PhotoEnhancer doesn't permit background processing.

The Last Word

The DC50 is the most capable consumer-level digital camera to date. The zoom function combined with Kodak's resolution and color advantages give it an edge over its competitors. But images take way too long to transfer to disk and decompress. And for most folks, the price is excessive. If you can live without zoom and autofocus, consider the DC40, now $700. Though downloading remains tedious, the DC40 is easier to use, more ergonomic, holds up to 48 full-res images without an expansion card, and provides the same resolution, color quality, and software as the DC50.—DEKE MCCLELLAND

RATING: ★★★/6.8 **PROS:** Zoom and autofocus; accepts memory-expansion cards; great color and good detail. **CONS:** Clunky feel; slow to transfer images to disk; expensive. **COMPANY:** Eastman Kodak (716/724-4000, *http://www.kodak.com*). **COMPANY'S ESTIMATED PRICE:** $1000.

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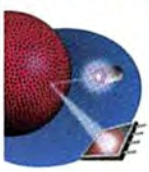

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Color StyleWriter 1500 and 2500

APPLE'S TWO NEW INK-JETS COVER ALL THE BASES

APPLE'S LATEST COLOR INK-JET printers are welcome additions to its imaging line. The Color StyleWriter 2500 offers quality and speed that small-office users will find valuable, and its low-cost sibling, the Color StyleWriter 1500, provides a bargain-priced option for the casual user.

KEVIN CANDLAND

Apple Color StyleWriter 2500 (left) and 1500.

Speed and Image Quality

Replacing the Color StyleWriter 2400 (see "Affordable Color Printers," *Buyers' Tools*, April 1996), the Color StyleWriter 2500 prints in color at 720 by 360 dpi, compared with the 2400's 360-by-360-dpi resolution. The result is a subtle but perceptible improvement in image detail, with no loss of speed (see "Color StyleWriters: Speeds Are Improving").

The 2500's black-only printing speed is stunning, too: even when using the standard four-color cartridge, the StyleWriter 2500 prints text more than five times as fast as its predecessor—even faster than a 2400 using a High-Performance Black Ink Cartridge. Apple claims that using this optional cartridge doubles the 2500's speed, but the cartridge wasn't available for our tests.

The Color StyleWriter 1500 doesn't officially replace the monochrome StyleWriter 1200, but with a mere $20 price difference, the writing is on the wall. The newest low-cost model produces decent output, but it's no Color StyleWriter 2500; colors aren't as deep or smooth, details aren't as clear, and text isn't as sharp. Printing speed, although generally faster than the 2400's, doesn't break any records. In short, the 1500 is no giant-killer, but its price—below $300—should please many home users. For school papers and personal correspondence, this little printer is a bargain.

Although both new Color StyleWriters offer an excellent price/performance ratio, they share a hidden cost: ink. Because they rely on a single tank for cyan, magenta, and yellow inks, you have to replace all the colors at once, even if just one runs out. Apple's ink tanks are small; we used them up quickly during testing—frequent replacements are bad news for both the environment and your wallet. Apple's ink also has a slightly sticky finish. It's not a major problem, but you have to handle output carefully until it dries.

Extras and Options

Both printers come with the Apple Color Printing CD-ROM, which features 12 Bitstream TrueType fonts and software for designing stickers, calendars, and cards. The box also includes a $99 offer for the Adobe/GDT Personal Publishing Toolkit. In addition to GDT Softworks' StyleScript PostScript interpreter—an excellent utility that's worth the price of the package all by itself—the Toolkit also includes clip art and Adobe's Home Publisher, Art Explorer, and WildType programs.

Both StyleWriters can be shared by multiple Macs through the use of Apple's bundled ColorShare software, but true LocalTalk ($105) is an option only for the StyleWriter 2500. Apple's new $199 StyleWriter EtherTalk Adapter, however, is a real bargain that lets any StyleWriter connect with your office LAN.

The Last Word

The Color StyleWriter 1500 is the undisputed value leader for home color printing; it's the only out-of-the-box color ink-jet printer for the Mac priced below $300. The Color StyleWriter 2500 produces higher-quality output and offers better performance than the Color StyleWriter 2400 at a lower price, and its optional EtherTalk Adapter makes it a fine choice for small offices.—PETER M STOLLER

Color StyleWriter 1500

RATING: ★★★/6.9 **PROS:** Reasonable color output quality at a bargain price; good software bundle. **CONS:** Low ink-tank capacity; you must replace all color inks at once. **COMPANY:** Apple Computer (408/996-1010, *http://www.apple.com*). **COMPANY'S ESTIMATED PRICE:** $289.

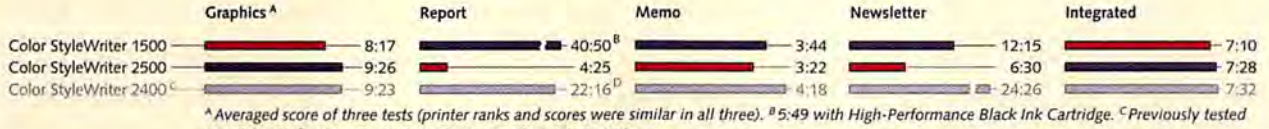
Color StyleWriter 2500

RATING: ★★★★/7.5 **PROS:** Quality output; EtherTalk Adapter option; faster than Color StyleWriter 2400; good software bundle. **CONS:** Low ink-tank capacity; you must replace all color inks at once. **COMPANY:** Apple Computer (408/996-1010, *http://www.apple.com*). **COMPANY'S ESTIMATED PRICE:** $389.

MW LAB

Color StyleWriters: Speeds Are Improving

Best result in test. Times are in minutes: seconds. Shorter bars are better.



A Averaged score of three tests (printer ranks and scores were similar in all three). B 5:49 with High-Performance Black Ink Cartridge. C Previously tested (April 1996). D 5:00 with High-Performance Black Ink Cartridge.

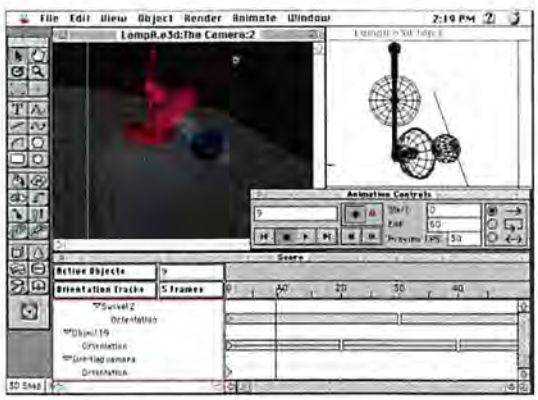
For information on our methodology, see *Buyers' Tools*, April 1996.—**Macworld Lab testing supervised by Mark Hurlow**

Extreme 3D

MACROMODEL WEDS THREE-D, LIVES HAPPILY EVER AFTER

YOU COULD SAY MACROMEDIA'S Extreme 3D joins the modeling tools of MacroModel with the rendering and animation features of Three-D. But it's more than simply the sum of its predecessors; Extreme 3D is a fully integrated working environment in which excellent modeling resources complement production-quality rendering and animation tools.

Consequently, animation effects that would have been cumbersome (or impossible) to produce using MacroModel and Three-D in tandem are easy in Extreme 3D. And the program's professional-level amenities—such as the ability to sort tracks in the animation sequencer and built-in distributed rendering—let you use every CPU on your network to churn out the final animation images.



Extremely Quick Rendering Extreme 3D's competent, accessible production environment lets you quickly preview final renderings.

Extremely Adaptable

Like MacroModel, Extreme 3D is an excellent modeler that can produce complex, numerically precise, spline-based objects. You start by drawing 2-D outlines or importing outlines from illustration programs, then apply the extrusion, lathing, sweeping, and skinning tools to produce 3-D objects.

The program gives you three levels of object editability, displaying a greater or lesser number of control points for the object. Depending on the editing level, you can use the twisting, bending, tapering, and skewing controls to produce subtle surface deformations or deform entire objects. At the deepest level, you can manipulate the individual vertices defining the object's surface mesh. A complement of construction tools helps you assemble objects into complex models.

Some of Extreme 3D's highlights include flexible, easy-to-use rendering tools; a materials editor that lets you customize the nine built-in procedural textures to produce limitless variations; and the ability to apply texture maps to object surfaces and produce a variety of lighting conditions, such as light-falloff effects and spotlight dust cones. A CD containing Wraptures textures from Form & Function is included.

This version of Extreme 3D doesn't support QuickDraw 3D (look for support in the next major release). Instead, a Gouraud shader is included with the on-screen rendering options. This shader provides an excellent representation of smooth object surfaces and fast response to modeling changes—nearly as fast as unaccelerated QuickDraw 3D. It creates final output with a Phong renderer, the professional animator's engine of choice for speedy production images. Final Render To Screen lets you preview rendering output—to see the effect of lighting changes, for example—and shows just how fast this renderer is. Graphic artists may miss ray tracing, but for animation and multimedia work demanding 30 images for every second, Phong is perfect.

Animation pros will appreciate Extreme 3D's built-in distributed rendering: you simply install the program on each networked Mac (although you can model on only one computer), and the program recognizes the remote machines as rendering servers for the main station. It even lets you render on mixed-platform networks, provided you have both Mac and Windows versions of Extreme 3D.

Extremely Animated

Extreme 3D's sequencer displays tracks for all animatable properties of every object, including geometric transformations, surface-texture changes, lighting alterations, and camera motion. It also lets you sort the list of tracks so that only those objects and properties pertaining to the work at hand are displayed. For example, you can isolate the tracks containing positioning information for lights or the color tracks of object-texturing materials; that's a real help when you're creating complex animation sequences.

Although Extreme 3D is a versatile animator and has a decent collection of object-linking tools, it doesn't support inverse kinematics. Realistic, articulated-motion effects need to be produced step-by-step; you can't just pull a model's hand and have the rest of the arm move properly. Extreme 3D also lacks pre-scripted animation routines, such as the animation assistants that smooth out camera moves in Specular Infini-D or the extensions that produce bounce and explosion effects in Ray Dream Studio and Strata Studio Pro. Special-effects plug-ins are expected in future versions of Extreme 3D, but for now you have to break up the model and move the pieces through space to get an explosion effect. Although that's the kind of control professionals need, Extreme 3D might not be the best choice right now for animation novices in a hurry to blow things up.

While the manual is a good, solid reference and the movie lessons on the CD provide a nice introduction, the tutorial booklet only scratches the surface of the program. And although Extreme 3D runs well on a Power Mac, it needs 19MB of free memory to run comfortably.

The Last Word

Extreme 3D is a good choice for graphic artists, animation producers, and multimedia developers who are looking for precise modeling controls (and who can live without inverse kinematics, special-effects plug-ins, and QuickDraw 3D support). And its price is half that of either MacroModel or Three-D. All things considered, that's a pretty good marriage.—CARLOS DOMINGO MARTINEZ

RATING: ★★★★/7.7 **PROS:** Excellent modeling tools; production-quality rendering and animation; built-in distributed rendering. **CONS:** Extreme RAM requirements. **COMPANY:** Macromedia (415/252-2000, *http://www.macromedia.com*). **LIST PRICE:** $699.

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ACT 2.5.1, ACT for Newton 1.0

CONTACT-MANAGEMENT AND SCHEDULING DUO IS ANYTHING BUT DYNAMIC

SYMANTEC BILLS ACT FOR MACINtosh and Newton as an integrated contact- and time-management combo that takes you from the office to the road and back again. Unfortunately, the desktop member of the team doesn't deal well with scheduling, and the portable partner is stuck in first gear with speed problems.

ACT for Macintosh 2.5.1

ACT 2.0 betrayed the program's origins as a poorly done port from Windows: practically every window was a modal dialog box, making it impossible to resize windows or have more than one calendar view open at a time (see *Reviews*, March 1995). The current version feels much more like a Mac application, but vestiges of Windows remain. The Contact List, for example, still appears in a dialog box with unmodifiable fields, and the program makes you go through extra dialog boxes in areas too numerous to list.

ACT's contact-management features are solid. The program helps with data entry by allowing you to customize most of its 75 fields, and AppleScript support and ACT's own macro features assist with repetitive tasks. ACT keeps a detailed history of all actions taken with each of your contacts. ACT's built-in word processor lets you create, print, and fax mail-merged memos, letters, and cover sheets easily.

The program has links to STF Technologies' Faxstf software, and can link with mapping programs using Apple events to show a geographic view of your contact data. Symantec also claims that ACT can read documents scanned with Visioneer's PaperPort Vx scanner.

ACT's scheduling features are vastly inferior to those of programs such as Now Software's Up-to-Date. Although ACT lets you view your events by the month, it offers no multiweek or quarterly views, and the month view doesn't support multiday banners. Its handling of recurring events is unacceptably primitive; you can't easily set a meeting for the third Thursday of every month, for example.

Displayed information is limited to an icon denoting the type of event (such as a meeting or phone call) and the contact the event is attached to—nothing else. You can't even enter notes or a description. This points up another big flaw in ACT's scheduling: every event must be associated with a contact, making ACT useless for to-do's not connected with a person or company, like "Pick up dry cleaning" or "Buy cat food."

More Info, Please ACT for Macintosh's Month View shows only the event's contact, making it impossible to see any other details about your month's appointments at a glance.

ACT for Newton 1.0

In order for ACT for Newton to run seamlessly with your Mac, you need to upgrade the current off-the-shelf desktop version (2.5) to 2.5.1 using disks included with ACT for Newton. ACT supports both Newton OS 1.0 and 2.0; you pick the proper version during installation.

Once ACT is installed, you synchronize data between the desktop Mac and the Newton Message Pad by connecting them via a serial cable or LocalTalk. In theory, ACT performs a two-way information exchange that leaves the most recent information on each machine. In practice, though, this transfer process leaves a lot to be desired: not all the information is transferred, and the two versions handle some data types differently. E-mail addresses, contact notes, and contact groups don't transfer easily; if you create a contact group on the Newton, it won't transfer to the desktop. Likewise, recurring tasks and schedule conflicts don't move across the platforms well.

You can view your contacts in any of six card styles, or in a list of all contacts. On most cards, tapping a contact's phone number dials the call for you using the MessagePad's built-in speaker or a modem, and logs the call as part of the contact's history. Like the built-in Newton Names application, ACT cards include a notes area where you can record details about the contact. Meetings or to-do's created in ACT appear in the Newton's built-in Dates application.

ACT for Newton's sluggish performance is its biggest pitfall. I loaded 420 contacts, and my Newton changed from a personal assistant into a digital albatross. Finding a contact took more than 10 seconds using ACT; by comparison, the same search using the Names application took less than 5 seconds. Switching between ACT's list and detail views is equally languid.

The Last Word

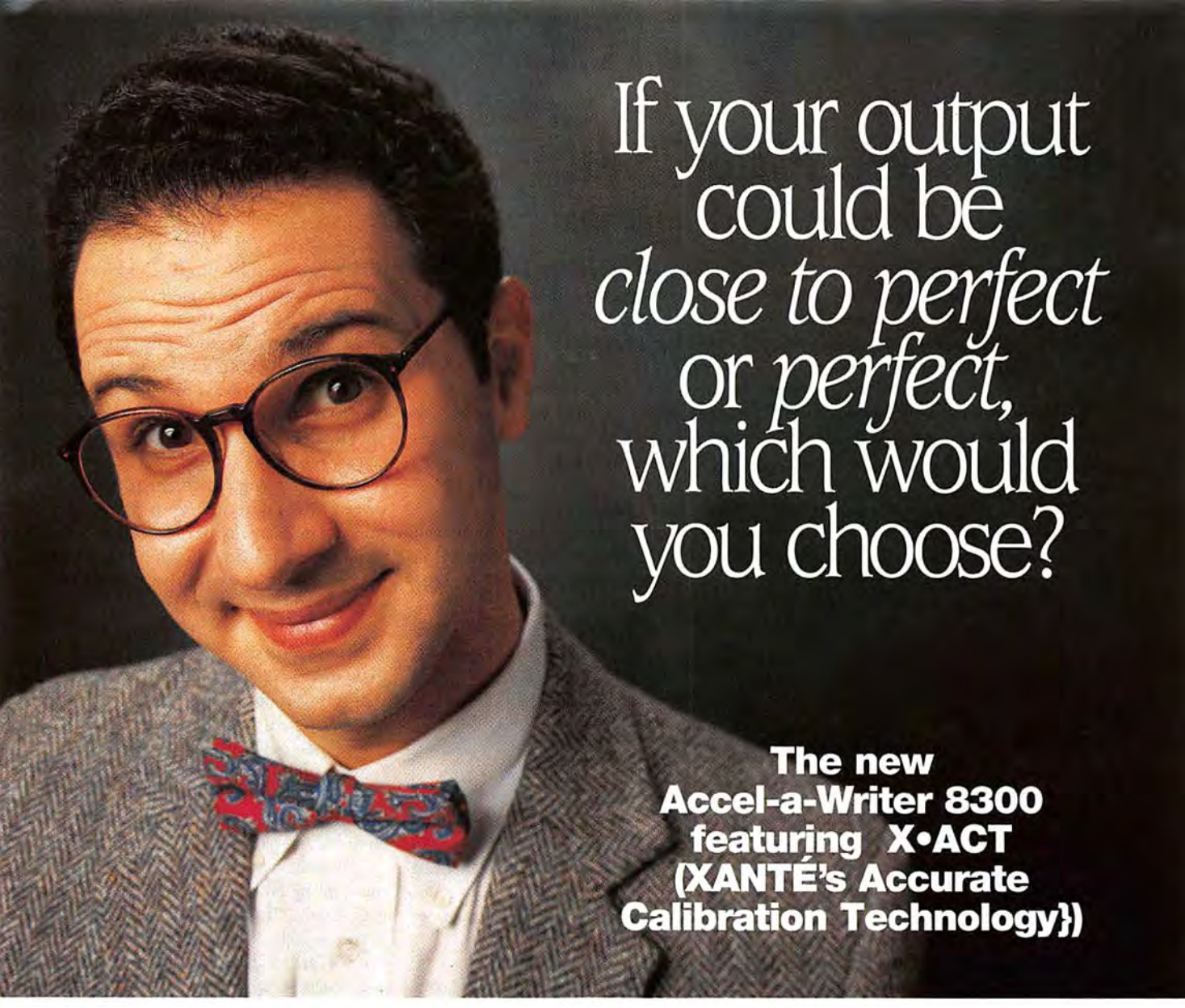
With the availability of excellent contact-management–and-scheduling combos like Now Contact and Up-to-Date, there's no reason to compromise, and ACT for Macintosh makes a few too many concessions in features and usability to be a serious contender. Using ACT for Newton is an annoying exercise in patience. Newton users need a fast, fluid tool that lets them find information fast, and this isn't it. I can only recommend ACT for Newton to die-hard fans of the desktop version.—TOM NEGRINO

ACT for Macintosh 2.5.1

RATING: ★★★/5.1 **PROS:** Solid contact management; innovative fax, mapping, and scanning links. **CONS:** Lags way behind competition in scheduling; clunky Windows feel. **COMPANY:** Symantec (541/334-6054, *http://www.symantec.com*). **LIST PRICE:** $169.95.

ACT for Newton 1.0

RATING: ★★/4.8 **PROS:** Easy to use; well integrated with Newton OS. **CONS:** Poor synchronization; painfully slow. **COMPANY:** Symantec (541/334-6054, *http://www.symantec.com*). **LIST PRICE:** $99.95.



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Interactive Music-Video Games

IN THE QUEST TO SHOWCASE NEW MEDIA, ARTISTIC VISION GETS LOST

THE CREATORS OF MEET MEDIABand and Total Distortion—Marc Canter and Joe Sparks, respectively—have been celebrated in the computer world for their development of authoring tools and the creative use of those tools: Canter was part of the original team that created Macromedia's Director, and Sparks is well known as a wunderkind of digital media.

Recently, they both released ambitious products that share a similar view of interactivity and the artistic future of digital entertainment. Both artists are clearly knowledgeable about their tools, yet both get mired in the technology and ultimately fail to deliver compelling entertainment.

Meet MediaBand

This collection of artwork and music from Canter Technology bills itself as an interactive music video. You click through six environments, known collectively as the aetherRave. It's not a particularly intuitive interface, often leaving you adrift among rendered columns and gratuitously Photoshopped artwork.

There's a lot of high-resolution art here but very little emotional resolution. For instance, the interactive UnDo Me video in the Stage Room offers 14 different viewer-controlled variations, but none of them are engaging, and the music is innocuous and bland. The same is true of the House Jam video, in which you control a disjointed collection of images and short music samples by clicking your mouse. After a few minutes of clicking, I'd seen most of the variations and was ready to move on.

The other "rooms" on the disc are even less engaging. In the Smart Bar, pixelated QuickTime sprites spout clichéd sound bites about the information superhighway and glib aphorisms like "Information wants to be free, shoes want to be expensive." Canter may have intended this to be irreverent and hip, but it just comes across as hackneyed geek-speak.

The Kids' Room, the Archives, and the Tekno Room seem to be afterthoughts composed of half-baked QuickTime clips, technical info, and animations, apparently dropped onto the disc to fill space. The final room is the Swag Shop, an interactive sales pitch for T-shirts and other MediaBand paraphernalia.

After a few viewings, you'll have explored most of the variations that Meet MediaBand has to offer. It feels more like a promotional CD or a demo than a complete entertainment disc.

Total Distortion

More original and better thought-out than Meet MediaBand, Total Distortion has been under development for three years amid a dizzying array of media coverage. Labeled as a music-video adventure game, like Meet MediaBand it's also a labored mix of interactivity and music videos. At least Sparks chose to include a stronger narrative and some complex game play.

Crushed by a Power Chord Total Distortion's Guitar Warrior blows you away with his guitar and then gloats with a solo. Ouch.

You take on the role of a dimension-hopping music-video director as you search for footage to sell to video producers back on Earth to earn your fame and fortune. You explore the Distortion Dimension armed with guitars, a video camera, and other adventure-game artifacts. Using an editing interface, you build your own videos with canned video clips and footage you gather during the course of the game.

Total Distortion's soundtrack and video clips are more interesting and compelling than MediaBand's, but the attempt to make them work as interactive building blocks makes for a less-than-satisfying game experience. This shortcoming is barely balanced by puzzles, sideshows, and games-within-the-game.

In the end, the focus on creating music videos makes Total Distortion less fun to play than it should be. It's a shame because Total Distortion—unlike Meet MediaBand—seems to have something to say. Total Distortion is full of wry pop-culture references and some excellent 3-D artwork. The game's rich environment is woven into a decent story line. Despite this, the interactivity of the video-editing suite doesn't provide the glue needed to let you enjoy the world that Sparks has worked so hard to create.

The Last Word

New media is having a rocky childhood, struggling to prove its legitimacy and attempting to scrub off the cold patina that technology leaves on artwork. As the creative tools become powerful enough to meet the needs of digital artists' vision, the focus shifts to their ability to find the rhythms and patterns that engage us.

Interactivity is celebrated as the hallmark of digital media, but in these projects it fails. In Canter's case, it simply masks a lack of compelling vision. In Sparks' game, it clouds a vibrant world and decent story line.

Despite their considerable technical skills, both artists lose sight of the big picture, celebrating technology at the expense of the artistic vision that should drive their efforts.—MATTHEW HAWN

Meet MediaBand

RATING: ★/2.8 **PROS:** None. **CONS:** Overpriced, poorly executed entertainment. **COMPANY:** Canter Technology (415/387-0400, *http://www.mediaband.com*). **LIST PRICE:** $49.95.

Total Distortion

RATING: ★★★/5.3 **PROS:** Detailed game play and puzzles. **CONS:** Story and game play take a backseat to the technology. **COMPANY:** Pop Rocket (415/242-2158, *http://poprocket.com*). **LIST PRICE:** $39.95.

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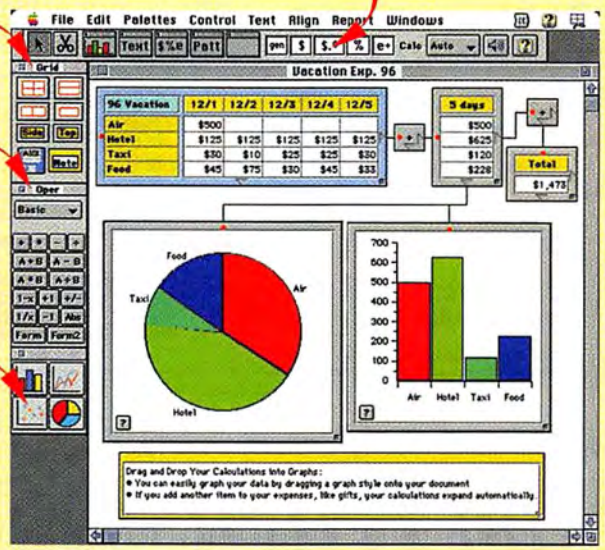

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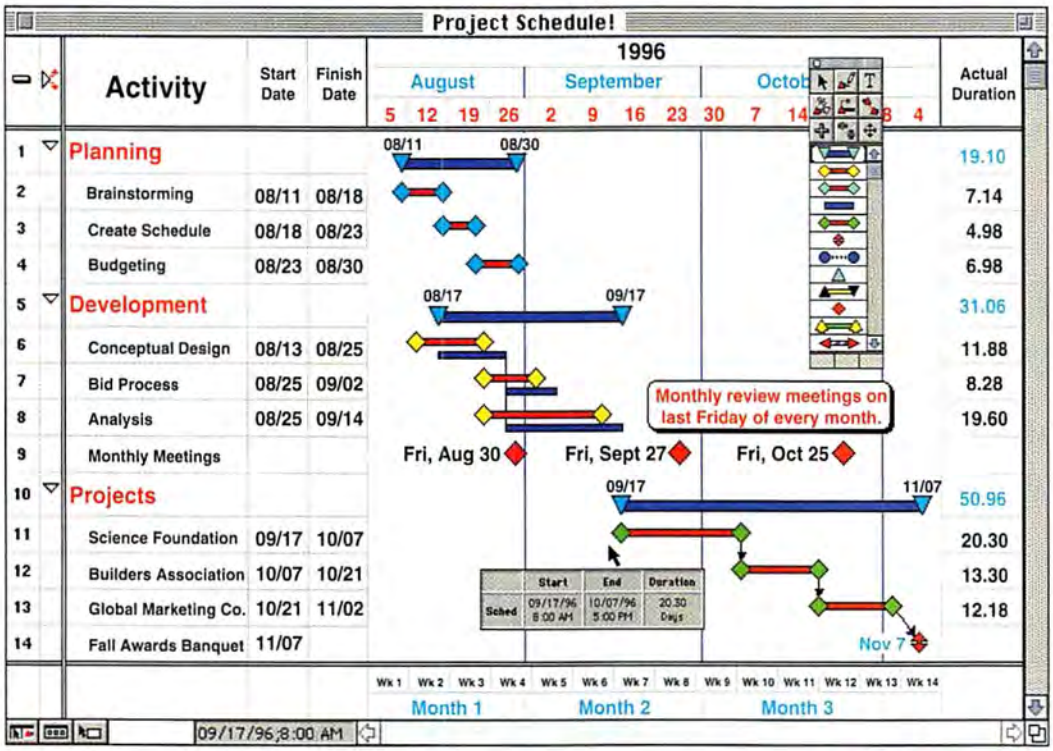

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SiteMill 1.0.2

SIMPLE WEB-SITE MANAGER IS WELCOME BUT INCOMPLETE

ADOBE HAS CLEARLY SET OUT to create the definitive set of tools for publishing on the Web. On the heels of its PageMill Web-authoring package (see *Reviews*, March 1996) comes SiteMill, which takes PageMill and adds a set of tools for managing Web sites. Because SiteMill, like PageMill, focuses more on ease of use than on state-of-the-art completeness, it's not yet the definitive Web tool. But it's certainly a step in the right direction; at least for now, SiteMill is the best tool for Mac-based Web-site management.

The best way to use SiteMill is to work with local copies of your Web site's files and synchronize them with your Web server later on. You load these files—HTML files, images, CGI (Common Gateway Interface) scripts, and so on—into the application, which displays them in the SiteView window. From here you can update links and move or rename files and directories while keeping all the hyperlinks intact. When anarchy makes its inevitable appearance, a separate Error View window points out broken links and orphaned files. Relinking these files is easy—you simply drag and drop them into their proper locations, and those changes flow back through the rest of your HTML files. It's a powerful yet simple way to keep your Web site functional and up-to-date.

Command Central SiteMill's SiteView window gives you centralized access to all the strands of your Web site.

The SiteView window also lets you check the links to and from any file on your site. When you click on the arrow next to a file name, a pop-up menu shows you the inbound and outbound links. Selecting a link brings up the page in the PageMill browser-and-editor window, where you can examine and modify the page. Besides being a convenient way to navigate a site, this approach gives a nice overview of its organization. There's also an External References window that displays links pointing off your site. You can drag these links around like internal URLs, but you can't browse them or check to see if they're still valid. It's an annoying oversight.

From a Web-authoring perspective, SiteMill goes beyond PageMill by making better use of the Mac's drag-and-drop capabilities. (It's much easier to interweave your site when you can see all your pages in a single window.) It also has all of PageMill's limitations, including lack of support for the latest HTML extensions and no direct access to HTML code.

Nor is SiteMill a complete site-management solution. It needs better integration with an FTP client (to let you post your Web files to a remote server); a synchronization tool that scans a local folder for changes and updates a remote server automatically; and tools for creating CGI scripts, which allow interactivity on a Web site. To be fair, no other Mac program has these features, either; Netscape Navigator Gold and Microsoft's FrontPage promise some of them, but for now they're just vaporware.

The Last Word

SiteMill's strength lies in its simplicity and ease of use. It's best suited to small and medium sites; larger sites need a more powerful tool that incorporates a good database, works more closely with Web server software, and can generate Web pages on the fly. Webmasters who need to manage multiple Web sites will find it a lifesaver, particularly if they gather content from many sources. If you're on a budget, though, you may find that SiteMill's features aren't strong enough or complete enough to make it a must-have application.—MATTHEW HAWN

RATING: ★★★/6.5 **PROS:** Enhances PageMill's features; repairing and updating links is easy; excellent manual. **CONS:** Can't post files on a remote server; can't synchronize local and remote pages; lacks tools for creating CGI scripts; expensive. **COMPANY:** Adobe Systems (415/961-4400, *http://www.adobe.com*). **LIST PRICE:** $595.

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In the May issue of *MacUser* magazine, the editors put the ViewSonic PT810 through its paces and reported: "[W]e were in for a surprise with this month's top performer, the 21-inch ViewSonic PT810. It boasts image quality so good that even demanding graphic artists and desktop publishers will be pleased." They concluded by awarding it their high 4-mice rating.

Jerry Pournelle, a featured columnist for *Byte* magazine, stated in the April issue, "The User's Choice Award for this year goes to the ViewSonic Professional Series PT810..." Discussing the PT810 in the March issue, he said, "You'll have to fight me to get this monitor away from me. I am literally sitting here wondering how I got along without it all these years...Highly recommended."

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Circle 59 on reader service card

MultiSync M500

CROMACLEAR TECHNOLOGY DELIVERS

FOR FAST-PACED, HYPERCAFFEINated multimedia games and applications, the NEC MultiSync M500 15-inch multimedia monitor offers rich color, crisp text, and some interesting sound features. The MultiSync M500 derives its splendid color and sharp detail by means of a new technology called CromaClear. CromaClear's main advantage is its elliptical phosphors, which produce more of a weave of color

KEVIN CANDLAND

than do shadow-mask phosphor dots. NEC has even coined a new term, measuring its resolution (0.25mm) in *mask pitch* rather than the traditional unit of measurement, dot pitch.

Although a 15-inch monitor might seem too small for multimedia purposes, most recent games and titles restrict the action to a small portion of the screen, usually a rectangular box about 8 by 6 inches. The M500's viewable area of 13.8 inches is more than enough space to blast space mutants and tread through foreign lands. The size also fits the budget of price-conscious multimedia-monitor shoppers. While it's not a budget monitor in the 15-inch category (comparable 15-inch monitors sans speakers and microphone go for $350 to $450), at $599 the M500 is still $300 to $400 less than 17-inch multimedia models.

To try out the M500, I used several favorite CDs, both audio and multimedia. The titles included action-packed games and some with bright, vivid color images. I was impressed with the clarity of color and the consistency in quality from edge to edge. I noticed subtle improvements in color depth and purity when comparing the M500 with my everyday work monitor (an AppleVision 1710).

With some monitors, the image on screen appears out of focus at the corners and even looks bowed, so to evaluate the M500's focus, I filled a Microsoft Excel spreadsheet with text of varying point sizes and styles and expanded it to full screen. I was pleased with the resulting consistency in sharpness.

The integrated, side-mounted speakers provide better sound than the tin-toned speakers of earlier multimedia monitors, but not by a lot. They don't compare to most stand-alone speakers. NEC includes some interesting sound-manipulation features, such as surround-sound simulation, which improves fidelity. It's difficult to quench your audio appetite, though, without the help of a good bass subwoofer. However, by plugging my headphones into the easily accessible jack, I was able to sample the full range of audio, which was quite pleasing.

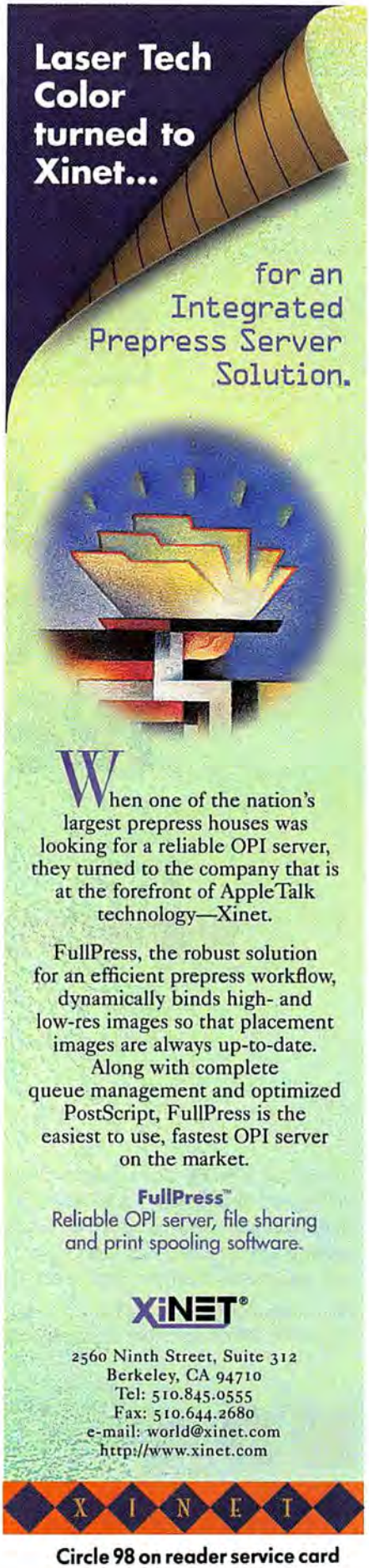
An omnidirectional microphone is also integrated into the monitor. Unfortunately, NEC does not provide a cable to connect the microphone to your Mac's mike jack, and suggests purchasing it separately. I tried using a standard mini-mini cable and discovered that my Power Mac required a special PlainTalk cable, available only from Apple (a mini-mini cable should work with an 040 or earlier Mac). NEC should provide the proper cables.

The front of the monitor has a clean display of buttons to drive the on-screen controls. Navigating through the menu options is efficient and intuitive. All the basics—brightness, contrast, volume, color temperature, and so forth—are there. Other features include the ability to prevent monitor adjustments and an enhanced video-display window for even clearer playback of QuickTime movies.

The Last Word

I enjoyed using the M500. NEC provides the basics of a good multimedia monitor—a top-notch picture, decent sound, and easy-to-use controls at a price that won't strangle your wallet.—MATT CLARK

RATING: ★★★/6.8 **PROS:** Outstanding image quality; easy-to-use controls; innovative audio features. **CONS:** Microphone cable not provided. **COMPANY:** NEC (508/264-8000, *http://www.nec.com*). **LIST PRICE:** $599.



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Visual C++ 4.0 Cross-Development Edition

PROGRAM IN WINDOWS, PORT EFFORTLESSLY TO THE MAC

ALTHOUGH *MACWORLD* SELDOM reviews Windows products, this one has serious market implications: Microsoft Visual C++ Cross-Development Edition helps cross-platform developers port Windows programs to the Mac by automating the conversion process. Unlike Metrowerks' and Symantec's C++ development environments—where you maintain a code base and then do a bit more programming to adapt an application to a particular platform—Visual C++ Cross-Development does 90 percent or more of the work required to get a Windows app onto the Macintosh.

The procedure, at least in theory, is simple: you load Visual C++ on the PC and the cross-platform components on the PC and the Mac, then write your program as a Windows app. (If you have an existing 16-bit app, you need to convert it to 32-bit on the Windows side before porting it.) Next, Visual C++ recompiles the code for the Macintosh. You get compiled code on the Mac side automatically, while the source code and its resources remain on the Windows system.

The Big Scribble This sample Visual C++–ported application is simple, crash-proof, and relatively enormous in its final Mac form.

How does this arrangement affect debugging and such Mac-specific features as balloon help and Apple Guide? First, you can't do source-level debugging with native Mac tools because all source code is on the Windows side. In addition, Mac-specific features that aren't easy to imitate in Microsoft Foundation Classes (MFC) must be added on the Mac using a separate development system.

Depending on the Windows program being ported, the result can be either a usable, automatically generated Mac app or months of optimizing and debugging. I used the program to port Windows software that operates a chemistry instrument, and although the resulting Mac code needed more memory to run than did the Windows version, performance on a Power Mac 6100 was fine. Some commercial developers in vigorously competitive markets have also taken advantage of Visual C++ porting.

On the other hand, many developers found their Visual C++ ports to be too big and too slow, the PC-based source code difficult to fine-tune, and the ported product hard to modify in a Mac development system. The size problem is evident in some of Microsoft's own sample files, where a very simple Power Mac draw program takes up 1.4MB (see "The Big Scribble"). Font problems, debugging difficulties, unsupported API types, resource glitches, and questions about Copland support have pushed some developers back into the waiting arms of Metrowerks and Symantec. Visual C++ may be generating a surprising number of commercial Mac apps, but it's not winning platoons of converts at the biggest Mac software vendors (except, of course, Microsoft itself).

The Last Word

For some software firms, particularly those that dominate a niche in the Windows market, Microsoft Visual C++ Cross-Development Edition is an ideal product—with just one Mac specialist and this package, they're ready to enter the Mac market. The resulting product may have trouble standing up to vigorous competition from those that were coded from scratch for Mac-native compilers. For the many specialty software titles that don't face such rivals, however, Visual C++ Cross-Development makes good economic sense.—CHARLES SEITER

RATING: ★★★/6.6 **PROS:** Turns MFC-based Windows apps into functional Mac apps with modest reworking. **CONS:** Size, performance, and debugging problems in some resulting apps. **COMPANY:** Microsoft (800/426-9400). **LIST PRICE:** $1999.

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X I N E T

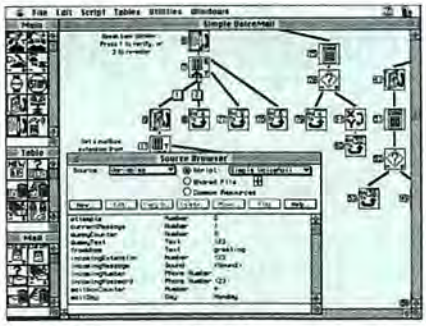
Circle 99 on reader service card

PhonePro 3.0

TELEPHONY STANDARD IMPROVES PROGRAMMING, SOUND HANDLING

CYPRESS RESEARCH IS PERHAPS best known for MegaPhone, an automated speakerphone-and-answering-machine system for AV and Power Macs. But before MegaPhone there was PhonePro, a fully automated telephony system for business (including automated answering, interactive voice mail, and automatic dial-out of recorded messages) that works with standard modems.

PhonePro 3.0 is a serious professional product, but its icon-based telephony programming makes it easy for newcomers to set up these often-complex functions, and both the documentation and customer-support hand-holding from Cypress are splendid. PhonePro also provides a good assortment of scripts for common business situations, and it's possible to cover most straightforward phone-handling situations simply by tinkering with these stock scripts, a few icons at a time. Complex phone-answering scripts are a breeze to construct, and basic automated or semiautomated telemarketing schemes are now (shudder) within the easy reach of every Mac owner.



Just Browsing PhonePro 3.0's new browser function is a necessity, as most useful business scripts easily grow to 30 icons or more.

PhonePro 3.0's main improvements are features for the serious telephony-applications programmer. Scripts for real business work get quite complex, so the new browser for examining programming elements and data structures is not just necessary but overdue. Another new PhonePro feature is CRC Sound Editor, which edits digitized-sound waveforms directly. This function will probably be most used for playing back and checking the sounds in a PhonePro sound table—it's easier to rerecord a botched sound than to fix it by editing.

Also new is the integration of voice mail with E-mail. Unfortunately, a 1.2K text message corresponds roughly to 200 words, or about a minute of spoken English. At a 22kHz sampling rate, the sound file corresponding to this paragraph of text is about 1MB. You can use voice-mail–E-mail integration to brilliant advantage in some business contexts, but if your users can't discipline themselves to leave messages like "Bob here. Call me," your network flow will look like frozen corn syrup.

Cypress offers only a separate fax-back–management program (FaxPro II, $195), instead of including fax capability. If you find this a problem, have a look at the icon-programmed software-hardware combination telephony system TFLX (Magnum Software, 818/701-5051, *http://www.primenet.com/~magnum/*).

The Last Word For about $400, you'll have to choose between a deluxe voice-telephony system or a less elaborate system that includes fax handling. For serious phone-only work, PhonePro 3.0 is currently the top Mac choice.—CHARLES SEITER

RATING: ★★★★/7.1 **PROS:** Flexible, easy-to-learn system; documentation and support good enough to get nonprogrammers started. **CONS:** Fax software sold separately. **COMPANY:** Cypress Research (408/752-2700, *http://www.cypressr.com*). **LIST PRICE:** $349.

SAM 4.0.8

SAM FINDS VIRUSES, KILLS 'EM

COMPUTER VIRUSES AREN'T NEARLY as vexing for Macintosh users as for PC users. In fact, most Mac viruses are relatively benign; it's a rare one that trashes a hard disk or corrupts data. Still, it's best to be prepared, and Symantec AntiVirus for Macintosh (SAM) is a good first line of defense.

Like previous versions, SAM 4.0.8 consists of an easy-to-use application that scans disks for viruses (either on demand or according to a schedule), and an extension, SAM Intercept, that monitors disks for viruses and suspicious activities. Intercept flashes a warning whenever it detects a possible problem, such as an attempt to create an extension. You can set Intercept to scan floppies and removable cartridges on insertion, or even to prohibit the insertion of floppies altogether. The SAM application scans your hard drive more closely, searching every file's code for viruses. The comprehensive manual walks you through the process of decontaminating infected drives and preventing clean drives from contracting a virus.

SAM 4.0.8, a compatibility release for use with System 7.5.3 and earlier, has been updated to detect and remove five strains of Microsoft Word macro viruses. Until recently, we assumed that Mac viruses couldn't infect PCs and vice versa. The Word 6.0 macro viruses changed all that; they use the program's macro language to infect Word documents and can tag along when those documents are converted from one platform to another. The fouler Word macro viruses, such as the one known as FormatC, can reformat a PC's hard disk, but on a Mac they merely display an error message.

Earlier versions of Word documents aren't affected; if you don't use Word 6 on your Mac, you don't have to worry. When I unexpectedly received an infected Word 6 document during my testing, SAM detected the virus and removed it from the file. It also found and deleted the other viruses I've kept around on floppy disks for testing purposes.

Ounces of Prevention The Set Preferences dialog box shows you the kinds of suspicious activities SAM 4.0.8 patrols for when you set it to its most cautious level.

I did find a bug in SAM's automatic updating of virus definitions: when dialing the Symantec BBS, the application unexpectedly quit. Turning off my Faxstf software solved the problem. Because virus definitions need to be updated only once or twice a year, this is a minor problem.

The Last Word SAM is the gold standard against which Macintosh virus killers are judged. If you rarely share files, all you need is an occasional scan with the freeware program Disinfectant (available from Macworld Online, *http://www.macworld.com*). But if you're on a network or regularly download files from dubious sources, SAM will keep the nasties from creeping into your Mac.—TOM NEGRINO

RATING: ★★★/5.7 **PROS:** Reliably keeps your disks virus-free. **CONS:** May be incompatible with fax software. **COMPANY:** Symantec (541/334-6054, *http://www.symantec.com*). **LIST PRICE:** $69.

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—Susan Glinert, Computer Shopper, April '96 issue (page 496)

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—Peter Scisco, Computer Life, May '96 issue (page 108)

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3D World

AFFORDABLE BUT LIMITED QUICKDRAW 3D DESIGN TOOL

MICROSPOT USA'S 3D WORLD IS A rare product that gives us a glimpse into both the past and the future of a technology. This modeler/renderer's simplicity is reminiscent of the affordable, easy-to-use programs that gave rise to 3-D design on the Mac; at the same time, 3D World is based on QuickDraw 3D, Apple's vision for ushering 3-D into the mainstream.

Relying heavily on QuickDraw 3D's architecture, the program uses 3-D metafile (3DMF) as its native format and the QuickDraw 3D interactive renderer as its imaging engine. Consequently, 3D World is available only for Power Macs, and it needs 16MB of RAM. (Although 3D World itself occupies a relatively small partition, QuickDraw 3D does not.) And some features, such as transparency, are enabled only if a QuickDraw 3D accelerator card is installed.

3D World is a limited modeler, offering only some tools for producing 3-D primitives and a cumbersome lathing tool with options for building swept objects, such as coiled springs. Defining curved surfaces with the lathing tool is difficult at best, and control points for adjusting the outline are lacking entirely. Lathing with any precision is almost impossible.

Quick Drawing 3D World's Librarian is great for accessing QuickDraw 3D–based models.

Object editing is limited as well. You can break rectangular objects down to their planar surfaces, but you can only separate pyramids from their bases—you can't pull apart their sides. Although you can resize or reshape spheres and lathed objects, you can't edit individual surface points.

Augmenting 3D World's tools are plug-ins for building pipes, tori, and 3-D text objects; aligning objects; pointing lights; and orbiting a camera around the scene. A collection of 28 additional plug-ins is available separately. Still, even with 34 plug-ins, 3D World is only a basic modeler.

One nice feature is the Librarian, a separate application you can use concurrently with other programs. Items in the library—3-D objects, 2-D images, textures, and sounds—are displayed as either thumbnails or icons, and you can drag and drop them into your scenes. But since System 7.5's drag-and-drop capability is 3D World's primary input/output medium, you're essentially limited to 3DMF and PICT output; the program doesn't export files in common 3-D formats such as DXF.

The Last Word 3D World's barebones design is fine for dabbling inexpensively in 3-D (if you have the hardware to run it), and it does show off what QuickDraw 3D can do. For serious design work, though, you'll probably need more than it can offer.—CARLOS DOMINGO MARTINEZ

RATING: ★★/4.9 **PROS:** Separate Librarian function; affordable. **CONS:** Includes only basic modeling tools; serious hardware requirements. **COMPANY:** Microspot USA (408/253-2000, *http://www.microspot.com*). **LIST PRICE:** $139.

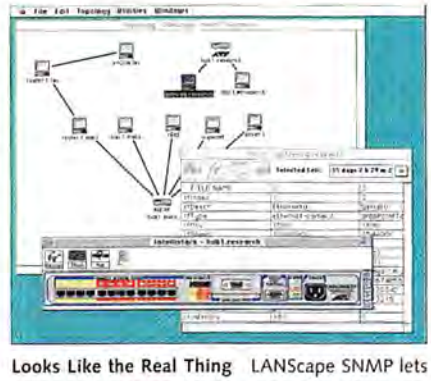
LANScape SNMP 2.1

SNMP CONSOLE DISAPPOINTS

SNMP MANAGEMENT CONSOLES for the Mac are rare. Sonic Systems helps fill the void with LANScape SNMP 2.1, which sports such sophisticated features as graphical depiction of devices and an integrated Management Information Base (MIB) compiler. Unfortunately, interface deficiencies and obsolete documentation make the product less usable than similar packages for PCs.

LANScape comes on one disk with a thin, poorly indexed manual, dated 1994. An addendum on disk explains some new features, but the majority are undocumented. The package also includes Apple's MacTCP and a generic MIB library for bridges, routers, and repeaters, as well as custom MIBs for Sonic and ATI hubs. A built-in MIB compiler lets you easily add MIBs for other devices.

LANScape first scans the network via AppleTalk or TCP/IP to find devices with SNMP support. As it scans, LANScape builds a network diagram on screen, then stores it in a file in the Preferences folder. You can edit the diagram to show device connections, change icons, and edit names.



Looks Like the Real Thing LANScape SNMP lets you manage selected devices using controls resembling the hardware's panels.

LANScape polls SNMP devices at a specified interval; if a device goes offline, its map icon grays out. Double-clicking on an icon shows the device's MIB variables. You can set up alarms and traps to report status changes via an on-screen alert, a log entry, a pager, or E-mail. You can also graph individual MIB variables, such as packet counts, over time. New in this release are Translators, which display the front panels of certain devices such as Sonic's hubs, complete with blinking LEDs.

A few serious user-interface and feature gaffes make LANScape difficult to use. You can monitor only one topology at a time, and the saved topology file name is hard-coded: you can't open another file. Instead, you must swap topology files in the Preferences folder and restart the application. Thus you can't view, say, a network overview diagram alongside several smaller, more detailed subnet diagrams. Worse, the grayed-out depiction for offline devices is hard to see. LANScape has no color flags or audible alarms when devices go down. The on-screen alerts appear one at a time, and you must dismiss the dialogs manually.

The list goes on. The log file holds only 10K of event data, far too little for busy networks. E-mail notification supports only CE Software's QuickMail, even though SMTP is more prevalent in SNMP environments.

The Last Word Were LANScape a brand-new product, it would be a promising start. By now, LANScape should have a better handle on basic features and documentation. For $799, Sonic owes users a much more sophisticated tool.—MEL BECKMAN

RATING: ★★/3.1 **PROS:** Graphical depiction of devices; integrated MIB compiler; alarm and trap support. **CONS:** Single topology file; no audible or color alerts; outdated user guide. **COMPANY:** Sonic Systems (408/736-1900, *http://www.sonicsys.com*). **LIST PRICE:** $799.

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GyroPoint Desk

MOUSE WORKS ON OR OFF THE DESK

THANKS TO INGENUITY AND GYROscopic technology, Gyration's GyroPoint Desk mouse is at home on or off your desk. It looks like a conventional mouse, though it's more rounded than most, and it's about the same size and weight. But the GyroPoint can control the on-screen cursor even when you lift it off the desk; you're limited only by its 10-foot cord. (A cordless model, the GyroPoint Pro, is available for $449.)

On the desk, the GyroPoint is a bit more sensitive than an Apple mouse, even with tracking set to slow. To use the GyroPoint in the air, you lift it and turn it 90 degrees onto its side. If you're right-handed, the GyroPoint's activate button will be on the bottom, under your middle finger; the top button, which you operate with your thumb, is for clicking and double-clicking. (You can operate the mouse with your left hand, but the mouse ball awkwardly faces your palm.) To control the cursor, you press and hold down the activate button and pivot your wrist in the direction you want the cursor to travel. Because an internal gyroscope senses

GIBSON

changes in the GyroPoint's position, you don't even have to point the mouse at the screen (though it's less confusing if you do; to see what I mean, try working with your mouse turned at an angle).

If cursor response becomes erratic, you reset the GyroPoint by holding it motionless or placing it on a flat surface for several seconds. You may also need to reset the mouse if your hand is very warm or very cold; the GyroPoint responds to hand temperature, like a mood ring, and extremes may cause the cursor to drift.

I tested the GyroPoint with a range of productivity and game applications. It took me a few days to become adept at using the GyroPoint in the air, partly because the control-panel setting that worked on the desk was too slow for off-the-desk use. Even after optimizing the settings, I had difficulty performing precise operations such as selecting text and clicking on small objects. Gyration should provide software that lets you customize cursor response for both operating modes. Also, the manual says you can customize the activate button's operation using your computer's mouse-control software. Unfortunately, the GyroPoint Desk uses Apple's Mouse control panel, which lacks a programming function.

The Last Word The GyroPoint's gyroscopic technology is certainly impressive, but whether you're likely to find it useful depends on your needs. The GyroPoint's biggest advantage over a conventional mouse is that it doesn't require a surface, so you can point and click while leaning back in your chair. For desk-only use, you might be better off with the $99.95 Thinking Mouse 5.0 from Kensington Microware. If you really need a dual-mode mouse, though, the GyroPoint Desk is the only game in town.—FRANKLIN TESSLER

RATING: ★★★/5.3 **PROS:** Works on or off the desk. **CONS:** Limited control over cursor response; no way to program buttons; difficult for fine tasks off the desk. **COMPANY:** Gyration (408/255-3016, *http://www.gyration.com*). **LIST PRICE:** $149.

Cliffs StudyWare for Algebra I

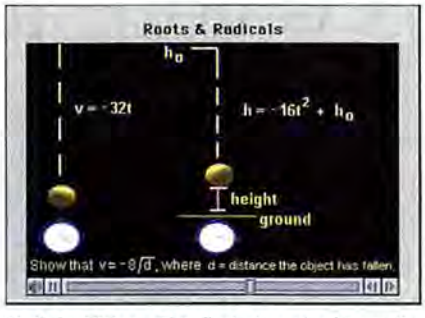
TUTORIAL CD AMOUNTS TO LITTLE MORE THAN A BOOK IN SHEEP'S CLOTHING

UNLIKE OTHER PRODUCTS—WHOSE necessity may be a matter of mere lighthearted conjecture—you *know* when you need Cliffs Notes: You're drowning in a class, the final is two weeks away, and you need some basic points pounded into your head. Updating the yellow-and-black pamphlets you may remember, the latest installment of Cliffs Notes comes on CD-ROM.

I looked at the Algebra I package, a modest review book and a CD of reviews, tutorials, and animation. Lessons cover a range from notation through graphing, inequalities, one- and two-variable solving, quadratic equations, and the dreaded word problems.

The review section presents the same kind of material you find in print, while the tutorial has a certain amount of question-answering interaction. Animations typically diagram graphed areas with some moving parts, or illustrate the familiar falling balls from algebra texts.

Topic selection is easily Cliffs Notes' most formidable area of expertise: it's safe to say that everything covered in this little



Math by Vision This illustration of a kinematics problem offers a valuable mini lesson, but some animations amount to no more than a drawing with a voice-over.

course will end up on the final, on the SAT, and in every college course you take. Since Cliffs Notes has spent 20 years boiling down algebra to ten key, must-do problems, what does it use to fill the other 200MB of the CD?

The short answer is animation, but although it's easy to see how animation could be a serious benefit in geology or physiology, it's not always obvious how a moving algebra drawing teaches you more than a few additional explanations of the same topics. Some animated lessons are nicely presented (see "Math by Vision"), but some topics offer nothing more than an awkwardly graphed diagram with a droning narration.

Although this product mostly does the job it should, it's hard not to feel that a world of educational possibilities lies untouched. At the simplest level, hyperlinks could take you to pages with alternative explanations of concepts. Links could also produce multiple-choice questions, with backup for students who need more help. Instead, Algebra I is largely a traditional study guide digitized on a CD.

The Last Word Face it, anything's an improvement on flunking, and Cliffs StudyWare does a creditable job of presenting the bare essentials of first-year algebra. More material, more detail, and—most of all—more innovative methods will have to wait for another incarnation.—CHARLES SEITER

RATING: ★★★/6.2 **PROS:** Time-tested content; easier to follow than standard textbooks. **CONS:** Perfunctory animation; basic set of material. **COMPANY:** Cliffs Notes (402/423-5050, *http://www.cliffs.com*). **LIST PRICE:** $49.95.

The New Casio Digital Camera.
Pretty amazing...no matter how you look at it.

The new Casio QV-10A *plus* Digital Camera might just change the way you take and share your pictures. Because until now, digital cameras were bulky and expensive. The QV-10A *plus* is anything but.

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Logical Journey of the Zoombinis

MATH WITHOUT THE NUMBERS

THERE'S NO SHORTAGE OF MATH education software for kids 8 to 12 years old; dozens of programs teach arithmetic using drills and practice games. Logical Journey of the Zoombinis is a different kind of math education program, helping children develop mathematical and logical thinking skills without manipulating any numbers. Most kids won't even know they're doing math while they're playing the game.

The Zoombinis—a race of small, bouncy animated creatures that look like the offspring of a Muppet and a Smurf—have to travel to a new home, and your job is to figure out how to overcome the obstacles in their way by solving puzzles involving mathematical concepts such as set theory, graphing, algebraic thinking, data sorting, and pattern finding.

One puzzle calls upon you to satisfy a hungry but extremely picky Pizza Troll. You must experiment with different combinations of toppings, and test hypotheses until the troll accepts the pizza and lets the Zoombinis pass. Another puzzle requires you to complete a pattern of shapes and colors formed by mudballs on a two-dimensional grid (see "Mudball Wall").

Mudball Wall There's a pattern of colors and shapes hidden in this wall. It's up to you, the Zoombinis' guide, to discover it.

At the end of the journey lies the promised land of Zoombiniville. But since Zoombinis can only travel in packs of 16, and the total Zoombini population is 625, there are plenty of repeat trips to attract you back, and each adventure brings more-challenging puzzles. Most younger kids will need lots of help on all but the simplest levels.

Our team of junior testers unanimously praised Logical Journey. Ten-year-old Alex didn't take his hand off the mouse for three hours, and he would have stayed longer if his mother hadn't called him home for dinner. Fourteen-year-old Johanna, who's usually bored by computer games, came back to play several times. Even her 18-year-old brother enjoyed the program.

The younger kids weren't really sure what they were learning, but they were sure they were having fun. In fact, many parents may not be able to tell exactly what their kids are learning as they play. Fortunately, the user's guide explains the educational underpinnings of each adventure.

The Last Word Logical Journey may not find its way into many traditional classrooms; it's noisy, silly, and hard to fit into lesson plans. But in situations where education doesn't need to be packed into 50-minute periods and tested with multiple-choice quizzes, Logical Journey is a worthwhile trip.—GEORGE AND BEN BEEKMAN

RATING: ★★★★/8.5 **PROS:** Challenging and entertaining; puzzles and rewards grow as players learn. **CONS:** May be difficult for low end of target age range. **COMPANY:** Brøderbund (415/382-4400, *http://www.broderbund.com*). **COMPANY'S ESTIMATED PRICE:** $40.

What Do You Say When You're Out Of Memory?

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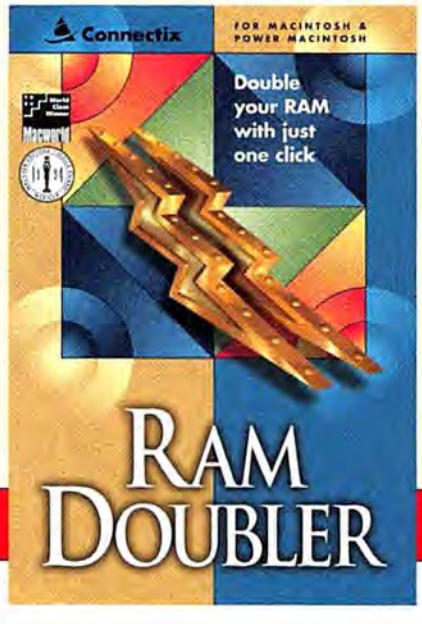
The more memory your Mac has, the more productive you'll be. But forget about adding SIMMs. RAM Doubler™ is software that doubles your Mac's memory. *RAM Doubler does what it says it will do.~Macworld.* And you don't have to open your Mac. Just run RAM Doubler's 15 second installation and you can run twice as many applications – instantly. *May well be the best investment you make this year.~MacUser.* You'll agree. Buy RAM Doubler today and double your RAM with one click. Your satisfaction is guaranteed. RAM Doubler is available wherever great software is sold.



Connectix

System Requirements: Macintosh equipped with a 68030, 68040 or PowerPC microprocessor. System 6.05 or later, including all versions of system 7 • 4 MBs required (hard disk required for machines with 4 to 6 MBs) • Not compatible with Mac SE, original Mac Classic, original Mac LC or PowerBook 100 or Mac II without a 68851 PMMU or any accelerator that does not work with virtual memory.

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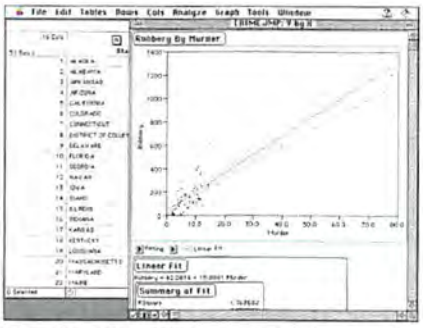
JMP In

STUDENT VERSION OF STATS
HEAVYWEIGHT SETS THE STANDARD

SAS INSTITUTE, ONE OF THE BIGgest vendors of statistics software, has made two quixotic moves lately. First it released a major update of JMP version 3.1 and called it 3.1.5. Then it collaborated with Duxbury Press on a $54 student edition of 3.1.5 called JMP In, counting on your sense of honor to buy the package only if you're a student (JMP sells for $695).

Student versions of Data Description's Data Desk and Abacus Systems' StatView are also available, but they're more expensive and lack some important features. JMP In, on the other hand, has all of JMP's essential features, reliability, and ease of use, with student-level examples and data sets geared toward a first-year college statistics class.

JMP In also shares JMP's statistical view of the world of data, with an interface that uses fewer menus and commands than any other complete stats package. You get three menus (Tables, Rows, and Cols) devoted to data manipulation and coding. The Graph menu covers the standard pie, bar, and line charts; 2-D and 3-D scatterplots; and Pareto and quality-control charts. The Analyze menu contains a handful of powerful commands—with just a few clicks, you can direct not just a regression analysis (see "Giving You Fits") but a whole multivariate analysis of variance study.



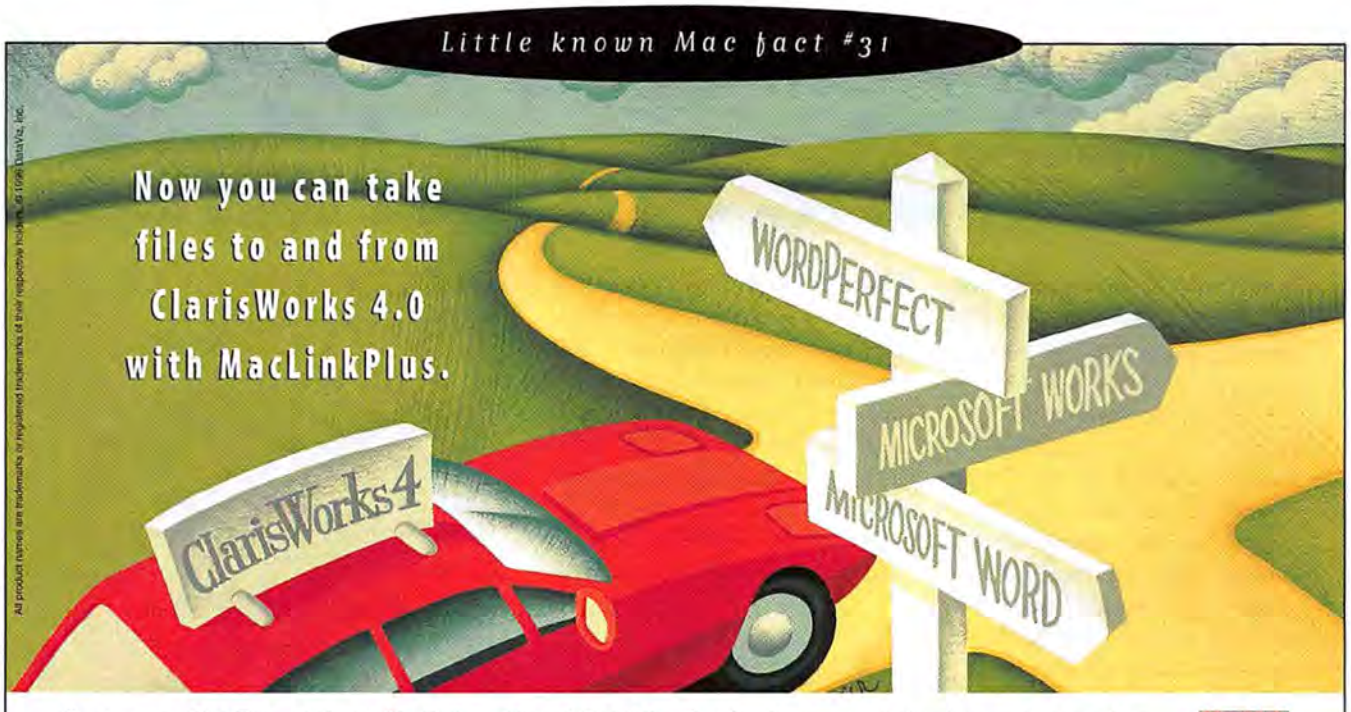
Giving You Fits JMP In can identify the right statistical model for your data and calculate it instantly, even on older 680X0 Macs.

It's a bit of a challenge to coordinate the menus' use with chapters from traditional stats textbooks, which are configured around a much clunkier and more limited approach to software. But all the new touches in 3.1.5's menus are here; the only things missing are a few chart types and some advanced experiment-design features.

I tested JMP In on a IIsi, an older PowerBook, and an SE, and the performance was amazing. But the biggest surprise is the documentation, a hefty single volume. Its publisher, Duxbury Press (an imprint of textbook giant Wadsworth, and the distributor of JMP In), persuaded SAS to write an introduction explaining software approaches to modern statistical analysis. One simple exposition, in which you learn to distinguish a small but statistically supported result from a bigger but statistically meaningless result, should be required reading. No popular textbooks—and certainly no stats software documentation—are anywhere near as provocative and involving as this one.

The Last Word JMP In is a formidable statistics package with documentation that's better than most classroom texts. Carefully blending newer exploratory methods with time-tested, textbook-approved basics, it sets a new standard in the academic market—one that other vendors will find a tough act to follow.—CHARLES SEITER

RATING: ★★★★/8.4 **PROS:** Impressively complete; inexpensive; rich, thoughtful documentation. **CONS:** Challenging to use with traditional textbooks. **COMPANY:** Duxbury Press (800/354-9706, U.S. only). **LIST PRICE:** $54.



Ever try moving ClarisWorks 4.0 files into WordPerfect or Microsoft Works? How about the other way around? If you have, you know something generally gets lost along the way. Like formatting. And graphics. The latest version of MacLinkPlus, on the other hand, gets you there with everything intact—embedded graphics, spreadsheets, styles and more. So move files in and out of ClarisWorks 4.0. Or any of the other word processing, graphic, spreadsheet or database formats MacLinkPlus supports. Now the shortest distance between ClarisWorks 4.0 and other Mac or Windows applications is MacLinkPlus. For more information or to upgrade, call 1-800-780-1466 or visit our Web site at http://www.dataviz.com/maclink2.

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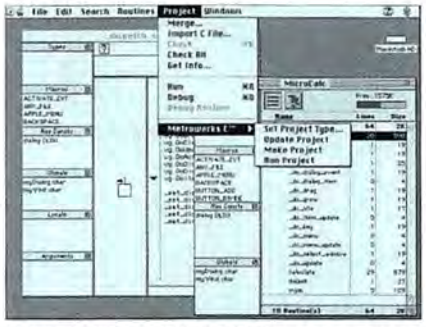
VIP C 2.0

IMPRESSIVE UPDATE OF SLICK DEVELOPMENT TOOL

COMPARED WITH OLD-FASHIONED command-line computing, creating a program in today's graphics-intensive, menu-driven environment means writing prodigious amounts of code. Mainstay's VIP C reduces this organizational and typing load by allowing quick access to the Mac Toolbox through special routine templates and by displaying code in flowchart form. That means you can perform basic Mac tasks, such as defining the main program event loop and setting up windows and menus, without risking a case of carpal tunnel syndrome.

Besides updating VIP C to accommodate the Universal Header Files 2.0.1 APIs that are part of modern Mac programming, Mainstay has moved the function libraries and frequently used tools out of the main program. They're now in the System Extensions folder, so you can modify or update them without overhauling VIP C itself. This new and improved version is also bigger, for the first time absolutely requiring System 7 and a CD player. Despite its size, though, its operation is amazingly fast.



Riding the Metro VIP C 2.0's direct link to Metrowerks' CodeWarrior C lets you create template-assembled, Toolbox-assisted programs.

Attesting to Mainstay's belief that more developers make a living programming database-like applications than anything else, VIP C 2.0 includes a special forms construct. Forms in VIP-ese aren't of the traditional variety, but chunks of code that list interface elements (buttons, check boxes, and other Mac favorites) and their event handlers. VIP C comes with sample code that shows you how to program input and output screens for a fast, low-overhead database. It even includes a limited version of Mainstay's $195 Database Manager that lets you study prototypes of database designs, though you'll want the full version if you're writing commercial applications.

You'll be impressed with the fast, compact databases you can create using this system rather than a "real" database development tool such as ACI US's 4th Dimension; an instant address or invoice database program coded in VIP C can fit in 20 to 30 kilobytes! Smaller file size is due partly to VIP C's virtues and partly to compiler optimizations in Metrowerks' CodeWarrior C (now built directly into a VIP C menu; see "Riding the Metro"). That's great for CodeWarrior C users, but it leaves fans of Symantec's earlier Think C and Apple's Macintosh Programmer's Workshop (MPW) out in the cold.

The Last Word VIP C 2.0 is a real improvement over the already excellent earlier versions. It's not cheap, but developers who are committed to writing commercial software for the Mac will find it produces finished, debugged code for the CodeWarrior C compiler faster than any competing tool.—CHARLES SEITER

RATING: ★★★★/8.0 **PROS:** Completely updated for System 7.5; new database and forms features; fast, clean interface. **CONS:** Developers using Think C and MPW compilers will have to switch to CodeWarrior. **COMPANY:** Mainstay (805/484-9400). **LIST PRICE:** $495.

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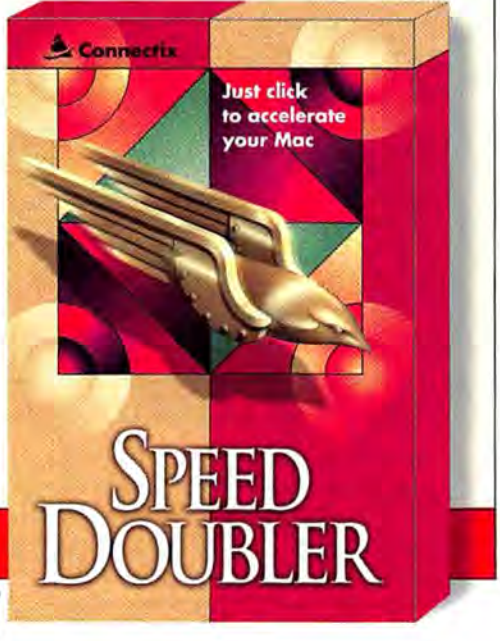
Connectix



Requirements: Macintosh equipped with a PowerPC, 68040, or 68030 microprocessor • System 7.0 or greater • 8 MB physical RAM or greater • Compatible with Connectix RAM Doubler • Not compatible with: Mac Plus, Mac SE, original Mac Classic, original Mac LC or PowerBook 100

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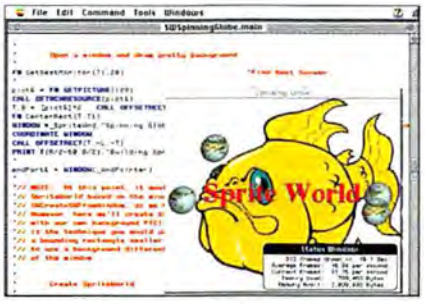
FutureBASIC II

COMPLETE, FRIENDLY BASIC PROGRAMMING ENVIRONMENT

FUTUREBASIC II WAS ORIGINALLY developed by Staz as a modern structured and compiled BASIC with points of similarity to Microsoft's Visual BASIC by Zedcor. (Staz also published the FutureBASIC application generator PG:Pro.) The FutureBASIC II package constitutes a complete Macintosh programming environment that's significantly easier to use (and deploy—you can run it on a Classic if necessary) than the professional packages from Symantec and Metrowerks.

Consider, for example, that this product ships on six disks, rather than on a CD-ROM, and takes about 9MB of hard drive space, rather than the 80MB or so the dominant C++ systems occupy. You even get real—and clearly written—documentation, rather than the option of ordering it separately. Another plus is a large assortment of sample and tutorial files that are documented with the sincere aim of getting you started (see "Nothing Fishy").

If you already use FutureBASIC, this package contains two big attractions: the integrated application framework, which lets you generate a simple application in an afternoon, and a new Staz-generated debugger. The technical downside to this version is that, alas, there still isn't a Power Mac–native FutureBASIC compiler, and unexpected slowdowns in programs with long, scientific floating-point numbers still occur. If you're clever, you can get around this last problem with judicious use of the included in-line assembler, but that's asking a lot from hobbyists and part-time coders.



Nothing Fishy FutureBASIC II's many examples contain the best-documented code offered in a Mac language package—you can pretty much learn BASIC programming studying the comments.

Probably the last programming package that allowed FutureBASIC's kind of easy entry to the world of coding was Think Pascal, which is now a module in Symantec's C++. That means that if you want to understand how a Mac really works, and perhaps want to create a little app to amaze your friends (the Mac software areas on services such as America Online show hundreds of examples), your options are to spend a few months learning proper C++ programming with the Mac Toolbox, or spend a few nights studying the smoothly integrated Program Generator (formerly PG:Pro) and experiment with easy text-editor, graphics, and database example programs. If you want a job as a full-time professional programmer, you'll have to bite the C++ bullet someday, but you can certainly learn a lot about programming in general and the Mac in particular with this friendly package. As an extra for beginners, the free phone help is superb.

The Last Word FutureBASIC is an attractive environment for hobbyists and for developers aiming at simple commercial apps. For programming as educational fun, it has no competition.—CHARLES SEITER

RATING: ★★★/6.9 **PROS:** Friendliest Mac programming environment; great support and documentation. **CONS:** No Power Mac support yet; some problems with numerics. **COMPANY:** Staz Software (601/255-7085, *http://www.stazsoftware.com*). **LIST PRICE:** $229.

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Breakthrough Performers Power Computing's PowerTower 180 (top left) leads the Mac set for the best balance of performance and price. Apple's Power Macintosh 7600/120 (right) offers a welcome speed increase, and shows that great performance is becoming the norm. Umax Computer's forthcoming SuperMac S900 (top center) will offer good speed and will be more expandable.

MW LAB

The New Speed Champs

Power Computing takes the Mac to a new level, with Apple and others in close pursuit

by Galen Gruman

YOU CAN REALLY FEEL THE DIFFERENCE. THE MAC HAS HIT THE 180MHz milestone on the never-ending road to greater performance, and this leap represents a tangible difference in performance. You'll notice the smooth display and scrolling, crisp calculations and file copies, and the always-at-the-ready pointer. It's easy to fall into clichés about the fantastic handling of a European sports car compared with that of a merely great Japanese sedan, but that's exactly how it feels.

In a word, wow.

Macworld Lab is used to Macs' (and PCs') getting faster every few months, and we've also learned the ugly truth that many speed improvements aren't that noticeable. Yet while a leap of, say, 132MHz to 150MHz can feel trivial, the seemingly equivalent leap from 150MHz to 180MHz can feel momentous. This leap is momentous.

Whom to thank for the 180MHz leap? Not Apple, but Power Computing. The original Mac-clone licensee was the first to jump to 150MHz and is now the first to leap to 180MHz (as well as 166MHz). You can expect the others to follow.

Power Computing's (*http://www.powercc.com*) new 180MHz PowerTower 180 is one of several new Mac systems; the company has also introduced the 166MHz PowerTower 166 and three PowerCenter desktop models: the 120, 132, and 150. All use PowerPC 604's running at the model numbers' speeds.

Apple (*http://www.info.apple.com*) has boosted four of its systems, rolling out faster versions of the 7200, 7500 (now called the 7600), 8500, and 9500. But these systems have no improvements other than

PHOTOGRAPHS BY PAUL HANZ MOORE/SCREEN IMAGES BY KEVIN CANDLAND

faster CPU cards. For now, the innovation lies elsewhere.

In May 1996, Umax will ship the 150MHz, 604-based SuperMac S900, which has a slot for a second CPU card. Umax expects to offer faster systems soon.

Also in May, DayStar Digital (*http://www.daystar.com*) will ship a new two-CPU version of its Genesis MP multiprocessor systems, using the 150MHz PowerPC 604. The new Genesis MP 300 has two extra slots for CPU cards, so you can have a four-CPU configuration. DayStar now offers 132MHz and 150MHz models of its four-CPU systems; neither 150MHz version was available for this review.

And the most recent Mac licensee—Motorola—can't be far behind in announcing its own systems.

Because of the rapid changes in speed, people looking to buy a new Mac in the next few months need a fresh perspective on their Mac system options. To give you that perspective, *Macworld* arranged to get hands-on access to the new Apple and Power Computing systems as soon as they shipped so we could evaluate and rate them in the new context—just days before we went to press. We also evaluated a late prototype of Umax's SuperMac S900, but we didn't rate it because it was not shipping; the company is targeting a May 1996 release and says the system we tested is final except for some cosmetic case-design issues. DayStar's two-CPU Genesis MP 300 was not available.

Note that we have recalibrated our Star Ratings point system to account for expected performance increases over the next year. In effect, that change lowers the scores of previously rated systems by almost a full point on our 10-point scale—what was top speed six months ago is no longer impressive.

The Power at Power Computing

There's no question that the new Power Computing systems are enormously compelling. The speed is great—but so is the price. Power Computing is using the same pricing approach that Dell and Gateway 2000 have used successfully in the PC market (see the chart, "Pentium PCs Cheaper Overall, but Power Macs Come into Range in '96").

Polished Apples The five faster Macs from Apple deliver more performance for the same price as their predecessors, but break no new ground. Shown here are the Power Mac 7600/120, right, and the 8500/150.

Power Computing has also redefined its product line. Like the Power series released in May 1995, the PowerWave series introduced in November 1995 came in tower and desktop models, aimed at both business and specialty users. The PowerCurve series introduced in January 1996 was a desktop-only system aimed at low-end business users and individual buyers. Both lines are gone.

Power Computing now offers the PowerTower line of tower systems, aimed at high-performance users such as image editors, programmers, media creators, and color publishers; and the PowerCenter desktop line, aimed at business, education, and home-office users. But if you really want a PowerCenter in a tower case, Power Computing will special-order one for you.

New Tower of Power The PowerTower series offers the most excitement, thanks to the groundbreaking 166MHz and 180MHz speeds. And the excitement is warranted: the speed advantage is tangible. The Macworld Lab benchmark, "Where to Get Top Speed: The PowerTower Series," shows the numbers; you'll have to take our word on the tangibility.

We like the power, but there are some rough spots to iron out.

First, the internal hard drive hampers performance. In Macworld Lab tests, the PowerTower 166 was slower than Apple's new 150MHz Power Mac 8500 in disk-intensive tasks—Apple's faster drive is the reason. (Power Computing bundles Connectix's Speed Doubler, which should boost drive performance by about 10 percent.)

Second, the case needs better expandability. Like all previous Power Computing Macs, the PowerTowers are designed to make adding RAM easy, but there are only four DIMM slots, so users of Adobe Photoshop and other memory-hungry programs should use 16MB-or-greater DIMMs for better expansion options.

The PowerTower's new case design makes it harder to upgrade the other components as well. To add or remove PCI cards, you have to do some maneuvering to unscrew the cards' retainers. That's not so bad.

But replacing the CPU card means removing the case bottom, the PCI cards and the riser card on which they sit, and then a support beam, before you get to the CPU card itself. Too hard.

Likewise, replacing or adding drives involves taking the case apart, which is not as simple to do as it was with the PowerWave. Getting at the PowerTower's four internal 3.5-inch drive bays (one holds the bundled hard drive) is a pain.

The PowerTower has three PCI slots and built-in video circuitry. But you'll most likely want a PCI video card for the extra speed, leaving just two slots free. Power Computing's built-in video circuitry is fine for business use—outperforming that of the Apple Power Mac

7600 and 8500—but not fast enough to suit the needs of image editors and publishers. Fortunately, Power Computing offers the $549 IMS TwinTurbo-128M video-display card, which Macworld Lab tests have shown is a strong performer (see "Maximum Display," *Macworld*, June 1996). If you go for the TwinTurbo, you get 4MB of VRAM; for the on-board circuitry, you have a choice of 2MB (millions of colors on a 17-inch monitor) or 4MB (millions of colors on a 21-inch monitor).

If you need a lot of PCI expansion, you should know that Power Computing plans to introduce a six-slot version of the PowerTower, aimed at media producers and other card-intensive users, in July.

The Center Moves Up For the rest of us who dream of a racing machine but have to settle for a more practical vehicle, Power Computing now offers the PowerCenter line of desktop Macs, in 120MHz, 132MHz, and 150MHz models. These replace the PowerWave series.

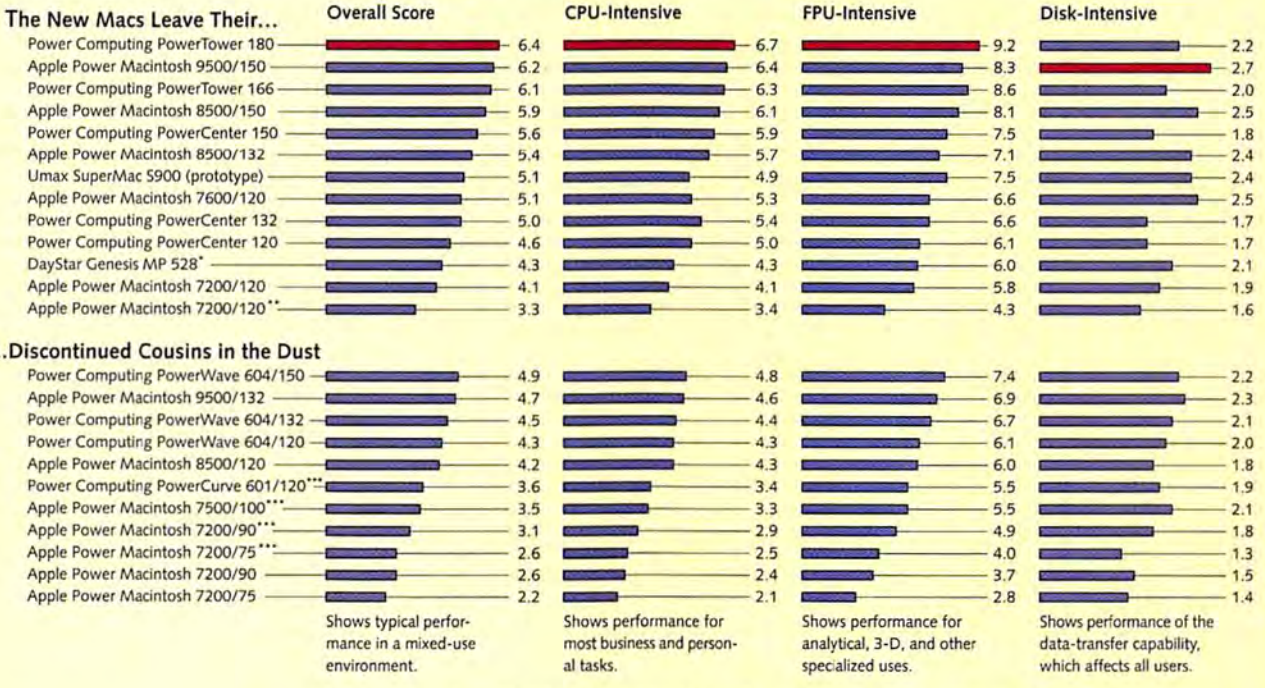
The PowerCenters have the same moderately fast on-board video circuitry as the PowerTowers. You get 1MB of VRAM on the base models (thousands of colors on a 17-inch monitor), upgradable to 4MB. Or you can buy a PCI video card; in addition to the TwinTurbo, Power Computing offers less expensive video cards from ATI Technologies ($449 with

MW LAB

Where to Get Top Speed: The PowerTower Series

And you thought the PCI Power Macs last fall and winter were fast. Power Computing has pushed the high end higher with its PowerTower series, and it has retained the lead in the general desktop category as well. Meanwhile, Apple has boosted its PCI Power Mac line across the board, and new clone makers DayStar Digital and Umax Computer are staying right in the thick of the new performance pack. Part of the speedup in the new Macs comes from System 7.5.3 (the new Apple and Power Computing systems came with System 7.5.3, while the other systems had System 7.5.2), since more of System 7.5.3 is PowerPC-native than is System 7.5.2. Also, much of the 8500/150's and 9500/150's very fast hard drive pushed its overall performance ahead of the 150MHz systems from other companies—the fast disk even put the 9500/150 ahead of the PowerTower 166. Because Umax and DayStar will use System 7.5.3, expect their performance to rise closer to Apple's and Power Computing's levels.

Best result in test. Longer bars are better. Results are times as fast as a Centris 650 (Centris 650 = 1.0). Products are listed in decreasing order of overall performance.



Multiprocessing does not affect standard tasks; see "Photoshop at Warp Speed," Macworld, June 1996, for multiprocessing-oriented performance. **Without 256K cache; Apple includes a cache card in 7200's with 16MB of RAM but not in 7200's with 8MB. We tested the 7200 both ways so you could see the effects of having a cache card. * With optional 256K cache.*

Behind Our Tests

Macworld Lab tests several functions in eight key applications plus the Finder to determine real-world performance for the three critical performance areas faced by most users: The CPU-Intensive tasks evaluate the Mac's essential computing performance; the FPU-Intensive tasks gauge performance for operations that take advantage of the floating-point unit; and the Disk-Intensive tasks gauge the performance you'll get for launching programs, opening and closing files, and copying files. We then average the results to detremine the Overall Score, giving the CPU-Intensive score 60 percent of the weight and the FPU and disk scores 20 percent each. These results are comparable with *Macworld* benchmarks published since the January 1995 issue. We test native versions of software on the Power Macs and 680X0 versions for the 040 Macs. The software includes System 7.5; Adobe Illustrator 5.5, PageMaker 5.0a, Photoshop 3.0, and Premiere 4.0; Fractal Design Painter 2.0; Microsoft Excel 5.0; Specular International Infini-D 2.6; and Wolfram Research Mathematica 2.3. Our Power Macs have 24MB of RAM; 680X0 Macs have 16MB. All systems were run with 8-bit color on 17-inch color monitors.—**Macworld Lab testing supervised by Mark Hurlow**

The Right Options: What Each Mac Offers

Company	Product	Star Rating[A]	Price[B]	CPU	Video Display
Apple Computer 408/996-1010	Power Macintosh 7200/120	★★/4.6	$2299	120MHz 601, 256K cache	1MB VRAM, 4MB maximum; on-board
	Power Macintosh 7200/120 PC Compatible	not evaluated	$2799	120MHz 601, 256K cache	1MB VRAM, 4MB maximum; on-board
	Power Macintosh 7600/120	★★★/5.8	$2999	120MHz 604, 256K cache	2MB VRAM, 4MB maximum; on-board
	Power Macintosh 8500/132	★★★/5.8	$3899	132MHz 604, 256K cache	2MB VRAM, 4MB maximum; on-board
	Power Macintosh 8500/150	★★★/6.0	$4699	150MHz 604, 256K cache	2MB VRAM, 4MB maximum; on-board
	Power Macintosh 9500/150	★★★/5.6	$4799	150MHz 604, 512K cache	2MB VRAM, 4MB maximum; PCI card
DayStar Digital,[H] 707/967-2077	Genesis MP 300	to ship in May	$6999	2 150MHz 604's, 512K cache	none (4MB, 128-bit video card is $849 option)
	Genesis MP 528	★★★★/7.0	$9999	4 132MHz 604's, 512K cache	none (4MB, 128-bit video card is $849 option)
	Genesis MP 600	not evaluated	$11,999	4 150MHz 604's, 512K cache	none (4MB, 128-bit video card is $849 option)
Power Computing,[H] 512/388-6886	PowerCenter 120	★★★/6.3	$1995	120MHz 604, 256K cache	1MB VRAM, 4MB maximum; on-board
	PowerCenter 120 Low Profile	★★★/5.9	$1895	120MHz 604, 256K cache	1MB VRAM, 4MB maximum; on-board
	PowerCenter 132	★★★★/7.1	$2495	132MHz 604, 256K cache	1MB VRAM, 4MB maximum; on-board
	Editors' Choice				
	PowerCenter 150	★★★★/7.3	$2995	150MHz 604, 256K cache	1MB VRAM, 4MB maximum; on-board
	PowerTower 166	★★★★/7.1	$3795	166MHz 604, 512K cache	2MB VRAM, 4MB maximum; on-board
	Editors' Choice				
	PowerTower 180	★★★★/7.3	$4195	180MHz 604, 512K cache	2MB VRAM, 4MB maximum; on-board
Umax Computer, 510/226-6886	SuperMac S900	to ship in May	$4000	150MHz 604, 512K cache	4MB VRAM, 4MB maximum; PCI card

[A] Based on features, implementation, innovation, performance, reliability, ease of use, and value. (See Star Ratings section for full explanation.) [B] All prices are company estimates. [C] Number of free bays assumes 3.5-inch internal devices. All systems include a 4× CD-ROM drive (except S900, which has an 8× CD-ROM). [D] All systems include the following ports: one ADB, two serial, one internal/external SCSI, two 16-bit stereo I/O, one Mac video, one AAUI Ethernet, and one 10BaseT Ethernet (S900 has an additional internal SCSI and ADB port). [E] DOS card bundles include 256K cache and 8MB of RAM for the DOS card; also available are the 100MHz Cyrix 5x86 ($799) and 100MHz Intel Pentium ($1049). [F] AV ports include one DAV, two audio-line I/O, one composite-video input, and one S-Video input. [G] Video card occupies one PCI slot. [H] Other configurations are available. [I] Extended keyboard and (for Power Computing) bundled software included. [J] Includes DayStar's nPower diagnostic software, FWB's Hard Disk ToolKit and CD-ROM ToolKit, and plug-ins for Kodak's Color Management System and Adobe Photoshop, After Effects, and Premiere

4MB of VRAM and $299 with 2MB).

Macs à la Carte Power Computing also differentiates itself by letting you custom configure your system. While there are several configurations preassembled and available for delivery within 48 hours, you can decide exactly what you want in your system if you're willing to wait a couple of extra days. (Power Computing hopes to get custom-configuration delivery time down to 48 hours by September.)

Power Computing also has several system bundles, including systems with Microsoft Office preinstalled, a $195 Internet kit you can add to any system (the kit includes a 28.8-Kbps Global Village modem and Apple's Internet Connection Kit), and a $795 media-publisher kit (which includes Macromedia Director 5.0, xRes 2.0, Extreme 3D 1.0, and Authorware SE). These bundles are not available unless you buy a system.

Moving Up If you already own a PowerWave, you can boost its speed by replacing the CPU card. Power Computing sells a 132MHz card for $495 and a 150MHz card for $695. PowerCurve owners can replace the 120MHz PowerPC 601 with a 120MHz 604 for $295.

For now, hold off on buying an upgrade card for your Power Mac 7500, 8500, or 9500. Power Computing may sell upgrade cards for today's PCI Power Macs, but it has not yet completed testing or passed federal radio-frequency emissions standards. The PowerWave upgrade cards should work in an 8500 or 9500, and the card for the PowerCurve should work in a 7500. I've used both in Macworld Lab, although not for long-term use.

How PowerTower Made the Leap

Going from 150MHz to 180MHz meant doing more than getting a faster PowerPC 604—Power Computing also had to increase the Mac's bus speed to 66MHz from its previous maximum of 50MHz. That meant upping the speed and tolerance of supporting chips, while observing the federal government's rules on radio-frequency emissions—the faster the bus, the more electronic noise it makes, which could interfere with other equipment.

Such problems delayed the first Pentium PCs, since most motherboard and system makers could not design systems to handle the 60MHz and 66MHz bus speeds required by Intel's then-new Pentiums. Intel stepped in to produce the systems, quickly taking over half the annual sales in motherboards and reinventing the PC-clone business in the process. Similar problems shouldn't happen on the Mac platform.

Bus speed is important because it relates directly to overall speed. For years, the CPU and bus ran at the same speed. Then Intel and Motorola introduced CPUs that ran twice as fast as the bus, known as *clock doublers*—the 80486DX2 is the best-known example. A little-known tidbit is that Motorola's 68040 CPUs do the same thing: a 33MHz 040 actually runs at 66MHz internally.

But doubling the CPU speed relative to the bus does not mean doubling the overall performance. A chip might be twice as fast, but if it can't communicate any faster, much of that extra horsepower sits idle. That's why adding a 256K cache card can boost performance 10 to 25 percent—it acts as a high-speed buffer between the CPU and the bus.

Until the PCI Power Macs came out, the fastest Mac bus was 40MHz (on the Power Mac 8100/80). Faster Power Macs had to use a slower bus: the 100MHz Power Mac 8100/100 had a 33.3MHz bus and a 100MHz CPU; the 8100/110 also had a clock-tripled CPU. When you triple the CPU speed relative to the bus, you get even more idle time, so you waste

Memory	Storage [C]	Features [D]	Case	Notes
16MB, 4 DIMM slots	1.2GB hard drive, 1 free bay	3 PCI slots	desktop	CPU cannot be replaced; 8MB version $1899.
8MB, 4 DIMM slots	1.2GB hard drive, 1 free bay	3 PCI slots, 100MHz Pentium	desktop	CPU cannot be replaced. [E]
16MB, 8 DIMM slots	1.2GB hard drive, 1 free bay	3 PCI slots, internal SCSI-2 Fast, AV [F]	desktop	
16MB, 8 DIMM slots	1.2GB hard drive, 1 free bay	3 PCI slots, internal SCSI-2 Fast, AV [F]	tower	
16MB, 8 DIMM slots	2GB hard drive, 1 free bay	3 PCI slots, internal SCSI-2 Fast	tower	
16MB, 12 DIMM slots	2GB hard drive, 2 free bays	6 PCI slots [G], internal SCSI-2 Fast	tower	
16MB, 12 DIMM slots	1GB hard drive, 7 free bays	6 PCI slots, internal SCSI-2 Fast	tower	Two more CPU cards may be added. [I]
16MB, 12 DIMM slots	1GB hard drive, 7 free bays	6 PCI slots, internal SCSI-2 Fast	tower	[J]
32MB, 12 DIMM slots	1GB hard drive, 7 free bays	6 PCI slots, internal SCSI-2 Fast	tower	[J]
8MB, 4 DIMM slots	850MB hard drive, 3 free bays	3 PCI slots, SVGA	desktop	Internal Zip drive available. [I]
8MB, 4 DIMM slots	850MB hard drive, 0 free bays	3 PCI slots, SVGA	low profile	[I]
16MB, 4 DIMM slots	1GB hard drive, 3 free bays	3 PCI slots, SVGA	desktop	Internal Zip drive available. [I]
16MB, 4 DIMM slots	1GB hard drive, 3 free bays	3 PCI slots, SVGA	desktop	Internal Zip drive available. [I]
16MB, 4 DIMM slots	2GB AV hard drive, 3 free bays	3 PCI slots, SVGA	tower	Internal Zip drive available. [I]
16MB, 4 DIMM slots	2GB AV hard drive, 3 free bays	3 PCI slots, SVGA	tower	Internal Zip drive available. [I]
16MB, 8 DIMM slots	2GB hard drive, 4 free bays	6 PCI slots [G], internal SCSI-2 Fast	tower	Has slot for second CPU card; optional 10BaseT/100BaseT and Ultra SCSI card. [I]

more of the CPU's theoretical speedup.

In a nutshell, all this means a clock-tripled system with a 33.3MHz bus and a 100MHz CPU will be slower than a clock-doubled system with a 50MHz bus and the same 100MHz CPU.

The PCI Power Macs introduced the first 50MHz bus, and all the PCI Macs with CPU cards—including the clone makers', since they use Apple's PCI Power Mac design—are designed to have a variable-speed bus, one that can self-adjust based on the CPU speed. Use a faster CPU card, and the bus speed goes up proportionally. (PCs have had this ability for a couple of years, although you usually have to set a jumper to change the bus speed; on the Mac, it's automatic.) So a Power Mac 7500/100 has a bus speed of 33.3MHz and a CPU speed of 100MHz; if you replace the CPU card with a 120MHz model, the bus jumps to 40MHz, and if you use a 150MHz card, the bus jumps to 50MHz.

But going faster means either raising the bus speed, or raising the clock multiplier from triple to quadruple—the latter option will erode the performance increase even more. Power Computing chose the former option in its PowerTower series. By contrast, Apple's new PCI Macs take the clock-quadrupling approach for CPUs faster than 150MHz.

The PowerTowers' buses can go as fast as 60MHz, which is how they support 180MHz by clock-tripling. You can expect 200MHz 604's to be available by September, and if production goes well, you may even see 200MHz PowerTowers in August, although it's not clear whether the company would clock-quadruple a 50MHz bus or try using a 3.5 multiplier on a 60MHz bus. (For more details on PowerPC progress, see "The PowerPC's New Heights," *News*, in this issue.)

Apple's Minor Refinements

As *Macworld* revealed in the May issue (see "New Notebooks, Desktops on Horizon," *News*), Apple has come out with a faster set of its existing PCI Power Macs.

Variable Increases The 9500 goes from 132MHz to 150MHz, while the 8500 goes from 120MHz to 132MHz and

Multiprocessing Hopefuls Umax Computer's SuperMac S900 (a prototype is shown at top) will give high performance plus the option to add a second CPU card. The company hopes that will attract more users than the four-CPU and forthcoming two-CPU Genesis MP systems from DayStar Digital (the four-CPU Genesis MP 528 is shown at right), which are aimed at image editors and other specialty users.

from 132MHz to 150MHz. Those are fairly minor speed increases.

The real jumps occur in the business and home-office lineup: the 7500—renamed the 7600—jumps from a 100MHz 601 to a 120MHz 604 (hence the model-number change). And the 75MHz and 90MHz 7200 models are replaced by a single 120MHz model, still using the PowerPC 601.

The 7600, despite the inclusion of AV features almost no one uses, continues to make the most sense because of its good balance of speed, upgradability, and cost. The 8500's advantage remains its higher speed and strong AV support for content creators—something no clone system even tries to offer. And the advantage of the 9500 is still its greater number of PCI slots and drive bays, something that Power Computing's forthcoming six-slot PowerTower and Umax's SuperMac S900 will offer for less money.

I don't recommend a 7200—at this price and performance level, a PowerCenter makes much more sense.

Questionable Upgrades Another reason to avoid the 7200 is that the CPU is soldered on the motherboard, which means you can't upgrade it later with a new CPU card. Although 7200 owners will have the option of buying a $1299 7600 motherboard upgrade, that's a rip-off. That price doesn't include the CPU card, so add another $599 (for a 120MHz 604) to $899 (for a 132MHz 604). To put these prices into perspective, I recently upgraded a 66MHz Pentium PC to 133MHz: the new Intel motherboard cost $249 and the 133MHz Pentium CPU cost $365—$614 total. An equivalent jump from a 90MHz 601-based 7200 to a 120MHz 604-based 7600 would cost $2000. I don't think so.

Apple says the other PCI Power Macs will support CPU cards as fast as 200MHz (running at four times their 50MHz maximum bus speed), although the company will have only a 120MHz card for $599 and a 132MHz card for $899 when it begins offering CPU cards in May. These prices are almost twice what Power Computing is charging for essentially the same thing.

Speaking of upgrades, Apple now says its long-promised 8500 motherboard upgrade for the Quadra 800, Quadra 840AV, and Power Mac 8100 will be available in May for $1799.

Pentium Macs Apple has delivered on a promise to bring Pentium power to its PC Compatible (formerly called DOS Compatible) cards and systems. Apple is the first company to offer a PC card for the PCI Macs and the first to add a Pentium to a Mac. Orange Micro (714/779-2772) is nearly a year late on its PCI-based Pentium cards, and Reply (408/942-4804, *http://www.reply.com*) won't ship its cards until August or September. (Apple's cards weren't available for testing.)

To have a Pentium on your PCI Mac today, you have two choices to make.

The first choice is the speed you want: a 100MHz Intel Pentium CPU, or a 100MHz Cyrix 5x86 CPU (which runs at about the speed of a 75MHz Pentium).

The second choice is whether to add a PC card to your PCI Mac or get a new system with PC compatibility.

The Pentium 100MHz card costs $1049 bought separately or $700 when bundled with a 7200/120. The 5x86 100MHz card is also available separately for $799. (Apple doesn't bundle the cards with other PCI Macs, but they will work with any company's PCI-based Macs.) Both cards come with 8MB of RAM and MS-DOS 6.22, but you will have to buy Windows 3.1 (about $75) or Windows 95 (about $90) separately.

Performance Leaders Power Computing's two PowerTower models (the 180MHz version is shown at right) have redefined high-end Macs, while the new PowerCenter desktop series offers inexpensive speed.

Multiprocessing Rising?

While Power Computing stakes out the high end of CPU speeds and Apple shores up the middle, DayStar is struggling to establish multiprocessing as a sustainable niche, and Umax Computer is putting the finishing touches on its first multiprocessor-ready Macs.

DayStar has had a wrenching two years as the bottom fell out of its bread-and-butter upgrade business because cheap Power Macs made both 040 and PowerPC upgrades an iffy proposition.

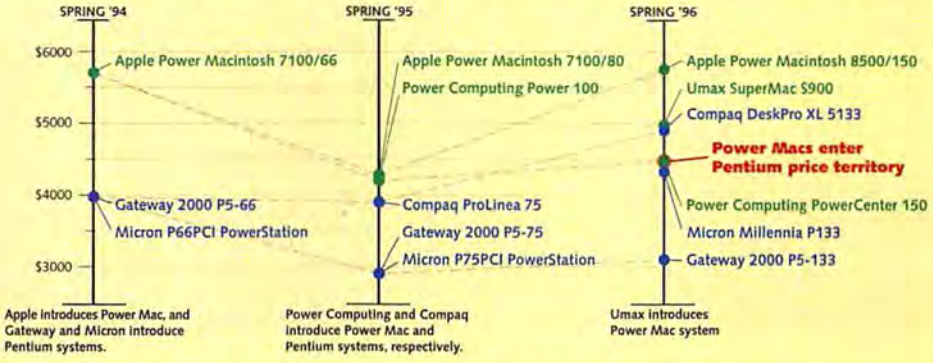
The company has tried to reorient its business to providing specialty systems for the people who bought its premium upgrade cards: mostly image editors, color publishers, and graphic artists. With Apple's blessing, DayStar created an addition to the Mac OS that allowed any multiprocessing program to use several CPUs simultaneously, and began selling its four-CPU Genesis MP systems this year.

Because the only popular program that supports multiprocessing is Photoshop, and because Genesis systems are expensive, the multiprocessing market has been slow to emerge. (Other multiprocessing programs include Strata StudioPro Blitz and Adobe After Effects.) Hoping to entice a broader customer base, DayStar is also introducing the Genesis 300, which has two CPUs, plus slots for two more (about $7000, versus about $12,000 for a four-CPU system).

There's no question that a Genesis MP flies through Photoshop tasks (see

Pentium PCs Cheaper Overall, but Power Macs Come into Range in '96

Macworld compared the prices of the Power Macs and Pentium PCs you'd choose for professional use—with equivalent performance and options. Thanks to Power Computing's aggressive pricing and Compaq's continued premium pricing, some Macs now cost less than some PCs.



We outfitted each system for professional use: with a 1GB hard drive (2GB for 1996), a 17-inch monitor, 2MB of VRAM on an accelerated video card, a 256K cache, 16MB of RAM, a 4x or 6x CD-ROM drive (2x for 1994), 10BaseT Ethernet, a keyboard, and a mouse. All components are from each system's maker when possible, and from a third party if the systems maker didn't offer the component.

"Photoshop at Warp Speed," June 1996), and people doing service bureau–level work will likely find the Genesis MP a worthwhile purchase, since their time is worth a lot of money.

Umax also has high hopes for multiprocessing, but unlike DayStar, it is not betting the farm on the technology. Umax's SuperMac S900 will have a slot for a second CPU card (which should cost about $1000, bringing the cost of a dual-CPU S900 to about $5000). But by making multiprocessing an option, Umax can sell its SuperMac systems to anyone who'd consider a PowerTower, Power Mac 8500, or Power Mac 9500—as well as a Genesis MP 300.

Umax thinks multiprocessing will take off in the next year, when Copland offers native support and as more software companies support DayStar's multiprocessing extension to System 7.5. The developers point to the similarly slow growth of multiprocessing PCs, which are now starting to be used as transaction servers for databases and E-mail.

Whether or not that happens, Umax has an enticing package in the wings for the single-CPU crowd: at $4000 and with strong performance, the 150MHz SuperMac S900 looks like tough competition for Power Computing's PowerCenter 150 and Apple's 8500/150 and 9500/150. Umax also promises to have faster-than-150MHz CPUs soon, saying it will deliver high-speed options aggressively.

The Last Word

It's clear that speed will increase frequently in the coming year. We were pleased to see that Apple is delivering on its promise of making the Mac OS more PowerPC-native and thus faster. On the chip side, expect 200MHz by this fall and 300MHz a year later. Expect the PowerPC 601 to fade away—of the new systems, only Apple's 7200/120 still uses it. Mac makers will use the 604 for business and specialty systems, and they'll use the upcoming 603's, which are faster than 601's, for notebooks and for education and home-office systems.

Also expect the clone makers to lead the charge in the performance race. Apple rarely adopts new technologies early, since it wants its offerings available to a broad base of customers. According to analysts, Apple sells about 4 million Macs a year, while Power Computing sells about 75,000. That means Power Computing can afford to buy items that are in relatively short supply—as the 166MHz and 180MHz PowerPC 604's will be for a few months—and still offer enough products to keep its customers happy. Umax seems to be taking a similarly aggressive approach.

Of course, Apple could do what IBM, Dell, and other PC makers have done: produce leading-edge systems using scarce components despite an inability to meet demand. These companies figured out how to excite their customers with hot new products while making it clear that availability was limited—remember the fervor over several generations of IBM's ThinkPads? That approach created excitement without producing a backlash.

Whatever Apple decides to do, the good news is that anywhere you turn, you can find a truly fast Mac today with the options you need. **m**

Executive editor GALEN GRUMAN evaluates systems technologies.

For easy access to the *Macworld* articles mentioned in this article, as well as other related stories, go to Macworld Online at *http://www.macworld.com*.

MAC SYSTEMS

MW EDITORS' CHOICE To pick the best Mac system, we evaluated performance, flexibility, and price, in that order of priority.

Power User's System

★★★★/7.3 **PowerTower 180** Go for the top speed. At this price don't delay. Hold off only if you need six PCI slots or more DIMM slots, or if you need AV technology—in which case consider the Umax SuperMac S900 and PowerTower with six PCI slots for greater expansion, or the Power Mac 8500 for AV. **Company:** Power Computing (512/388-6886, *http://www.powercc.com*). **Direct price:** $4995 (with 32MB of RAM, a 2GB hard drive, and an IMS Twin-Turbo-128M video card with 4MB of VRAM).

Business User's System

★★★★/7.3 **PowerCenter 150** Performance and price combine to make this the most sensible choice for businesses and for midrange publishing and graphics use. **Company:** Power Computing (512/388-6886, *http://www.powercc.com*). **Direct price:** $3188 (with 24MB of RAM, a 2GB hard drive, an internal Zip drive, and 2MB of VRAM).

B

the web goes interactive

New tools promise multimedia Web pages. How much sizzle do they really add?

BY MEL BECKMAN

THE RICH TYPOGRAPHIC AND IMAGE CAPABILITY of the World Wide Web vastly improves on traditional 12-point text, but like Pavlov's dogs at the sound of a bell, users and content creators alike are already hungering for even more online sizzle. Web multimedia promises to deliver that sizzle in the form of audio, video, music, speech, animation, and virtual reality.

These new media make Web pages a richer vehicle than ever, and products for creating and viewing multimedia Web content are just now appearing in the Mac marketplace. On-demand audio and video let you broadcast live events, such as a speech or entertainment, while they're in progress. Animations communicate dynamic concepts more clearly than do static images. On-the-fly scripting creates a powerful new Internet component—the intelligent Web page that can, for example, download a molecular model and let you manipulate it in three-dimensional space. And Web-borne virtual reality transports you into the cyberspace universe.

Sound great? Certainly—but multimedia developers and consumers won't find it easy to conquer these brave new worlds. The new multimedia data types must work across multiple browsing platforms, and their capaciousness strains the bandwidth of even the best-connected Web user. At the same time, the nature of some new data types—Java scripts, for example—raises some security concerns.

Just as the first Mac applications strained memory and speed limitations in Mac hardware, the first

JENNIFER JESSEE

crop of multimedia Webware struggles with limited bandwidth and users' high expectations. Many of the new media types take hundreds to thousands of kilobytes. No matter how glitzy a walking, talking Web presentation may be, fickle Internet users will pass it by if they don't get swift gratification. The only real cure is either a tenfold improvement in capacity, which in the case of the Web means bandwidth, or vast improvements in compression technology.

Until users graduate from modem browsers at 28.8 Kbps to digital circuit surfers at 256 Kbps (twice today's ISDN rate), the value of multimedia on the Web is dubious. Should your organization spend a fortune on multimedia production gear and start building the Acme Animated Stereo-CD–Quality Amphitheater and Shooting Gallery site today? To address that question, we test-drove ten Web-capable multimedia products over a reasonably fast 128-Kbps ISDN Internet connection, which is a lot more bandwidth than most netizens have in easy reach. Our preview of coming attractions for multimedia Web tools starts with sound and movies and moves on to scripted applications and virtual reality.

If you're going to embark on multimedia development, you might not want to mortgage the house just yet. Sizzle sounds great, but the Web still has too little bandwidth for multimedia products to show their stuff. However, given the speed with which the Web has taken off, we've stopped making blanket predictions about implementation. The products

the nuts and bolts of multimedia

FROM A SIMPLE GIF IMAGE to a multilayered virtual reality universe, every Web-delivered media type uses a common identification system to let servers serve, and browsers browse, Web content the way its author intended. That identification system, called MIME (Multipurpose Internet Mail Extensions), specifies both a type and a subtype for every kind of media content.

For example, a GIF graphic has the MIME type "image" and the subtype "gif"; QuickTime movies are of type "video" and a subtype "quicktime" (see the table "Multipurpose Extensions: Audio, Video, and Virtual Reality"). When a server delivers a media object to a browser, it sends the MIME type first so the browser can decide what to do with the subsequent data stream.

And the browser can do almost anything it wants. For common MIME types, such as GIF and JPEG graphics, the browser likely will integrate the object into the Web-page display. MIME types unknown to the browser can be handled by either a browser plug-in or an external, or helper, application. To make use of a particular media type, you must have a browser, browser plug-in, or helper app that handles that type.

Helper applications and plug-ins differ in significant ways. You can't always just download a particular helper application and expect your browser to launch it automatically when necessary. Short of searching your whole hard disk, the browser has no way of knowing what helper applications you have. To make the connection between MIME type and helper app, you must manually configure the MIME type, subtype, and target application in your browser's preference dialog box.

Plug-ins are a different matter. They're stored in a particular place—usually inside a folder along with the browser application—and include a table of the MIME types they handle. At launch, the browser notes the available plug-ins and their MIME types; when it encounters a known MIME type, it loads the appropriate plug-in and passes the data stream to it. Loading a plug-in is also much faster than launching a helper application. These two advantages make plug-ins generally more desirable than helper applications, but some sophisticated applications won't fit in the confines of the browser window, so there will always be helper apps.

Multipurpose Extensions: Audio, Video, and Virtual Reality

Application or Plug-in	Description	MIME Type (type/subtype)	File-Name Extensions
Crescendo	MIDI song file	audio/x-midi	mid
PreVu	MPEG movie	video/x-mpeg	mpe, mpeg, mpg, mpv
RealAudio Player	RealAudio audio stream	audio/x-pn-realaudio	ra, ram
StreamWorks	StreamWorks audio stream	application/x-xdma	xdm
Talker	speech text file	text/x-speech	spc, talk
ViewMovie	AIFF sound file	audio/x-aiff	aif, aiff
ViewMovie	QuickTime movie	video/quicktime	mov
Voyager	VRML world description	x-world/x-vrml	wrl

Every Web-delivered media type has a MIME (Multipurpose Internet Mail Extensions) type and subtype to let browsers route data to an appropriate helper application or plug-in. This table lists MIME information for the applications or plug-ins reviewed here that handle each multimedia data type, a description of the data type, the most common types, and their file-name extensions.

we've looked at here are good starting points for experimentation and experience. They'll help you determine the reactions of both your customers and your Web site when you roll out multimedia.

We should also add that while we looked at many of these products in their beta versions—and thus did not rate them—almost all of them will be shipping by the time you read this.

Preliminary Hearing

The easiest multimedia Web category to deliver is sound, which uses so-called streaming object delivery, in which the browser plays audio data to the user as it's received. Because data-type information, called MIME (Multipurpose Internet Mail Extensions), comes at the start of an object's data stream, a browser can process the object as it arrives, instead of waiting for the whole thing to be downloaded to disk (see the sidebar, "The Nuts and Bolts of Multimedia"). Unfortunately, the packet-oriented Internet rarely delivers data in a continuous, error-free flow, so stream-handling plug-ins and helpers must buffer a certain amount of the stream to accommodate delayed or lost packets. This puts an unavoidable pause at the beginning of every streaming audio program. In addition, the user must have at least enough bandwidth to continue receiving new data at the same rate as the browser processes it; any bandwidth shortage quickly manifests itself as fits and starts in the audio presentation.

The first streaming audio system on the Web was Progressive Networks' RealAudio. We tested version 2.0, which has come a long way from the original release—that sounded like a dog talking through a tin can. RealAudio now supports both 14.4-Kbps and 28.8-Kbps rates. The sound at 14.4 Kbps is acceptable for speech but too grating for music. Even at 28.8 Kbps, music through RealAudio sounds like a cheap AM radio (Progressive Networks promises a future version for ISDN connections that will deliver better-quality sound).

RealAudio requires server software for your Web site (a version exists for Quarterdeck/StarNine's WebStar Mac Web server), but the player software, available as both a browser helper application and a plug-in, is downloadable free from Progressive's Web site. The player delivers either live or archived audio files of any length. For archived files, the player has fast-forward, rewind, and pause controls to let you play any part of the file you want.

Xing Technology's StreamWorks is the high-end counterpart to RealAudio. It also requires server software, but no Mac version of the server software is available. StreamWorks accommodates high-speed digital Internet connections, supporting 32kHz mono audio at 56 Kbps and 44.1kHz CD-quality stereo at 128 Kbps. In our tests, StreamWorks sounded very good at either setting, although occasional dropouts due to Internet traffic surges marred the results. StreamWorks can also serve up real-time video, but unless you can find a use for a postage stamp–size herky-jerky movie delivered over a 128-Kbps Internet connection, you'll find this feature more a curiosity than a capability.

It's tempting to think of streaming audio and video as "broadcasting"—after all, anyone in the world can tune in, right? Not right. The problem is that a given streaming server can send to only a small number of simultaneous users. For example, a server on a T1 (1544-Kbps) Internet hookup can serve about 50 streams at 28.8 Kbps, so don't expect to convert your corporate infomercial to Web format and hit an appreciable number of users. Still, there is some value in delivering information over audio, and you can present short sound bites to several hundred simultaneous users without saturating a T1 line.

Radio Waves Progressive Networks' RealAudio lets you use the Internet to tune in to Copland—the composer, not the operating system.

Where No Plug-in Has Gone Before InterVu's PreVu lets you embed MPEG movies into Web pages—which might be a tough sell for QuickTime-centric Macintosh users.

If you only want musical accompaniment for your Web pages, then Live Update's Crescendo, a MIDI (Musical Instrument Digital Interface) player plug-in using QuickTime's built-in MIDI synthesizer, may be just the ticket. Crescendo downloads a MIDI sound file and plays it as a continuous sound loop in the background while a user peruses your Web page. Because MIDI is a very compact representation of a song—literally the notes themselves, like a player piano's punched song scroll—the download time is negligible and the operation is transparent to the user. Sound simply happens. Unfortunately, there doesn't seem to be a way to make it *stop* happening, other than jumping to a different, non-Crescendo page.

A product in the same vein as Crescendo is MVP Solutions' Talker, which speaks—and even sings—in

Roll 'Em Shareware product ViewMovie lets you configure downloading one of two ways—the movie plays either automatically or when the user clicks on the first frame.

Director's Cut On Macromedia's home page, click on the Interactive Gallery for demos of Shockwave's animation techniques.

a synthesized voice. Talker uses Apple's own built-in Speech Manager (from System 7.5), so you can control the voice and inflection to suit your application. We tried out version 2.0, which lets you change voices and turn speech on and off using embedded HTML commands. Because Talker synthesizes its voice from downloaded text, it requires no more transfer time (or bandwidth) than ordinary text. The speech itself can go on long after the text has been downloaded. And on. And on. As with Crescendo, there seems to be no way to cancel sound output without navigating to another Web page.

Pictures That Move

As with audio, streaming isn't the only way to deliver video. You can also download entire movies—either MPEG or QuickTime—and have a video-savvy plug-in play them directly on the Web page. We tested prerelease versions of both an MPEG plug-in called PreVu from InterVu and a QuickTime-capable plug-in called ViewMovie from shareware developer Iván Cavero Belaúnde, and found they both worked well. You can configure downloading and playing to be automatic, or just display the first frame of a video file, downloading the file only if the user clicks on the first-frame view. PreVu also supports streaming play, although it's barely usable at 128 Kbps.

Although MPEG may be a foreign format for QuickTime-oriented Macintosh users, you can convert movies from QuickTime to MPEG easily using video-conversion utilities such as Maynard Hundley's shareware Mac application Sparkle. The use of QuickTime may limit your audience, as Web surfers on PCs use MPEG much more widely, even more than QuickTime's Windows version. Because MPEG can store video in 30 percent fewer megabytes than QuickTime (for the same size on screen), it's also more attractive for Web-based videos.

However, the real usability barrier is the time required to download movies. The smallest movies run 100K and up; movies of 1MB and larger are common. The average Web user will find the delay off-putting, so creators should keep videos short.

As snazzy as video is, it may not be the medium for your message when it comes to the Web. For years, Macromedia's Director has been the standard tool for producing animated presentations. Director records the paths that objects take, along with transformations in the objects' appearance, rather than recording a frame-by-frame rendering. Because it stores only one copy of each object's image, and because path and transform commands are compact, the resulting files are many times smaller than an equivalent frame-by-frame video.

For the Web, Macromedia developed Shockwave, a Netscape plug-in that downloads and plays Director animations inside the Netscape browser window and can accommodate background audio. This makes Shockwave convenient for animating logos and banners. We tested a prerelease version of the Mac plug-in and found it performs well with short individual animations, but a single large animation—or several small ones—will set you yawning.

Although Director files are smaller than video, and thus easier to upload and download, the files can still run to several hundred kilobytes. Thus, as with video-on-demand, you should keep Shockwave presentations short and sweet. (Competing plug-ins

How Multimedia Sends the Message

Company	Product	Star Rating[A]
Iván Cavero Belaúnde	ViewMovie 1.0	beta, not rated
InterVu	PreVu 1.0	beta, not rated
Live Update	Crescendo 1.0b1	beta, not rated
Macromedia	Shockwave 1.0	beta, not rated
MVP Solutions	Talker 2.0	★★★★/7.2
Natural Intelligence	Roaster 1.0	★★★★/7.0
Netscape Communications	Netscape Navigator 2.0	beta, not rated
Progressive Networks	RealAudio 2.0	beta, not rated
Virtus	Voyager 1.0	★★★★/7.3
Xing Technology	StreamWorks 1.0	★★★★/7.3

[A] Based on features, implementation, innovation, performance, reliability.

such as DeltaGraph's WebAnimator and FutureWave's SmartSketch were unavailable for testing.)

Following the Script

Multimedia on the Web isn't limited to these embedded media types. Completely apart from adding audio and video is the ability to execute programs within a browser. Called Web-delivered scripting, this lets you endow your Web page with native intelligence, both for manipulating downloaded data and for interacting with the user.

Sun Microsystems' Java language is the most famous example of such scripting intelligence. Like C++, Java is a platform-independent programming language. You write Java scripts to carry out operations—display images, run animations—and then you compile the scripts using Sun's Java compiler. The resulting compressed intermediate code—called an applet—gets stored on your Web server just like any other media type. A Java-capable browser can pull down the applet and execute it directly within the browser. The same compiled script works on any Java-enabled platform—Mac, PC, or Unix.

We tested Java on the Mac using the developer release of Roaster, a Mac Java development environment from Natural Intelligence, and the beta version of a Java-enabled Web browser from Netscape Communications. Java itself is designed for experienced programmers. It's much more sophisticated than AppleScript or HyperTalk, so don't consider Java development unless you're committed to becoming an expert. (Symantec's Caffeine, a competing Java environment, was unavailable for testing.)

Because Java is an open standard, any vendor can produce both development and run-time products for it. Roaster has at its core the Sun Java Developer's Kit for Macintosh, which includes Sun's official compiler, javac (pronounced *java-see*), and a slew of example applets with source code. But Natural Intelligence also produces its own native PowerPC-accelerated Java compiler, which is much faster than javac, although not completely compatible with Sun's Java standard in the version of Roaster we ran.

Because a Java applet is a program, it can draw graphs, compute fractals, even play a game with the user. It can also do less savory things, such as tamper with the end user's system. Running a Java-enabled browser on the Internet is akin to downloading random programs without checking for viruses first.

Although browser vendors such as Netscape take pains to erect software barriers restricting the things a Java applet can do (for example, an applet isn't allowed to write to your hard disk), those barriers are subject to human error, just as any software is. Earlier this year, a group of Princeton computer scientists discovered several bugs in Netscape 2.0 that let an applet usurp control from a Mac and mount a TCP/IP attack against other machines on the same network. Because such an attack is coming from a machine on the user's own LAN, it effectively circumvents any Internet firewalls you might have in place. If you're running a completely private network with no Internet access, and can be reasonably certain that your Java applets contain no malicious intent, then Java may be a useful client/server application development tool. While Java's known security flaws have been fixed, the potential for problems still lurks. Keep your browser on decaf by disabling Java execution in your browser's preferences.

Is It Real?

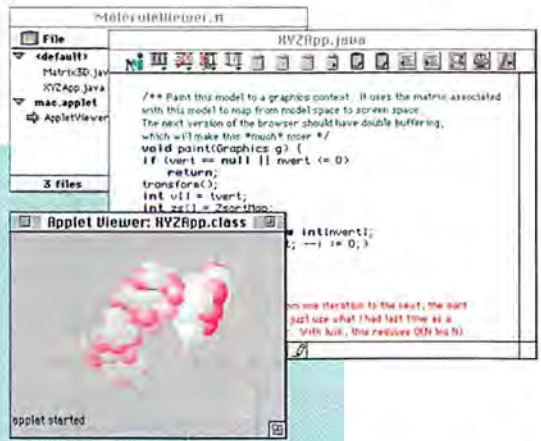
The ultimate in multimedia adventuring is enabling virtual participation in cyberspace. Virtual reality, or VR, lets you construct imaginary 3-D worlds and then navigate them as though you were physically present. On the Web, VR is a compact data type that can be delivered more quickly than video or even animation—only the model of a 3-D world need be

List Price	Contact Information	Multimedia Category	Availability	Comments
free (shareware)	*http://www.well.com/user/ivanski/viewmovie/viewmovie_info.html*	QuickTime movies	now	Downloading can be automatic or customized; use of QuickTime may limit audience.
free	619/633-1008	MPEG movies	now	Supports streaming play, though barely usable at 128 Kbps.
$9.95	508/657-5400	MIDI files	now	Fast download, but you can't stop the music, and program requires QuickTime MIDI extension.
free	415/252-2000	animation	now	Works well with short animations from Director 4.0, but not large files.
free (shareware)	*http://www.mvpsolutions.com/PlugInSite/Talker.html*	synthetic speech	now	Uses Apple's Speech Manager, and uses no more bandwidth than text does; won't shut up until you go to another page.
$299	617/876-7680	Java applets	now	Fast Java compiler, but some compatibility problems with Sun's Java standard.
$49	415/528-3777	Java applets	now	Comes with sample applets and Sun's own compiler; security problems a concern.
player free, server $1500	206/447-0567	audio	summer	Supports both 14.4 and 28.8 Kbps; plays AM-radio–quality audio; requires Open Transport 1.1.
free	919/467-9700	virtual reality	now	Uses bandwidth-friendly VRML, but navigation tools are nonintuitive.
player free, server $3500–$50,000	805/473-0145	audio	now	Plays CD-quality audio; no Macintosh server available.

ease of use, and value. (See Star Ratings section for full explanation.)

downloaded; a browser-side helper or plug-in performs all the navigation on the user's own machine.

Virtus's Voyager is just such a helper application. You create virtual worlds in Virtual Reality Modeling Language (VRML) using Virtus Walkthrough Pro or some other VRML-capable modeling tool. You then upload the VRML models to your Web server, just as with any other media type. Simple VRML models take only a few dozen kilobytes of storage, and even complex models seldom exceed 100K. VRML is much more bandwidth-friendly than video or animation data types.



Secret Code It's important to remember that Java scripts, such as this one created with Natural Intelligence's Roaster development environment, require a programmer's expertise.

Walk On In, Sit Right Down Virtus's Voyager software uses VRML (Virtual Reality Modeling Language) to create three-dimensional virtual reality settings on the Web that require much less bandwidth than video clips.

Once you've configured your browser to recognize the VRML MIME type, Voyager automatically launches to display the downloaded virtual world in a navigation window. You can then move around at will. Objects within it can have associated Web links; clicking on a linked object executes the link just as clicking on hypertext in a Web browser does. This lets you integrate VRML into a Web site to provide a more intuitive view of the site's organization than is possible with two-dimensional viewing.

Unfortunately, Voyager's navigation isn't all that intuitive. You move through the world by pressing the mouse button and sliding a visible cursor away from center-screen, and this can confuse novice users. Changing your orientation in other ways—such as in altitude or rotation—requires holding down a modifier key. Voyager would be much more useful if it provided a "drive-around" mode simulating a vehicle or a person walking. A more intuitive interface would make Voyager a powerful Web-site navigation tool indeed.

The Last Word

By now you're probably asking yourself if these products are ready for the Web. A better question: Is the Web ready for these products? Although current Web multimedia products are ingenious in their use of compression to maximize available bandwidth, it's impossible to escape the feeling that they are seriously restrained by available network speed. The products with the lowest bandwidth needs—those that employ MIDI and VRML—are also the most esoteric. Applications for these media types aren't as plentiful as for sound, video, and animation, and implementing them requires sophisticated preparatory work. Low-bandwidth media suffer from a dearth of applications, while high-bandwidth media suffer from a dearth of network capacity. The most useful media types—audio, video, and animation—need very fat Internet pipes to be truly effective.

Those fat pipes are coming, but slowly. Even though it's capable of speeds five times greater than the fastest modems, ISDN still provides only about half the necessary performance jump. The next bandwidth jump on the horizon will use technologies such as Asymmetrical Digital Subscriber Loop (ADSL), video cable modems, and spread-spectrum radio. In addition to faster end-user connections, the Internet backbone itself needs to grow to accommodate the surge in multimedia traffic. Currently the backbone operates at 45 Mbps. The latest expansion, under way, raises that to 155 Mbps, which probably still isn't enough to realize the full potential of multimedia.

None of this bandwidth expansion will be completed this year, or even next year. So play your multimedia cards carefully by making the most of bandwidth-friendly media types. You can safely start developing for low-bandwidth media—speech, music, sound, and limited animations—today. But the Acme Animated Stereo-CD-Quality Amphitheater and Shooting Gallery will have to wait. **m**

Contributing editor and network engineer MEL BECKMAN (*mel@becknet.com*) helps companies develop Internet connection strategies.

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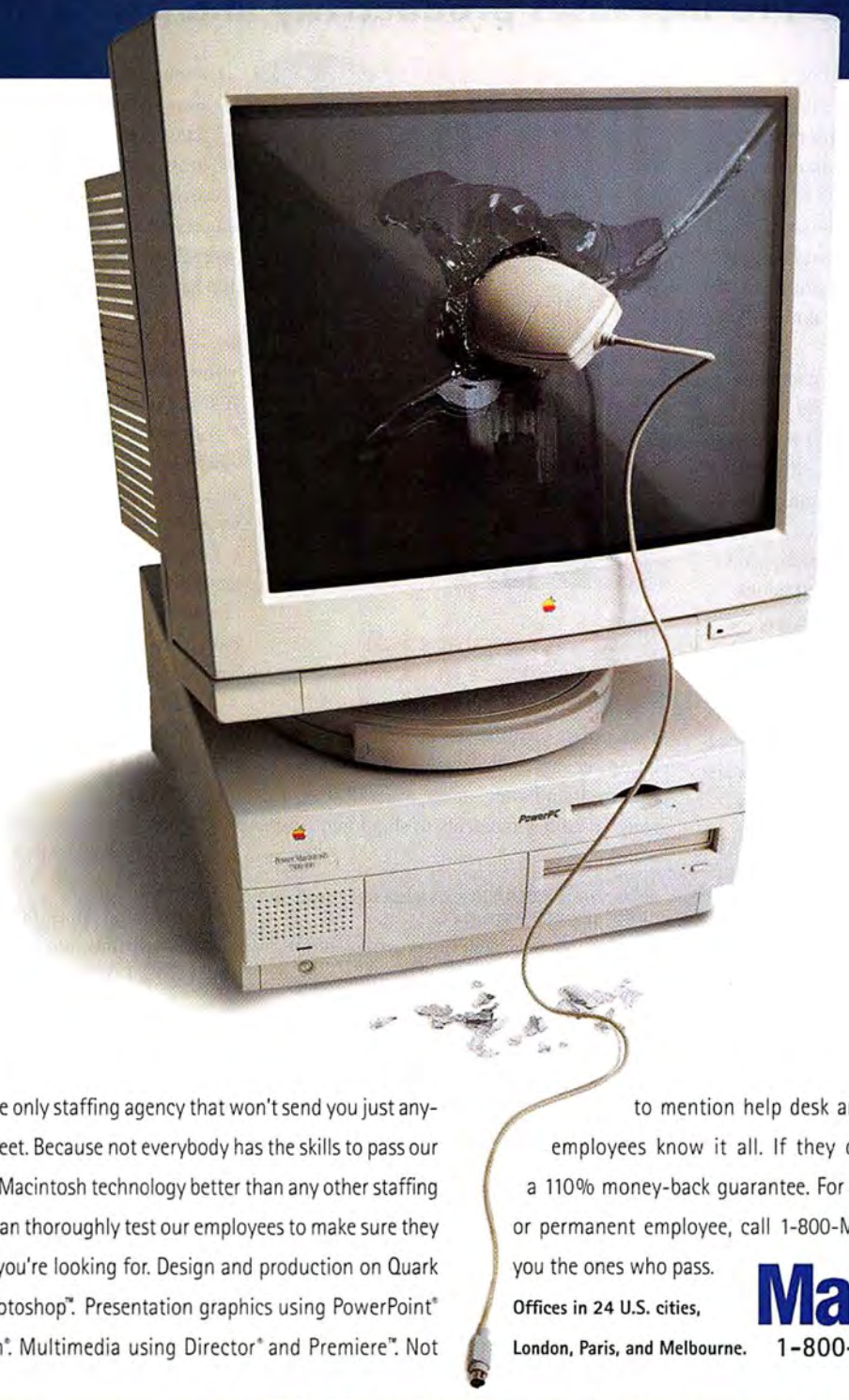

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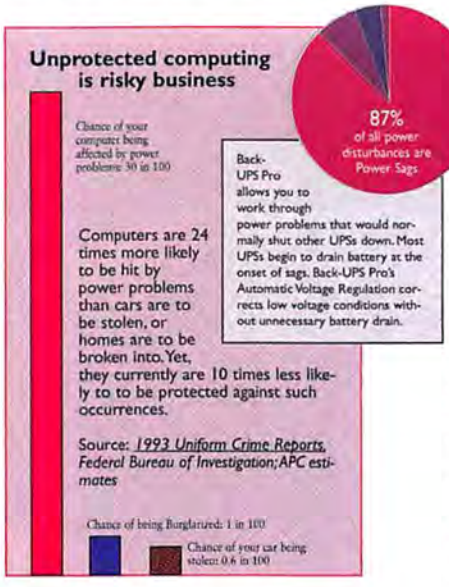

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CLOCKWISE: "After 13 plus years in the computer industry (with both Apple and Digital), I have changed directions and now live in the Santa Cruz mountains, where the power is as bad as the view is beautiful," says Harald Striepe. "Now I spend most of my time consulting and writing fiction. The power is the worst during rainy season and brownouts are a daily occurrence. But, not a problem for me since I got my Back-UPS Pro with AVR - now, I work through the rainstorms."

"I am the Product Development manager for Radio Flyer," says Antonio Pasin. "But quite often, I work at home, where I pay for all the equipment....my TV has been zapped in the past (it turned GREEN!). Here, I don't have an extra $1200 to replace the DAT tape backup...an investment in APC is more cost effective for me. But besides just protecting the hardware, I look it it as protecting my media...I have lots of time invested in my data, and Back-UPS Pro protects that as well. Not to mention the unit is well-designed, easy to use, and APC provides great customer service to boot."

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NEWTON 2.0 AND THREE CONTENDERS

TRY TO RENEW THE PDA PROMISE

The PDA

BY CARY LU

It was almost three years ago that Apple's first Newton MessagePad arrived to initial enthusiasm, followed quickly by a chorus of Bronx cheers and disappointing sales. Despite the Newton's rocky reception, Apple has hewn to its original vision of the personal digital assistant, or PDA, as an inconspicuous, easily portable, all-around helper. Early this year Apple finally delivered version 2.0 of the Newton Operating System, which substantially improved the paperback-size organizer–and–scratch pad's performance and handwriting recognition.

Meanwhile, other consumer-electronics vendors have been trying hard to overcome consumers' failure to flock to PDAs as they have to portable phones. Among PDAs robust enough to challenge the Newton MessagePad, several are clearly designed to appeal to desktop computer users and provide Macintosh connectivity: early this year Sharp released the Zaurus ZR-5800FX and Sony released the Magic Cap–based Magic Link PIC-2000 (Personal Intelligent Communicator), and Psion is pushing ahead with new releases of its Psion Series 3a. (And see *News*, this issue, for yet another new PDA, Palm's Pilot.)

But the initial questions still remain. Can a PDA replace a laptop computer? Is a PDA *better* than a laptop for some users? Can you build your work around a PDA?

On-the-go computing options, from left to right, include the Sony Magic Link PIC-2000, the Apple MessagePad 130, the Psion Series 3a, and the Sharp Zaurus ZR-5000.

Comeback ?

Does the new crop of PDAs have what it takes to satisfy the average walkabout manager or traveling professional?

To find out, I lived with the Magic Link, Newton MessagePad, Psion, and Zaurus day in and day out for several months. My conclusion? PDAs have gotten better in three years, but they are still tools for specialized uses. They provide some compelling features, but they still fall short in many areas. The bottom line is that a PDA purchased for no particular purpose will probably end up as a high-tech paperweight. On the other hand, if you apply a PDA to a specific need, you may well be delighted with the results.

The Four PDAs

• The Sony Magic Link, with the Magic Cap 1.5 operating system, is stylus driven but requires third-party software for handwriting recognition. The Magic Link emphasizes communications: it's the only one of the four PDAs with a modem built in, and it has many messaging features. The Magic Cap interface is based on manipulating on-screen representations of a desk, a hallway, rooms, and a street. This is very easy to learn but clumsy to use, and quickly becomes tedious.

• The Apple MessagePad, with Newton OS version 2.0, looks and behaves like a notebook—its interface presents pages you write on and forms you fill out with a stylus. The MessagePad works like no other computing device, so it is the hardest PDA to learn, but once you get the hang of it, it's easy and usually efficient to use, and offers handwriting recognition. (The Apple MessagePad 130, which adds backlighting, will be reviewed next month.)

• The Psion 3a works like a tiny text-based computer; the built-in software runs just like a DOS "Works" program (it is not based on DOS). You do everything on the Psion through the keyboard—it does not support stylus entry, so you cannot draw or write anything.

PAUL FRANZ-MOORE

• The Sharp Zaurus faintly resembles a Mac. It has both keyboard and stylus input, uses icons, and has a menu bar with pull-down menus. It does not recognize handwriting, but does store sketches and notes jotted on the screen.

Putting Information In

A key requirement of a handheld, take-it-everywhere device is ease of entering information you gather in the field—whether that's a few notes from coffee talk with a colleague or critical medical information at the scene of an accident.

Handwriting Recognition Easily the most famous PDA feature, handwriting recognition is actually not widespread; of this group, only the Newton MessagePad has it built in. How well handwriting recognition works depends on your handwriting; unlike almost anything else computers do, handwriting recognition performs differently for different users.

Newton OS 2.0's handwriting recognition is a big improvement over that of previous versions. Though it's still far from perfect, its errors now resemble typos more than random, incorrect words. The Newton MessagePad is pretty kind to my handwriting when I write carefully; it can't cope with my fast scrawl, but then I can't always read my fast scrawl either. I found that writing slowly and deliberately inhibits taking notes. For faster note taking, you can turn off the Newton's handwriting recognition and save your scribbles as a graphic, but then you may as well take notes on paper.

The Newton can also defer recognition until you have time for it, but you may write less precisely if you are not paced by the recognition system; I found deferred recognition's error rate too high for my handwriting.

Sony's Magic Link can perform handwriting recognition with Lexicus's QuickPrint installed ($79; 415/462-6800, *http://www.mot.com/MIMS/lexicus/*). To use QuickPrint, you first spend about 15 minutes training it by writing a specific set of letters and numbers. You enter text in boxes, one letter or number at a time. QuickPrint can also display a keyboard and a numeric keypad on which you tap out symbols and numbers.

By contrast, Newton OS 2.0 does not require any training. If it doesn't get your handwriting at first, write more carefully. You can write anywhere on the screen and mix upper- and lowercase, numbers, and symbols. This feels more natural than QuickPrint but is prone to errors that QuickPrint doesn't make.

Palm Computing's Graffiti (for the Newton, $79; 415/949-9560, *http://www.usr.com/palm/*) and Nimble Software's Scribe (for the Magic Link, $74.95; 206/340-4400) require using simplified characters that resemble shorthand. You

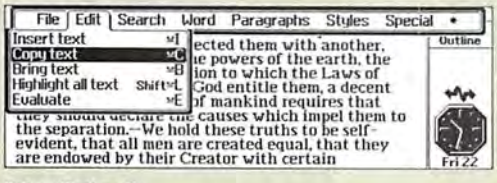
A Compact Rundown on Pocket

Company	PDA	Star Rating [A]
Apple	Apple MessagePad 120 [C]	★★★/6.3
Computer	Apple MessagePad 130 [B C]	not tested
Psion	Psion Series 3a	★★/4.2
Sharp	Zaurus ZR-5000	★★/4.8
	Zaurus ZR-5800FX [F]	not tested
Sony	Magic Link PIC-1000 [H]	not tested
	Magic Link PIC-2000 [B I]	★★/4.2

[A] *Based on features, implementation, innovation, performance, 2.0.* [B] *Can switch easily between portrait and landscape modes.*

Can You Really Work on a PDA ?

To get your work done while roaming the office hallways or sitting on a jet, you must be able to write: word processing is the computer user's essential productivity tool. All four PDAs we examined provide word processing in some measure, but their implementations are very different, and some are much easier to use than others.



Psion Series 3a

Psion Word closely resembles a DOS word processor, with drop-down menus operated entirely through keyboard commands. Though Psion's word processor has the richest set of standard text-editing features of the four PDAs, the tiny keyboard will deter you from doing much writing.

Newton MessagePad 120

Working with a Newton is somewhat like writing on paper—except that your pen can edit, move, and delete text instead of just crossing it out. If you can't wait while your writing is processed, you can save it as a bitmap and run the recognition later. As with pen and paper, you can intersperse doodles and drawings with text.

Sony Magic Link PIC-2000

Magic Link Notebook provides a three-row on-screen keyboard; you enter text by tapping on letters with a stylus. To enter numbers, you must change to number mode (the switch is next to the caps-mode button at lower left); to edit text, you must bring up the tool palette. Clearly, this is a cumbersome way to write.

List Price/ Company's Estimated Price [B]	Phone	Size (thickness × width × length, in inches)	Weight (in ounces)	Screen size (width × height, in inches)	Screen size (in lines × characters)	RAM	Batteries
$699/$699	408/996-1010	1.2 × 4 × 8	20	3 × 3.9 [D]	10 × 24	2MB	four AA; NiCd [E]
$799/$799	408/996-1010	1.2 × 4 × 8	20	3 × 3.9 [D]	10 × 24	2.5MB	four AA; NiCd [E]
$595/$499 [G]	508/371-0310	0.9 × 6.4 × 3.4	9	5 × 1.75	11 × 42	1MB	two AA
$499/$399	201/529-8200	1 × 6.7 × 4	14	4 × 2.6	13 × 47	1MB	two AA
$799/$729	201/529-8200	1 × 6.7 × 4	14	4 × 2.6	13 × 47	2MB	two AA
$499/$399	408/432-1600	1.5 × 7.6 × 5.5	24	4.5 × 3	14 × 46	1MB	Lilon
$899/$799	408/432-1600	1.5 × 7.6 × 5.5	24	4.5 × 3	14 × 46	2MB	Lilon

reliability, ease of use, and value. (See Star Ratings section for full explanation.) [B] *Actual prices could be higher or lower than the estimated street price provided by the company.* [C] *OS is Newton OS* [E] *$105 for NiCd.* [D] *Backlit screen.* [G] *$695/$599 with 2MB of RAM.* [H] *OS is Magic Cap 1.0.* [I] *OS is Magic Cap 1.5.*

write in a box and switch modes for upper- and lowercase and numbers. Graffiti and Scribe are accurate and easy to learn, but using them demands that you fight lifelong habits (see "Handwriting Recognition Makes the Newton Unique").

Overall, Newton OS's handwriting recognition is the best—if it understands your handwriting. After using the other handwriting-recognition systems, I returned with pleasure to pencil and paper.

Keyboards Hard and Soft The Newton MessagePad and Magic Link come with on-screen keyboards rather than a hardware keyboard. Handwriting recognition isn't built into the Magic Link, so its on-screen keyboard is the standard way to enter text. Since the keyboard is about half the size of a standard desktop keyboard and shows only three rows of characters, attempting to type with your fingers on the Magic Link screen may convince you to spring for Sony's optional keyboard ($99.95), which is almost full size and weighs less than 13 ounces.

The Newton's on-screen keyboard is much too tiny to type on with your fingers, but its layout contains no surprises once you get the hang of typing with a stylus. Apple also sells a real keyboard ($85) that weighs less than 10 ounces.

Hauling around an external keyboard makes either of these two PDAs nearly as bulky as a PowerBook Duo. But a Newton MessagePad or a Magic Link may provide the mobility you need, and you can plug in the keyboard when you need to write long E-mails or other documents.

The Psion and Zaurus come with small fold-down keyboards. The Psion keyboard, about the same size as the Newton's on-screen keyboard, is pretty hard to type on; the Zaurus keyboard is larger and somewhat easier to use. Their layouts are also nonstandard—the Psion keyboard resembles those of British manual typewriters made 50 years ago, with the question mark on shift-8 and adjacent colon and semicolon keys. The Zaurus keyboard layout is a little better, though it has a tiny backspace key and some wayward punctuation keys.

If you don't have a table or desk to work on, your lap is not much of a substitute. The Psion is particularly hard to use on your lap—it opens to an L-shape, causing it to bounce around and tip backward on your lap. The Zaurus is slightly better because it can lie flat. The external Magic Link and Newton keyboards aside, entering text on any of these PDAs is a challenge.

Sharp Zaurus ZR-5800FX
The Zaurus word processor looks and feels the most like a Macintosh program, with stylus-operated pull-down menus and an icon bar. As with the Psion, you name and save files. The Newton, by contrast, uses the first few words to identify a file, and the Magic Link stores them with a thumbnail—naming that file is optional.

Getting Information Out

As mobile communication tools, PDAs have great potential. You can attach a modem to a PDA, but wirelessness is their real promise—a way to be in two places at once by keeping in touch with everyone at the office while you work in the field. Unfortunately, the wireless infrastructure is still fractured, confusing, and expensive.

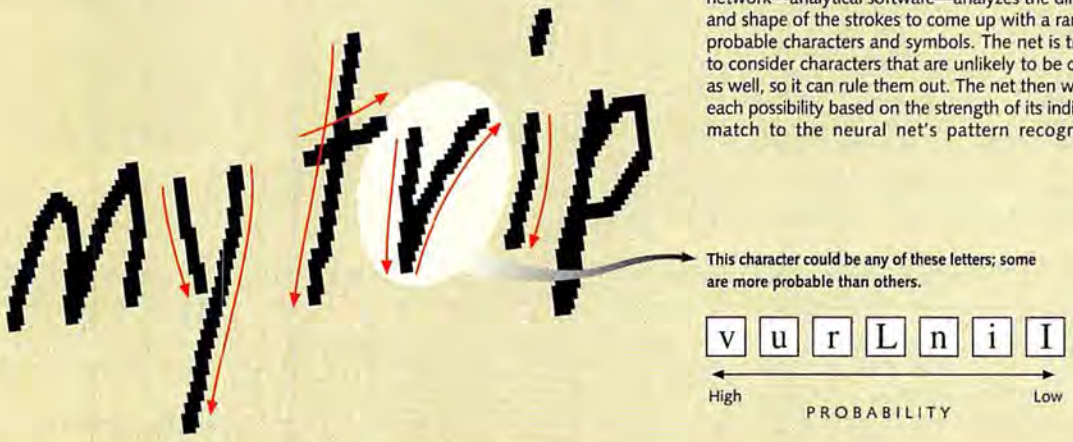
Modems Only the Magic Link has a modem built in (14.4 Kbps; it also has a PC Card slot for faster or specialized modems). The Newton and Zaurus take either an external modem or a PC Card modem; the Psion takes an external modem. The Magic Link and Newton provide software for accessing the Internet and the E-mail functions of major online services. The Zaurus and Psion have old-fashioned character-based terminal programs for driving a modem. For surfing the Web, Active Paper plans PrestoLinks for the Magic Link (price not set at press time; 512/708-1255, *http://www.aplx.com/*); and AllPen Software plans to offer NetHopper for the Newton ($49.95; 408/399-8800, *http://www.allpen.com/*).

Faxes All four PDAs can send faxes, but the Psion's lack of graphics support makes it much less useful for faxing. Only the Newton can receive faxes without extra software.

Cellular Modems Modem connection via an analog cellular phone call is available nearly everywhere. A PC Card modem designed for cellular communications will work in all the PDAs except the Psion; check for compatibility with your PDA and cellular phone before buying.

Handwriting Recognition Makes the Newton Unique

Version 2 Makes It Work



When you write a word, the Newton's neural network—analytical software—analyzes the direction and shape of the strokes to come up with a range of probable characters and symbols. The net is trained to consider characters that are unlikely to be correct as well, so it can rule them out. The net then weights each possibility based on the strength of its individual match to the neural net's pattern recognition.

Cellular Digital A Cellular Digital Packet Data (CDPD) modem notifies you of messages immediately without your dialing in. However, CDPD is off to a very slow start and isn't available in all areas. Digital Ocean offers CDPD for the Newton (pricing depends on usage; 913/888-3380, *http://www.digitalocean.com/*).

Packet Radio Like CDPD, packet radio informs you immediately when a message arrives. Because you pay by the packet, packet radio systems and CDPD are less expensive for short messages, while a cellular call may be cheaper for longer ones. For packet radio messaging, try the AllPoints PC Card radio from Megahertz (801/320-7000, *http://www.megahertz.com*) or the PM-100D from Motorola (847/576-5000, *http://www.motorola.com*); both are about $500. Mail service starts at $30 a month with WyndMail (805/781-6000, *http://www.callamer.com/wynd*), or slightly more for RadioMail (415/286-7800, *http://www.radiomail.net*).

Pagers Pagers that plug into PDAs and laptops have not sold well because most paging systems are receive-only—you may as well clip a pager to your belt. And most paging systems are limited to very short messages—about 10 to 50 words. SkyTel's two-way paging system, which has a 500-character limit and supports Internet E-mail, is not yet offered for the PDAs described here.

Accessing the LAN For wireless local-area networking, Digital Ocean and Dayna Communications (801/269-7200, *http://www.dayna.com*) have products for connecting a Newton to an Ethernet or LocalTalk network. The Psion and Zaurus lack network support; a future release of the Magic Cap OS will offer TCP/IP support. The Magic Link and Newton have infrared ports useful only for communicating with identical PDAs; the Zaurus infrared port uses the IrDA protocol supported by some printers and laptops (but not PowerBooks).

Productivity for PDAs

Besides keeping you in touch with your colleagues, your PDA must provide the tools you need to do your work. All four PDAs come with basic software built in. For applications that they all have in common—word processing, calendar, simple database, to-do list—the Psion generally has the most comprehensive features. The Psion and the Zaurus 5800FX also have a spreadsheet, though operating it with the mini keyboard gets old fast.

All those units, except the Psion, provide graphics features for sketching ideas, drawing maps, and so on. The Zaurus has an easy-to-use paint program that includes rubber stamps of buildings and street segments for creating maps. The Newton has the bare minimum of drawing features to create, move, and erase lines, but it can clean up what you draw, straightening out lines and smoothing curves. The Magic Link has a few more drawing tools, such as different line thicknesses and rubber stamps. However, the selection of cheerful hearts and Halloween-pumpkin rubber stamps is more suitable for children's greeting cards than for business.

The most established product, the Newton, has the greatest range of third-party software—commercial titles plus at least 1000 free or shareware programs. You can choose from two spreadsheets—PelicanWare's QuickFigure Pro, a well-executed basic spreadsheet ($59.95; 503/221-1148, *http://www.pelicanware.com*) and the slower, more Excel-like Equate from Holosoft ($99; 408/748-9648, *http://www.holosoft.com*). Psion also has an extensive collection of commercial software, but most of it is available only in Great Britain; several hundred shareware and free titles are readily available in this country. The Magic Link has attracted little software because of poor sales. The Zaurus will never have much software, which can only be developed with specialized hardware.

Your biggest concern may be synchronizing a PDA's contact manager, scheduler, and address book with programs on a Mac. The Newton is by far the strongest in this area: Concierge Software's csInStep ($39.99; 703/404-9168, *http://www.conciergesw.com*) can synchronize the Newton with the Mac versions of Symantec's ACT, Adobe's TouchBase, Now Contact, and Now Up-to-Date; Now Software offers Now Synchronize ($30; 503/274-2800, *http://www.nowsoft*

The Newton tries to do something that other PDAs don't—recognize your handwriting. Other PDAs use keypads or require you to draw specific symbols that represent characters. The Newton accommodates the writer by making an intelligent analysis of writing within a broad range of styles that people use naturally—although you still need to write with some consistency to make it work. Version 2.0 of the Newton Operating System combines neural networks' analyses of shape and stroke, geometry context, and language to discern your scrawl.

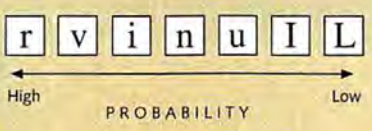
Next, the Newton assesses the geometry of the character by looking at the size and spacing and comparing it with previously written characters. This helps discern between upper- and lowercase and between characters and punctuation.

Based on geometry analysis the order of probability could change.

Then a language model checks whether the found characters work in combination to make words. Combinations that don't make words are assigned a low probability, but still retained in the event that the intended word is not in the dictionary.

trip tvip tiip tnip tuip

Language-model analysis can assign yet another order to the list of probable characters.



The same language model drives a search engine that combines neural-network analysis, geometric context, and language-model input to find the best interpretation of the handwriting on the screen.

my trip

The character with the highest overall probability gets used.

r

.com) for syncing with its desktop programs. ACT for the Newton can synchronize with ACT on the Mac, but ACT for the Psion can synchronize only with the Windows version of ACT. Exchanging files with a Mac using Psion Link is like sending files, complete with file extensions, to a DOS computer. The Magic Link and Zaurus can't synchronize their data with a Mac database, but you can export and import fields chosen from a list. All four PDAs can back up files on a Mac without difficulty.

The Last Word

For many Macintosh users, a PowerBook may be the best choice for a portable computing device. But remember that a PowerBook is a repackaged desktop computer and is not portable in the same way as a PDA is. For example, PDAs boast longer battery life, start up instantly, and automatically save everything you do.

Size and weight are another PDA advantage: PDAs are small enough that you could carry one with you at all times. Of these four, the Psion is the easiest to carry, and the Zaurus is almost as portable; both fold into a self-contained hard-shell case that fits in a large pocket. The Newton MessagePad is a big step up in size; the Magic Link is even larger and heavier—you'd probably carry a Newton or Magic Link in a zip-up case because neither would fit in your pocket, and the Magic Link requires protection for its exposed screen.

Size and shape also affect where you can use your PDA. Only the Newton is designed to be used while you're standing or walking around; you can hold it securely in one hand and wield the stylus with the other. Even so, operating a Newton can be distracting—talking to a Newton user often seems like talking to someone who's watching television over your shoulder. You can use the stylus on the Magic Link and Zaurus while walking, though doing so with the Magic Link is awkward because you have to cradle it on your forearm.

Should you spring for a PDA? And if so, which one? If all you require is something you can get started with quickly and use conveniently, look to the Zaurus, which straddles the stylus and keyboard worlds. If you need the feel of a desktop computer and keyboard-operated traditional software, the Psion comes closest to providing that in a tiny package.

If you need a PDA to do things that a desktop or laptop computer can't do, the Newton, with its strong base of shrink-wrapped applications and high-level application-development tools, is your best bet. It is the most developed PDA in other ways as well—for example, in handwriting recognition and breadth of communication options. Another thing the Newton has to recommend it is Apple's plan to adopt the StrongARM processor jointly developed by Digital Equipment and ARM. At 2.1 MIPS, StrongARM is five times as fast as the present Newton CPU with the same power consumption—it's an impressive chip that will let the Newton team at Apple deploy much-improved handwriting recognition and other sophisticated capabilities.

Sony's Magic Link comes up short for general use—it seems more like a toy for children than a tool for adults. On the other hand, if your company needs a communications-intensive, highly customized application—and has the resources to develop it—the TeleScript agent technology underlying the Magic Link's Magic Cap OS may be just the ticket.

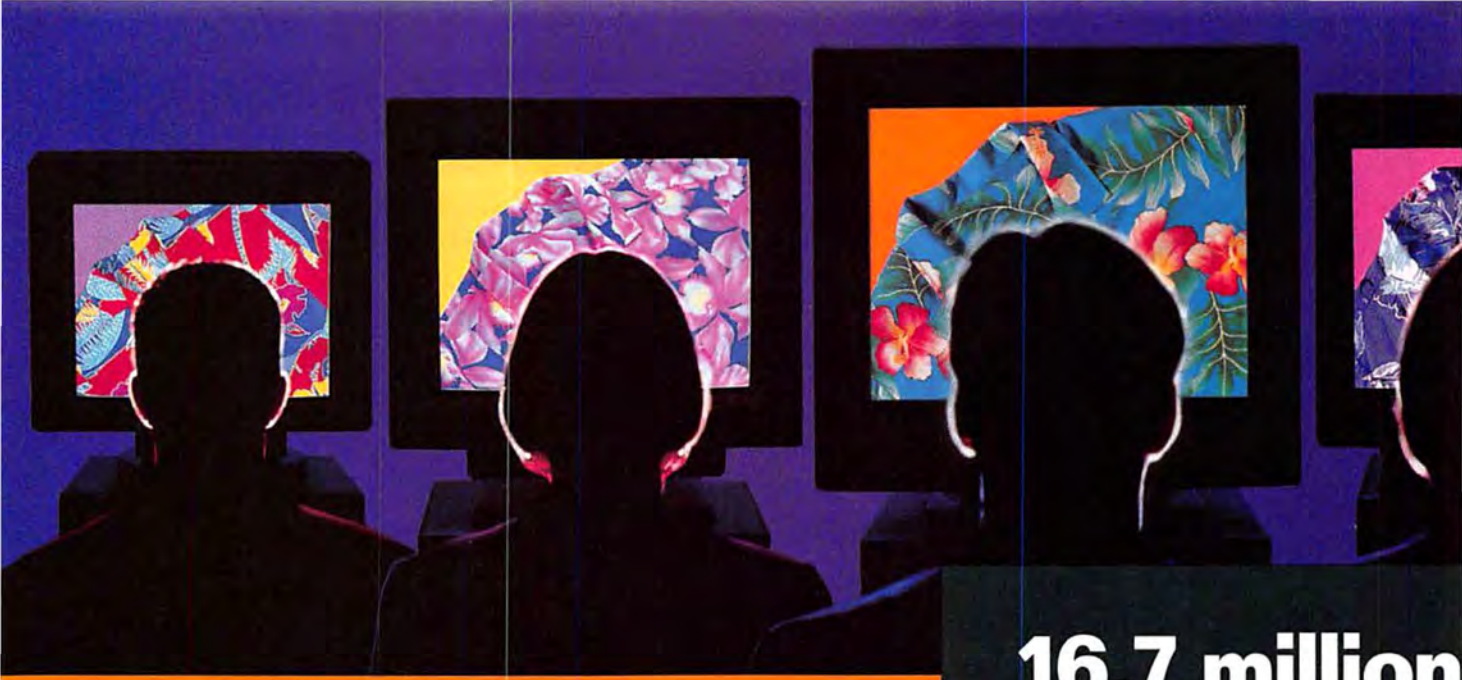
The fact is, no PDA is a general-purpose computer. If you need everything your Macintosh provides, get yourself a PowerBook. If you purchase a PDA and don't have a pressing need for what it offers, you'll probably stop using it after the novelty wears off. **m**

Contributing editor and PowerBook aficionado CARY LU loves portable devices but hates batteries.

PERSONAL DIGITAL ASSISTANTS

MW EDITORS' CHOICE

No Choice PDAs are all about doing real work on the run, then connecting up with your home base. While each unit has some advantages, and the Apple MessagePad 120 comes closest to being a strong and useful device, we think that for most people, PDAs are still more promise than practical tool.



16.7 million

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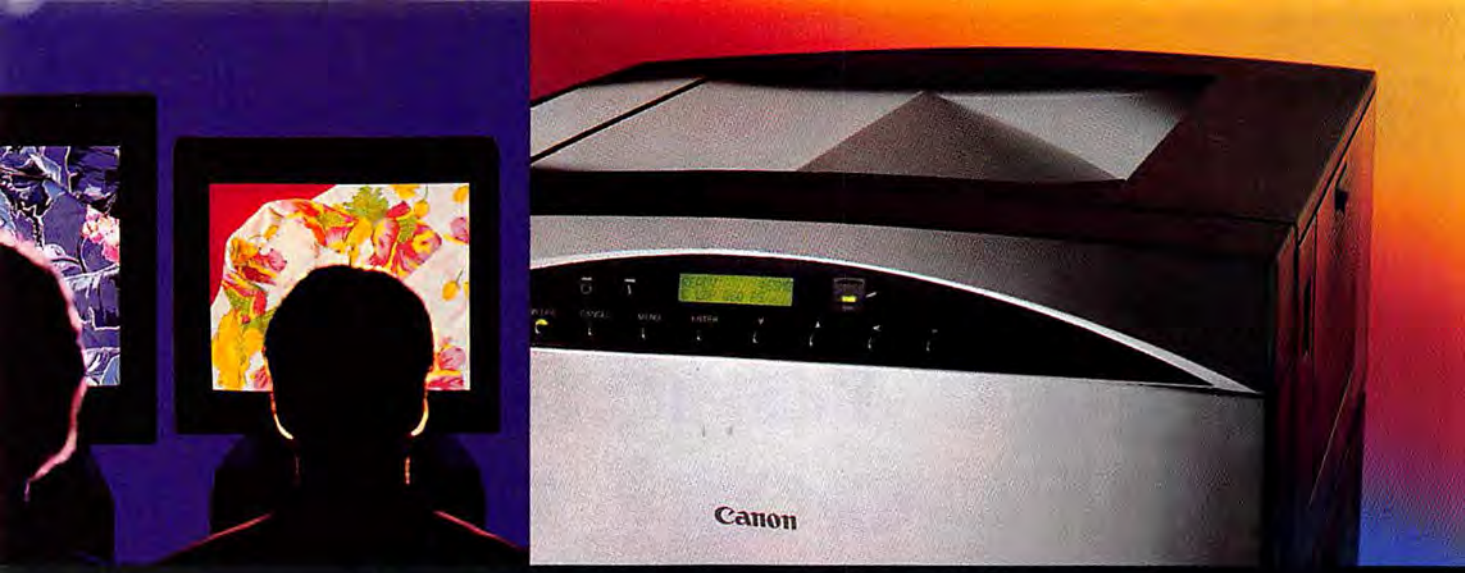

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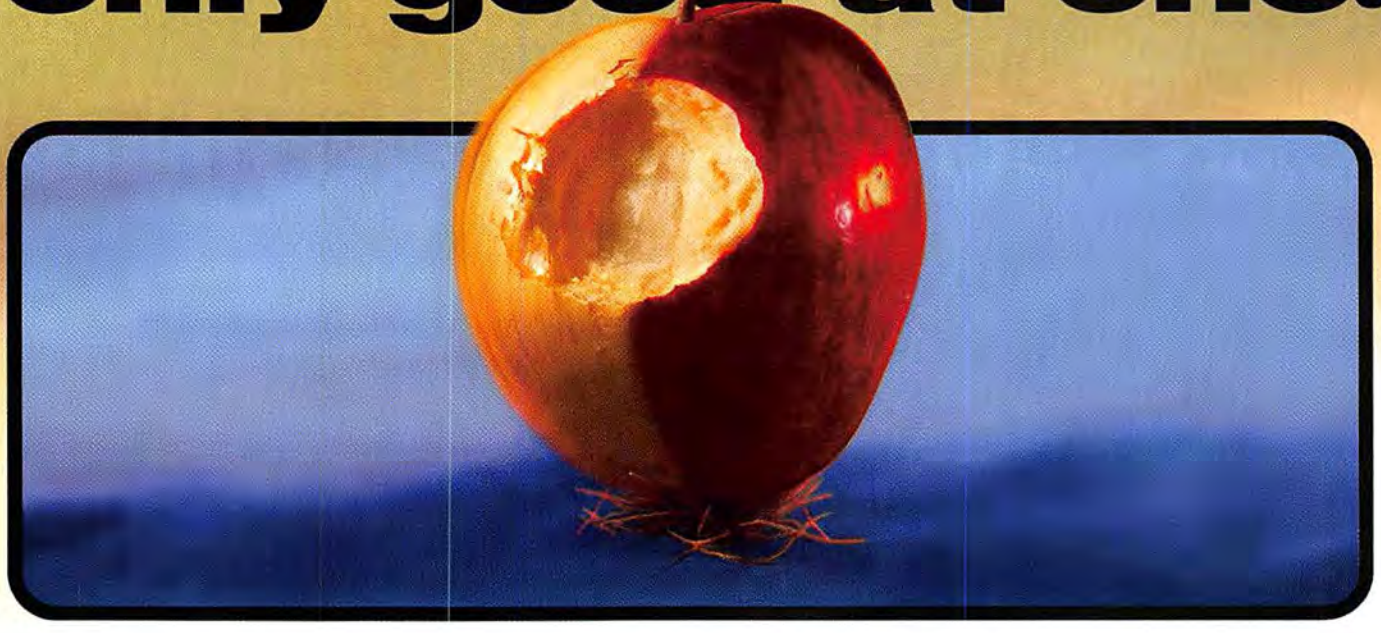
Canon

Circle 53 on reader service card

Oddly, most PC cards built for two functions are only good at one.



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Circle 162 on reader service card

Secrets

The Truth about OpenTptAppleTalkLib

QUICK CURES FOR CHRONIC SYSTEM BLOAT

by Joseph Schorr

The System Folder—believe it or not—once held just six files: the System, Finder, Note Pad, Scrapbook, Clipboard, and a tiny printer driver. System 7.5 crams *hundreds* of components into your System Folder—with enough arcane-sounding extensions and control panels to daze even a seasoned Mac guru. Sure, you know you need the QuickTime extension to play movies and AppleShare to connect to a network, but what on earth is OpenTptAppleTalkLib?

Fact is, your System Folder is probably bloated with dozens of files you don't need—but that eat up RAM and increase the chances of a system crash or an extension conflict. But how do you tell which cryptic files are safe to toss? Read on.

For PowerBooks Only

Several Apple extensions and control panels are PowerBook-specific, but some installations of System 7.5.X dump them on desktop Macs anyway. Some items are obvious; if you have control panels with PowerBook in the name on a desktop Mac, get rid of them. Other items are less clear: AutoRemounter, a control panel, automatically mounts file servers and shared volumes on a PowerBook's desktop after it has been asleep or shut off. Assistant Toolbox, an extension, works in conjunction with AutoRemounter. Neither one does a thing for desktop Macs. Also in the Extensions folder, check for Caps Lock—a file needed on early PowerBooks. Cleaning out AutoRemounter and related items gains you 87K of RAM.

Driver Mania

Every Mac comes with driver software for a wide range of Apple printers—from the ImageWriter to the LaserWriter Pro 810. You only need the ones that work with the printers you actually use; ditch the rest. Look for driver files inside the Extensions folder. While you're there, pare down the Printer Descriptions folder, which is crammed with dozens of printer-specific files you'll never use.

Similarly, your Extensions folder is probably full of CCLs—modem drivers used by the Apple Communications Toolbox. Each CCL file bears the name of a specific modem model: Global Village PP Gold/Silver, PSI PowerModem II, and so on. You only need the CCL file that works with *your* modem. Feel free to get rid of the rest.

continues

JEFF NEUMANN

Right Extension, Wrong Mac

A number of system components relate only to specific models. The Button Disabler control panel, for example, works only on Macs with front-mounted sound and brightness buttons. The PowerPC Monitors Extension supports the AudioVision 14 monitor—nothing else. Likewise, the IIci/IIsi Monitors and Quadra Monitors extensions, which all come with System 7.5, serve absolutely no purpose unless you have the models indicated.

System 7.5 makes extensive use of shared libraries—allowing applications to share pieces of code to conserve RAM and disk space. Library files with names ending in *Lib* are Power Mac–specific, however. So, the file MathLib improves the performance of math operations, but on Power Macs only. This principle holds true for AppleScriptLib, ThreadsLib, ObjectSupportLib, OpenTransportLib, and so on. System 7.5.3 automatically removes some of these files on desktop Macs, but it doesn't catch all of them.

Some extensions work in conjunction with a specific piece of Apple software. That's true of Video Startup. You need it if you record video with the Apple Video Player utility. If you don't digitize video—or you use another program—all Video Startup does for you is grab another 20K of RAM.

The CD-ROM Story

You only need one file to read a Mac CD—the aptly named Apple CD-ROM extension. To read *non*-Mac CDs, you need Foreign File Access. This extension works in conjunction with several other translator extensions: Audio CD Access (for listening to audio CDs); Apple Photo Access (for reading PhotoCD files); and High Sierra File Access (for accessing CD-ROMs that use the High Sierra format). If you don't have a CD-ROM drive, remove these files; Foreign File Access gobbles up more than 122K of your available RAM.

More Help Than You Need

Apple Guide, Apple's built-in interactive help system, is great for novices, but if you know your way around the Mac, you can decommission Apple Guide and its related files. Any files in the Extensions folder that contain the word *Guide* are completely dispensable Apple Guide documents. Among these are About Apple Guide, 9500 Guide Additions, and Video Guide Additions. At the very least, dispose of guide files for hardware or software you don't have.

Networked or Not

The Extensions folder is crammed with files that let a Mac connect to an Ethernet or Token Ring network. If you're not networked (or if you're on a LocalTalk network), you can remove the EtherTalk Phase 2, TokenTalk Phase 2, TokenTalk Prep, and MacTCP Token Ring Extension files. You can also say good-bye to A/ROSE (Apple Real-Time Operating System Extension). You need this file only if you connect to a Token Ring or Ethernet network via a NuBus card that relies on A/ROSE technology.

If you never connect your Mac to a network—and that includes the Internet—you don't need any of the files associated with Open Transport, System 7.5.3's integrated networking scheme. That eliminates a number of files that start with *Open*: OpenTptAppleTalkLib, Open Tpt AppleTalk Library, Open Transport 68K Library, Open Tpt ATalk 68K Library, and so on. m

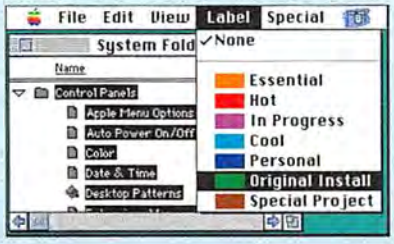
Contributing editor JOSEPH SCHORR is coauthor of *Macworld Mac and Power Mac Secrets*, third edition (IDG Books Worldwide, 1996).

KEEPING TABS ON SYSTEM CLUTTER

The function of a control panel or extension is usually clear from its name—but not always. The three steps below will help you hunt down nonessential system components, see where they came from, and figure out what they do.

1.

Perform a clean install of your system software and apply a color label to every item in your System Folder. Select all the files—in name view use ⌘-option–right arrow (→) to open all nested folders—then choose a color from the Finder's Label menu. You can also give the label an appropriate name. Later, this color coding lets you see which components were part of your original installation and which were dumped in by other programs (all the unlabeled files).



2.

If an extension's name or icon provides no clue as to what it is or what it does, select the icon in the Finder and use the Get Info command (⌘-I). The version field almost invariably bears the name of the company that produced the software. You can quickly determine whether an extension is a piece of Apple software or a component added by third-party software, maybe software you no longer use. If that's the case, you can safely Trash it.

3.

Use Conflict Catcher 3 ($69.95; Casady & Greene, 408/484-9228, *http://www.casadyg.com*), to display the *name* of each extension and control panel with its icon during start-up. Instead of watching rows of cryptic icons parade across the screen, you see what each start-up file is. (And Conflict Catcher outshines the Apple Extensions Manager for managing extension conflicts—for example, telling you how much RAM each extension consumes and a report of every file your Mac loads at start-up.)

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Quick Tips

Tips, Tricks, and Shortcuts

by Lon Poole

Transcribing URLs is a pain you can avoid if you use Netscape Navigator 1.1 or 2.0 with System 7.5 or later. Roger S. Cohen of Cranford, New Jersey, reads his E-mail with Claris Emailer and surfs the Web with Netscape. Therefore, URLs in his E-mail aren't hot links—clicking an URL in Emailer does not make Netscape go to the corresponding Web site. His workaround is to make a folder on his desktop for collecting URLs. When he encounters an interesting URL in E-mail, he selects it and drags it from Emailer to the desktop folder. This creates a text-clipping file, which he renames to indicate the Web site it links to. Later, he can check out the Web site by dragging its clipping file from the desktop folder to Netscape's window; Netscape does the rest.

In fact, you can drag URLs to a desktop folder—or directly to Netscape Navigator—from any application that supports drag and drop, such as recent versions of the Note Pad, Stickies, SimpleText, WordPerfect, and ClarisWorks. Add bookmarks in Netscape only for the sites you frequently visit.

In Netscape Navigator 2.0, you can specify an URL that has the common form *http://www.website.com* by dragging (or typing) only the Web site part; Netscape adds the *http://www.* and *.com* parts. For example, you can get to Macworld Online by dragging the word *macworld* to the Netscape 2.0 window.

To find sites in your bulging bookmark list, Timothy W. Shire of Tisdale, Saskatchewan, Canada, suggests making it into a Web page. Start by making an alias of the Bookmarks.html file located in the Netscape folder, which is in the System Folder's Preferences folder. Then put the alias in an accessible place, such as the Apple menu, the Launcher, or the desktop. When you open the alias, Netscape displays your bookmarks as hot links in an outline format, complete with descriptions you have entered, on a searchable Web page (see "Tailor-Made Bookmarks Page"). Now add a bookmark for the bookmarks page, and you have easy access to it from Netscape's Bookmarks menu. You might also consider setting Netscape's preferences so it initially opens your bookmarks page instead of Netscape's home page. Do that by pasting the URL for your bookmarks page (which begins with file:///) into the Preferences dialog box (General Preferences in 2.0).

If you want your bookmarks page accessible from anywhere, Timothy M. Wood of Deer Park, New York, suggests you publish it through your Internet service provider (ISP). First, open the Bookmarks.html file in Netscape preferences folder. Next, use the Save As command to save it as a source document. If you wish, you can edit the source document (since you're working on a copy of the original file, you can safely ignore the text at the beginning of the file that warns you not to edit it). For instance, you may want to delete confidential information you have entered as a description for some bookmark. Then upload the file to your Web space as you would any other HTML document (get instructions from your ISP if you don't know how). Now you—and anyone else—can access your bookmarks page from anywhere.

Performa 630 Series Upgrade

Q I own a Performa 636 and want to upgrade to PowerPC. I'd rather not buy a new machine, but I'd like to eventually be able to use Copland. Does Apple have plans to provide a logic-board upgrade for the 630 series?

John Cozier
Tampa, Florida

A Apple finally began shipping the $769 Power Macintosh 5300/6300 Logic Board Upgrade (part M4447LL/A) in April for all Performa 630 models as well as for the Performa 5200/6200 series. Because this upgrade replaces your entire logic board with the logic board of the Performa 5300/6300 series, which has a 100MHz PowerPC 603e chip, your Mac becomes a full-fledged Power Mac capable of running Copland when it becomes available. You can take SIMMs from the old logic board and put them in the upgrade logic board. Likewise, the video-in, TV tuner, and modem cards from the old logic board should work with the upgrade, since it has the same type of video, com-

continues

JOHN BLECK

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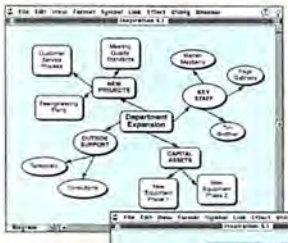

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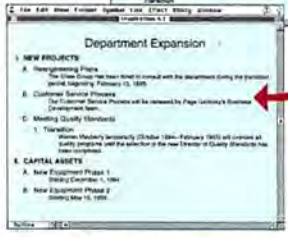

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munications, and PDS slots as the logic board it replaces. However, don't count on using a DOS card from a 630 series Mac with the upgrade logic board. Also, keep in mind that when you upgrade, you lose the 4MB of DRAM soldered to the 630 series logic board—the upgrade doesn't include any DRAM.

If you were to trade up to a $2499 Performa 6300CD, instead of the internal hard drive, double-speed CD-ROM, 14.4-Kbps internal modem, 14-inch monitor, and bundled software from the original machine, you would get a 16MB SIMM, a 1.2GB hard drive, a quad-speed CD-ROM drive, a 28.8-Kbps Global Village fax/data/voice modem, a 15-inch monitor (all with new warranties), and new bundled software. Be sure to factor in the value of those upgraded components when deciding whether to upgrade or trade up.

Tailor-Made Bookmarks Page If you make your Netscape bookmarks list into a Web page, you see any notes you typed into each bookmark's description field, and you can use Netscape's Find button to search through your bookmarks for a long-lost site.

Slow Internet Access

Q Why does my 14.4-Kbps modem work only at 300 to 500 bps when I use Netscape? I once got it to work at 1000 bps late at night. How can I get it to go faster?

PRAVIN SHUKLE
Saskatoon, Saskatchewan, Canada

A A number of factors can reduce the flow of data below the maximum capacity of your Internet connection. The general level of activity is one factor. When people crowd onto the Internet, they create a data traffic jam that slows down data flow for everyone. But congestion doesn't have to be massive to affect you. It can occur at the source or at some point en route to you. Many small Web sites can handle only a few visitors at a time, and even a large site with a fast server and a high-speed connection to the Internet can bog down if enough people try to access it simultaneously. To trace the routes data takes on the Internet, use Chris W. Johnson's free utility program MacTCP Monitor (*http://gargravarr.cc.utexas.edu/mactcp-mon/main.html*).

When the overall demand for data exceeds the ability of a site's server or its connection to the Internet, everyone accessing the site experiences a slowdown. All you can do is hope a busy site adds capacity, and in the interim, try visiting the site at different times and days to determine the site's off-peak hours.

Slowdowns also can occur in your Mac. MacTCP is known to sap performance; most people find Open Transport 1.1 much faster. Unfortunately, some people find MacTCP more reliable. (Open Transport 1.1 is installed as part of System 7.5 Update 2.0 on a Mac with a 68030, 68040, or PowerPC processor, but not on the Power Mac 5200, 5300, 6200, and 6300 series, which are incompatible with Open Transport 1.1. To use Open Transport 1.1 on an older Mac, you must activate it with the application Network Software Selector, located in the Apple Extras folder.) In addition, many people report a PPP dial-up connection to be slightly faster than a SLIP dial-up connection. If you use SLIP, find out if your ISP can switch you to PPP.

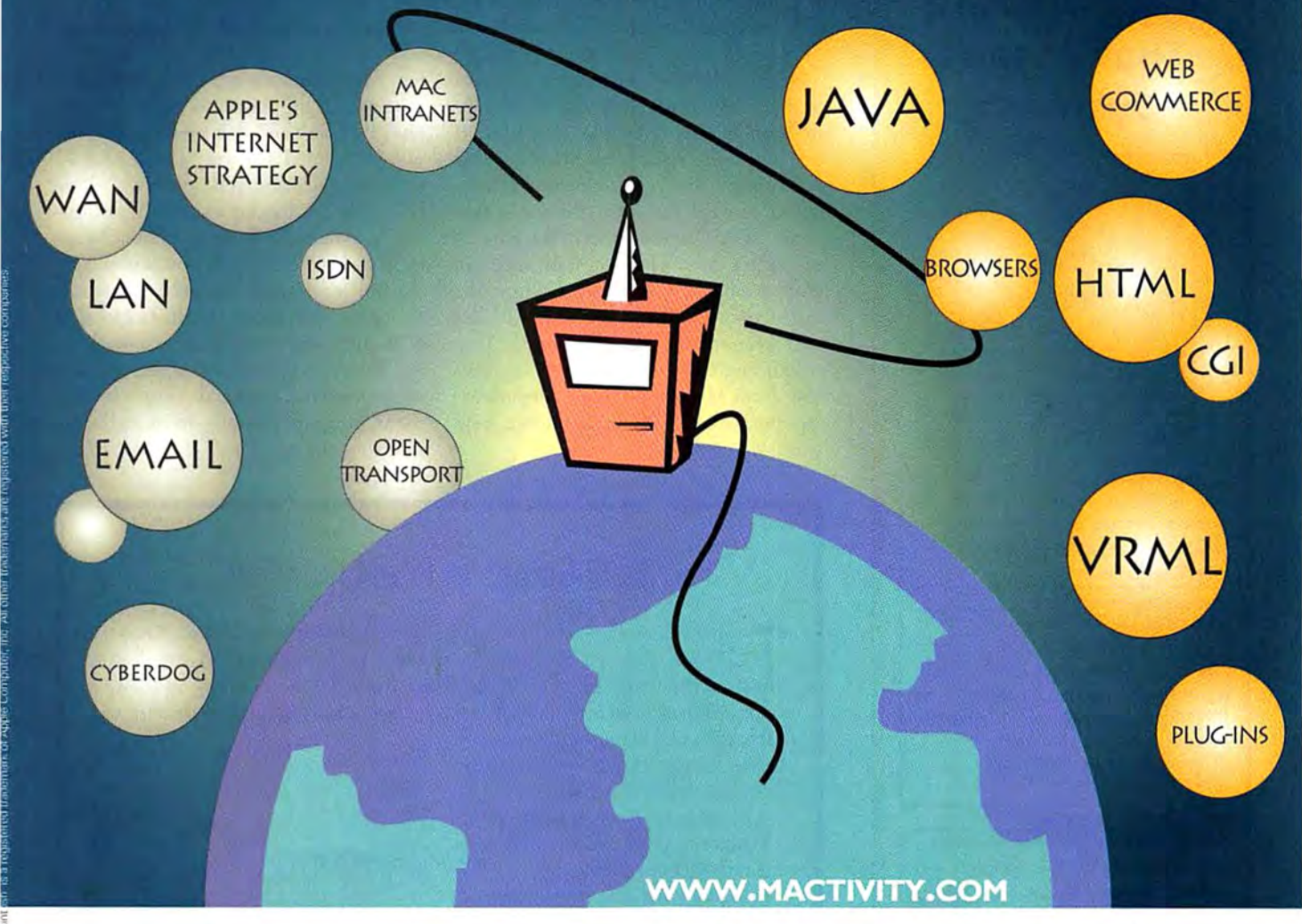
Replacement CD and Floppy Icons

Q I'd like to change my default CD and floppy icons, but can't find them with ResEdit. I've searched everywhere inside and outside the System file for them. Where are they?

ALAN GORNICK
via the Internet

continues

Where the Mac Meets the Internet



Mactivity Week: A week of tutorials, conference sessions and exhibits on Macintosh Internet and networking technologies.

Mactivity/Web (July 13-15) is the Macintosh Webmasters University, featuring technical sessions, tutorials, special events and hands-on learning in our Web Site Creation lab. Mactivity/Web is the event to learn *Java* and *VRML* on the Macintosh. Mactivity/Web also offers complete curriculums for new Webmasters, graphic artists and Web entrepeneurs.

Mactivity'96 (July 15-18): The Macintosh Connectivity Conference is the place to see the latest in *Internet, networking, connectivity, and communications technology* for the Macintosh. In sessions, exhibits, and lectures, you find solutions for connecting your Macs to the Internet, building Macintosh intranets, network management and more.

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You Asked for It, You Got It!
Larry Tesler
Vice President Internet Platforms
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Apple Fellow

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Stop beating your head against the wall. All you need to do is install the free extension Discolour from Ambrosia Software (716/325-1910, *http://www.AmbrosiaSW.com*). Discolour replaces System 7's standard black-and-white floppy icon with a colorful, 3-D icon. If you want to replace the standard CD icon, install the free extension CD Discolour. In the case that the icons that come with Discolour and CD Discolour aren't quite what you want, you can edit them with ResEdit (follow the instructions located in the Read Me files that accompany the extensions). Discolour and CD Discolour are also available from Macworld Online (*http://www.macworld.com*; on America Online, keyword *Macworld*).

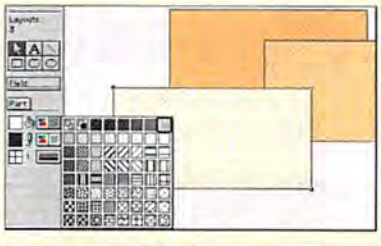
Getting AOL Access from a Hotel

TIP Getting a local access number for America Online can be a problem when you're staying at a hotel that requires dialing 9 or 8 to get an outside line. You can't add that prefix to the 800 number dialed for the "Get Local #" locality because AOL doesn't allow changing that locality's setup. A coworker tipped me off: Choose the Home locality, click on the Setup button, and specify the outside-line prefix there. Somehow the prefix finds its way to the "Get Local #" locality, and the problem is solved.

When you get a local access number to use from the hotel and create a locality for it, you must specify an outside-line prefix for the new locality. Be sure to use

New Colors in FileMaker Pro

Tired of the limited colors offered in Claris's FileMaker Pro? Izzy Vasquez of Albany, California, suggests you combine them with patterns to get a variety of pale shades and textured colors. In FileMaker 2.1 and 3.0, the technique works with fields and objects you draw; in FileMaker 3.0, it also works with the body, header, and other parts of a document (the example shown here uses FileMaker 2.1). To get this effect, follow these steps.



1. In Layout mode, select the object you want to color, and choose a color from the Fill Color palette.

2. With the object still selected, choose a pattern from the Fill Pattern palette. To create a lighter shade of the original color with minimal texture, select a pattern from the top two rows of the Fill Pattern palette (the fewer black dots in the pattern, the lighter the result will be). To compare shades side by side, create several duplicate objects (or draw several rectangles to use as temporary color swatches), color them alike, and apply a different pattern to each. When you decide on a pattern, delete the extra objects and apply the pattern you like to the original object.

3. Adjust the size and position of the shaded object as needed.

Incidentally, the decorative elements in the example are actually made from the DF Incidentals font, which is part of the Fontek collection from Letraset USA. Since almost no one has those fonts installed, Vasquez converted the "text" to a PICT graphic with a screen-capture utility, then copied and pasted the graphic into the Web Pages database.

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Circle 80 on reader service card

the prefix that the hotel system requires for a local call; it may be different from the prefix for an 800-number call.

HOWARD LEVITSKY
Philadelphia, Pennsylvania

Close Stickies Note without Warning

TIP When you click on a Stickies note close box, a dialog box pops up asking you to confirm that you want the note deleted. To skip the warning, control-click on the note's close box.

DANIEL PAPA
Urbana, Illinois

Server Access from Save Dialog

TIP Don't you hate it when you get into a Save dialog box only to find that you aren't logged on to the server volume you want to save to? I did, until I made an alias of my Recent Servers folder and put it on my desktop. Beats a trip to the Chooser any day.

DAN DRULINER
Seattle, Washington

Restart from Extensions Manager

TIP When you open Extensions Manager during start-up (by holding down the shift key) and activate or deactivate an extension that loads before it, such as Disinfectant, you must restart the computer to make the change take effect. To have Extensions Manager restart instead of continuing the start-up, simply hold down the ⌘ and option keys while clicking its close box.

MIKE WIMPY
Eugene, Oregon

We pay from $25 to $100 for tips published here. Send questions or tips on how to use Macs, peripherals, or software (by mail or electronically) to *Quick Tips*, Lon Poole, at 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.

LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld System 7.5 Bible*, third edition (IDG Books Worldwide, 1994). m

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Joseph Schorr co-authored the 1st, 2nd, and 3rd editions of *Macworld Mac and Power Mac SECRETS.* He is a contributing editor and has recently launched the new SECRETS column in *Macworld* magazine—check it out each month.

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NetSmart

Community of Support

by Cameron Crotty

In years past, computer communities tended to be local—mostly friends and groups banding together for mutual protection and support. But the growth of the Internet has created a distribution channel that brings updates, advice, and even new software directly to your desktop. To tap into this community, all you need is a modem and an Internet connection.

Feed Your System

We curse extensions, we rail at Finder deficiencies, and we bemoan the chunks of RAM we have to give up, but what makes a Mac a Mac is the software that animates the hardware: the Mac OS. So your first Internet stop for support should be a place to nourish your Mac's all-important heart.

Apple Computer's online resources are alternately some of the best- and worst-organized on the Net. Individual divisions' servers are generally well laid out, but starting from ground zero (*http://www.apple.com/*) to find a specific item can require serious detective skills (Apple apparently does not believe in server-wide search engines). Even so, for the latest Mac system software, Apple's servers are obviously the place to be.

Quite a bit of information is scattered throughout Apple's Internet servers, so it's worthwhile browsing, starting at Apple's information and support sites (*http://www.info.apple.com* and *http://www.support.apple.com*). But if it's system software you're after, make sure to hit the Apple Software Updates page (*http://www.support.apple.com/wwwdocs/apple_sw_updates.html*). This page contains not only links to servers (FTP, HTTP, and Gopher) carrying Apple system software updates, but also a link to a page carrying a continually updated list of additions to the libraries.

If you are curious about other Apple information and goodies, the company maintains a descriptive list of its Internet servers and descriptions of their contents at *http://www.apple.com/documents/otherappleservers.html*. The servers are for the most part organized by technology (for example, Mac OS, OpenDoc, Newton, and QuickTime) and contain a mixture of information, software, and links to related sites.

SUSAN LYAN

Expert Advice

Apple puts a lot of technical information online. The Tech Info Library (*http://til.info.apple.com/til/til.html*) is its official technical-support database—the same one Apple tech-support uses to answer questions on the 800/SOS-APPL line. The Tech Info Library is searchable, updated daily, and contains over 13,000 articles on topics ranging from error codes to the Read Me files for every Apple product ever made. Just think—you might get that Apple III up and running.

As an added bonus, the Tech Info Library contains a directory of third-party companies searchable by contact information. It's neither exhaustive nor scrupulously up-to-date, but it is another resource to help locate that elusive hard drive vendor.

For a more frequent fix of Apple technical info, consider subscribing to Information Alley, Apple's daily E-mail feed of Macintosh technical news, troubleshooting, and tidbits. Information Alley articles are written by both Apple and non-Apple contributors, and some are culled from the Tech Info Library in response to oft-asked questions. Information Alley serves a broad range of readers, from moderately technical users all the way up to professional IS troubleshooters.

Recent issues have included articles as elemental as the difference between vector and bitmap graphics, and as technical as information on translating TCP/IP LPR print jobs to PAP sessions in AppleTalk. To subscribe, send an E-mail message to *infoalley@lists1.austin.apple.com*, with the word *subscribe* in the subject field. (To cancel the subscription, send a message to the

continues

same address with the word *unsubscribe* in the subject field.) You can also check out the Information Alley home page at *http://support.info.apple.com/info.alley/info.alley.html*.

Resources Further Afield

Apple isn't the only place to find help; the Web is scattered with pages of tips and tricks, maintained by both individuals and companies. One particularly useful resource is Quill Services' Complete Conflict Compendium (*http://www.islandnet.com/~quill/c3data.html*), an online database of Mac software incompatibilities. Quill asks users for conflicts they've found solutions to and problems still unresolved. Before posting a solved conflict, Quill assigns a confidence rating based on the number of reports received and their completeness. Unresolved problems go into the Hmmm Zone, occasionally annotated with suggestions from Quill.

It's always a good idea to check with the manufacturer for tech support, but some issues involve several pieces, or may have troubled someone before you. In that case, it could be time to post a question to a Usenet newsgroup or a discussion group on your favorite online service.

Before you press the Post Message button, read the FAQ for the group you think might answer your question. Ohio State University maintains a Web-linked set of most Usenet FAQs, with limited searching capability, at *http://www.cis.ohio-state.edu/hypertext/faq/usenet/top.html*.

Use the Alta Vista (*http://www.altavista.digital.com*) or InfoSeek (*http://www.infoseek.com*) engines to search current Usenet postings first. Also check Deja News, a Usenet archiving service (*http://www.dejanews.com*), or Apple's Usenet archives (*http://www.support.apple.com/wwwdocs/usenet_archive.html*); Apple indexes the previous 12 months' worth of postings from the newsgroups in *comp.sys.mac*, *comp.sys.newton*, *comp.unix.aux*, and *comp.protocols.appletalk*.

If you find someone asking the same question but don't see an answer, consider E-mailing that person directly; it's possible he or she received an E-mail answer. A short, succinct message is much more likely to generate responses.

Desperately Seeking Software

No false sense of modesty will prevent us from trumpeting that your first stop for Mac shareware should be Macworld Online's well-groomed libraries (*http://www.macworld.com*). Online services, particularly America Online, have complete and well-organized Mac software libraries.

But if you don't subscribe to an online service, then you should know about Shareware.com (*http://www.shareware.com*), a service from c|net. Shareware.com maintains a database of thousands of files drawn from some of the most popular software archives on the Internet, including the Info-Mac archives at Stanford University (*ftp://sumex-aim.stanford.edu/info-mac*), the Mac archives at the University of Michigan (*ftp://mac.archive.umich.edu/mac/*), and the public archives of several software vendors, including Netscape, Adobe, and Macromedia. You can search the database for a specific file or browse the most recent arrivals. When you find a file you want to download, Shareware.com points you to either an original site or a *mirror*, a site that precisely mirrors the content of another site and thus eases the load on the original server.

Reading the headlines before they appear on CNN may give a quick thrill, but tapping into the Mac resources on the Internet definitely sparks a longer-lasting glow of satisfaction. Whether you need new software, want to check out the latest games, or need to troubleshoot some ornery silicon, you and your Mac are no longer alone. **m**

Associate editor CAMERON CROTTY covers the Internet and telecommunications for *Macworld* and believes the phrase *natural language searching* is a cruel joke.

Shareware PICKS

For über-geeks: If you've ever wondered what's going on when your Mac spouts off a numeric error, check out Dave Rubinic's freeware **Easy Errors 1.11.** Just type in the error code, and Easy Errors returns the error code word and a (very) brief description. Most of the errors are meaningless unless you're a programmer, but when you combine them with notes from Apple's Tech Info Library, you can get an idea of what's going on under your Mac's hood.

The less technically minded might just be happy to contact a company when something starts smoking. **VendorDA 1.45** from FourArts is a $10 shareware application that lists vendor fax and telephone numbers. VendorDA has been around for years, but the author, Bill Baldridge, has spent the time to maintain the list and make sure the information is reasonably up-to-date.

You can get these applications and other Mac shareware in the Macworld Online Shareware Library on AOL and on our Web site (*http://www.macworld.com/software/*).

Web Worthy

Shareware.com is a software index and a good way to keep an eye on what's new at several sites or find a specific file, but it's not well set up for browsing individual libraries. If you want to take a stroll through the Info-Mac archives, check out MIT's mirror site, HyperArchive, at *http://hyperarchive.lcs.mit.edu/HyperArchive/HyperArchive.html*. The archives are organized by software category, and each file has a descriptive abstract.

Resources abound on the Net: O'Grady's PowerPage (*http://www.iliad.com/ogrady/5300.html*) is a must-see for PowerBook users; TidBits (*http://www.tidbits.com*) offers weekly online news about the computer industry, with an emphasis on things Mac; and Eric David Belsley's Macintosh Page is a gem (*http://www.cs.miami.edu/~belsley/mac/mac_index.html*).

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World Wide Web: *http://www.macworld.com*

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http://www.imageclub.com/

Impossible Software

Learn about the latest in Macintosh font management tools, tips and techniques by exploring the features of TypeTamer™ on Impossible Software's Web Pages. You will find answers to many font related FAQs, be able to download a trial version of TypeTamer™ and communicate with Impossible Software's Support Staff. See you on the web! 1-800-470-4801.

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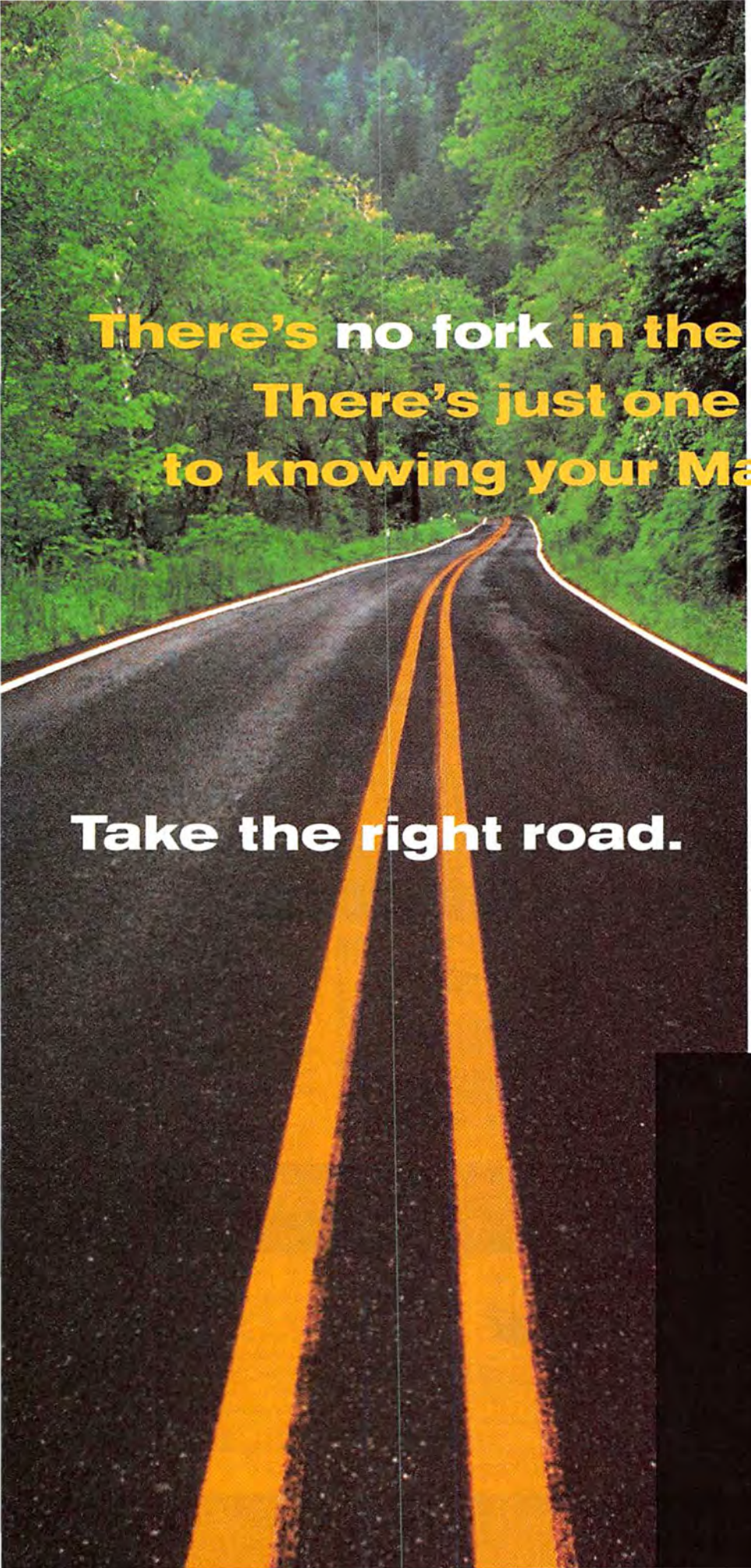
http://iaswww.com/source.html



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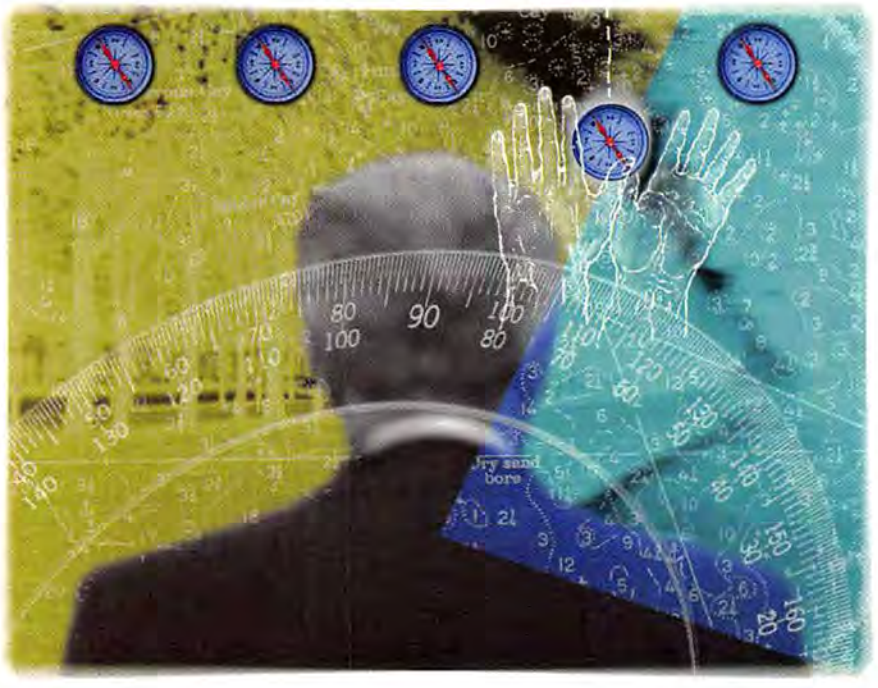
Media

Making Image Maps for Web Sites

A BEHIND-THE-SCENES PEEK AT SITE NAVIGATION

by Jim Heid



The World Wide Web is the hot neighborhood on the Internet in part because it supports graphically appealing sites, places you can navigate as you do CD-ROMs—by clicking on flashy designer buttons, for example. A common device for site navigation is a special graphic called an image map. It might look like a set of buttons and icons or a list of text options. It might even look like an actual map: click on a city to go to its page.

All image maps start the same way: you create a graphic containing the map's navigation buttons or devices, then with an image-map–creation program you draw *hot spots* that tie each button to a Web page.

That's the short version. The full story is more complex, with subtleties that affect Web-site performance. This month, I detail the good and the bad behind image maps. For links to related Web sites and to download the freeware and shareware tools I describe, visit my Web site (*http://www.heidsite.com*).

How Image Maps Work

Image maps embody the ugly buzz phrase *client-server computing:* an image map is a joint effort between the client Web browser and the Web server software. When a visitor clicks on a Web site's image map, the browser sends a pair of coordinates to the server. These coordinates specify a location, not an option the user chose. The message isn't "The Home button was clicked," but "The mouse was clicked 30 pixels to the right of and 50 pixels below the image map's upper-left corner."

It's up to the Web server to translate coordinates into the address (URL) of the target page. To do this, the server usually uses a Common Gateway Interface (CGI) application. CGIs run on a Web server and do special processing tasks or act as intermediaries between a Web server program and another program. When you fill out an on-screen form to do a search, for example, a CGI takes the information you enter and supplies it to a database manager or search engine.

When you click on an image map, your browser sends coordinates identifying where you clicked to a CGI, which compares them with a *map-definition file:* a text-only file describing all the hot spots in the map—each one's shape and location, as well as its corresponding URL. The CGI passes the URL to the server, which transmits it to the browser, which goes to the appropriate address.

STUART BRADFORD

A Behind-the-Scenes Look at Image Maps

AN IMAGE MAP MAY LOOK LIKE a collection of individual buttons and icons, but it begins with a single bitmap. Four main elements work together to make the image map the interactive beast Web visitors know and love.

Set the Scenery

The first step in making an image map is to create a bitmapped graphic. Use whatever program you like, but do optimize the graphic: make it no larger than necessary, and use a low bit depth and a compact file format (for more on optimizing graphics, see *Media*, May 1996).

Choose Active Areas

Key to the image map's interactivity are hot spots that associate each "icon" with an URL. Web tools with image-map features support several shapes (rectangles, ovals, circles, polygons, and points), so you can match them to your graphic.

TOOLS Adobe PageMill ($149; 408/961-3769, *http://www.adobe.com*), a terrific Web tool, makes short work of mapmaking. You draw a shape around the part of the image that should be hot, then type a target URL into the text-entry area of the window. You can also drag and drop page and anchor icons from other PageMill documents to copy their URLs. SiteMill, PageMill's senior sibling, has identical mapmaking features.

Fractal Design Painter 4 ($549; 408/688-8800, *http://www.fractal.com*) is another choice. This bitmapped-graphics powerhouse can associate URLs with floating selections.

Several shareware or freeware mapmaking programs are also available. The best of the bunch is WebMap, by Rowland Smith, which lets you create hot spots for an existing GIF or PICT file. Version 1.0.1 is a $20 shareware program and is available at *http://www.city.net/cnx/software/*. You can also download a beta release of version 2.0, which will be a $25 commercial program when released.

Define and File

The result of a mapmaking session is a map-definition file—a text file that's used by the image-map CGI installed on your Web server. For each hot spot, a line of text defines the shape and associated URL. Each shape attribute requires coordinates describing the shape's location on the map graphic. But don't get a migraine: PageMill and other map-creation tools supply the values for you.

NCSA and CERN—the two map-definition file formats—are similar but arrange the shape attributes and URLs differently. Most Mac image-map CGIs use NCSA. Be sure to specify the correct format in your map utility's Preferences or Save As dialog box.

The *default line*, the first line of the file, tells the CGI which page to display if a visitor clicks on part of the graphic that's not hot.

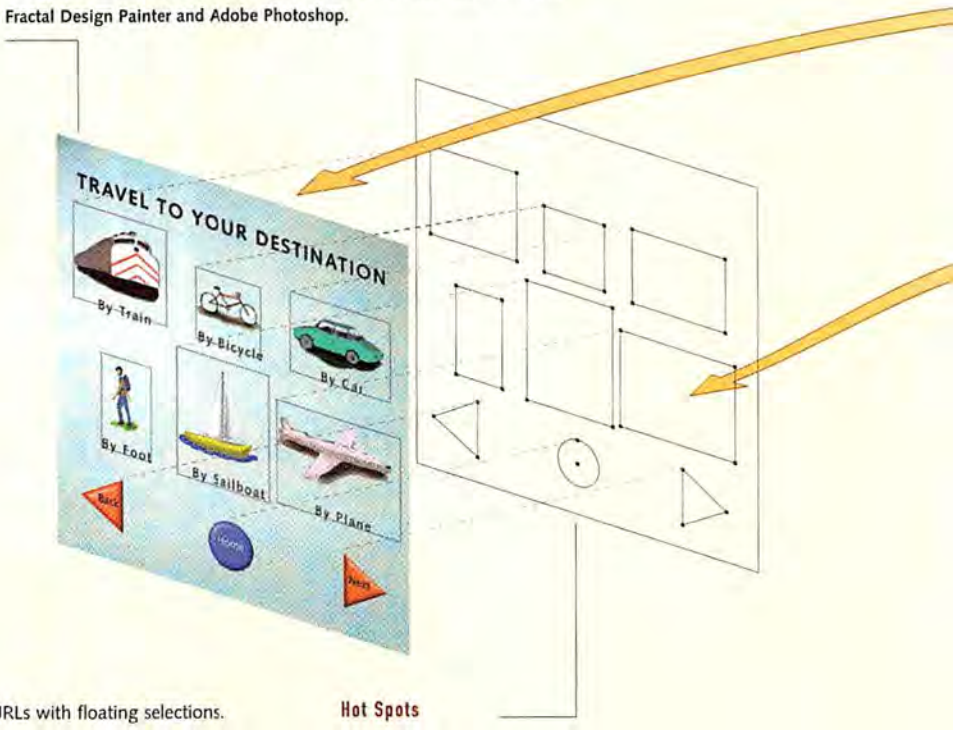
TIPS An image-map CGI scans map-definition files from top to bottom. For best performance, prioritize the entries in the file, putting the most-used hot spot first.

If two hot spots overlap, the CGI application uses the one that comes first in the map-definition file, so be sure to place the hot spot definition you want to take precedence first.

HTML Ties It Together

Behind the image map lies the HTML coding of the page the image map appears in. To display an image map,

Image Map Graphic
This graphic—which you can see on *Macworld*'s Web site—was created in Fractal Design Painter and Adobe Photoshop.



Hot Spots
Rectangular hot spots provide leeway for where to click and make server response faster than form-fitting, multisided polygons would.

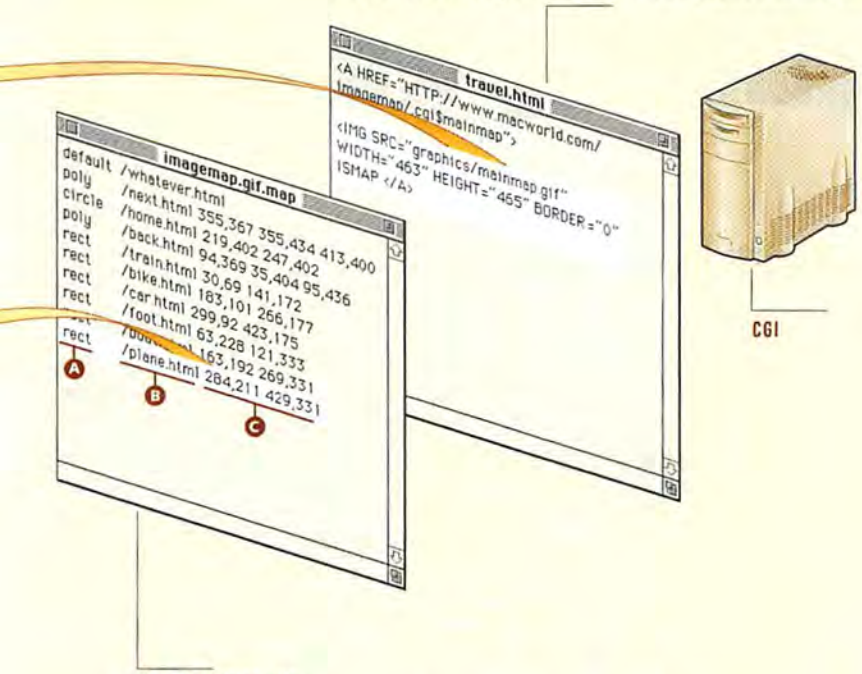
The Downside of Image Maps

One disadvantage of image maps is that they slow your server. Consulting a map file and translating coordinates into URLs isn't brain surgery, but it takes time that the server could spend dishing out Web pages. Multiply several image maps by the number of visitors clicking on them and the processing toll mounts.

Another drawback: while CD-ROM buttons and icons provide feedback—changing shape or color, for example—image maps provide no such clues. Move the pointer over a hypertext link, and your browser displays the link's target URL. Move the pointer over an image map, and the only change is to the coordinates at the end of the page's URL.

Worse, click on part of a map that isn't a hot spot, and the back-and-forth communication between browser and server still takes place. A couple of seconds (or more) elapse, and you see no change.

To minimize this problem, Web designers should make it clear where visitors can click to make something happen (see "Image Map Do's and Don'ts"). Cre-



The HTML Page

The <A and </A> tags denote an anchor element. The HREF tag points to the CGI; the IMG tag points to the map's graphic. The ISMAP attribute at the end of the IMG tag tells a browser that the graphic is an image map.

Map-Definition File

The rectangle attribute (A) describes the hot spot's shape. The URL (B) points to the hot spot's target page. These coordinates (C) indicate that the hot spot's upper-left corner is 284 pixels to the right of and 211 pixels below the map's upper-left corner; the spot's lower-right corner is 429 pixels to the right of and 331 pixels below the map's upper-left corner.

you create an anchor element and tags pointing to your CGI application and the map's graphic. You must also tell the browser to treat the graphic as an image map.

The CGI Runs the Show

Behind the scenes, translating received coordinates into URLs, is a CGI application.

TOOLS Two excellent map-processing CGI applications are available for Mac-based Web servers (ones running Quarterdeck/StarNine's WebStar, or MacHTTP). MapServe, a $20 shareware CGI by Kelly Campbell, is fast and runs native on Power Macs. It's at *http://www.spub.ksu.edu/other/machttp_tools/mapserve/*.

Web gurus say Lutz Weimann's Mac-ImageMap CGI is a bit slower than MapServe. But it's free. Find it at *http://weyl.zib-berlin.de/imagemap/mac-imagemap.html*.

TIPS If an Internet service provider is hosting your Web site, consult with the provider to determine how to implement your maps.

Image Map Do's and Don'ts

Arty but Awkward

This image map, from the Publisher's Depot home page (*http://www.publishersdepot.com/*), may look cool, but it violates several tenets of user-interface design. The hot spots are of varying size (implying that some options are more important) and lack a consistent appearance. They're scattered randomly throughout the map, providing no organization. Visitors unsure of where to click are likely to click on dead spots—frustrating themselves and slowing the server.

Simple but Effective

This image map, from the I Can't Believe It's Not Butter site (*http://www.tasteyoulove.com/index.html*), may be less hip, but it's clear and effective. The heart spots—er, hot spots—are unambiguous and have text labels.

About 5 percent of all Web users still use text-only browsers, such as Lynx. A larger percentage use 14.4-Kbps modems and turn off the browser's graphic-loading option. For these groups, it's good to provide text-only navigation options, such as a bar below the image map.

ating maps whose options are obvious won't prevent errant mouse-clicks, but it will reduce them.

Finally, image maps are cumbersome to test. You can't test a map by using a browser to open the HTML file containing the map—you must upload the map and its associated map-definition file to a Web server that also contains the CGI you will use to service the map. If a service provider is hosting your site this means lots of uploading time as you test and debug your maps.

Current Web interface-design options may be primitive, but this is an embryonic communications medium—cut it some slack. When radio was as old as the Web is now, people were tuning in stations by adjusting the position of a fine wire called a cat's whisker. Now *that's* a primitive user interface. **m**

Next month: Client-side image maps

JIM HEID produced the CD-ROM included with his *Macworld Complete Mac Handbook*, fourth edition (IDG Books Worldwide, 1995).

Publishing Workshop

Faster Printing through Font Downloading

by Steve Roth

"Downloading font Arabesque Oblique." How much of your life have you spent watching messages like that—often repeated over and over for a single print job? Would you like to banish that message and speed printing? The good news is that you can often avoid it, and save many hours in printing time over the course of a week, month, or year. The better news is that it's easy.

Through a series of back-and-forth queries, the Mac and the printer determine the location of the fonts in a print job. If they're not in the printer, the Mac automatically downloads them from its own hard drive. But the download takes time—maybe 5 or 10 seconds for each font (more on a busy network). And when the printer finishes a job, it flushes the fonts from memory, and your Mac and the printer must go through the whole download dialogue again for the next print job.

Five seconds doesn't sound like much, but if you have a half-dozen fonts on a page (remember—just switching to bold or italic requires a different font), you're looking at 30 seconds or more every time you print. Print 20 jobs a day, and there's 10 or 15 minutes of your life—gone. With certain documents and software (Adobe PageMaker is the prime culprit), your Mac might download the same font several times for a single page. On more than one occasion I've missed the deadline for FedEx pickup just because of font downloading.

Note that PageMaker is a special case. While its font downloading works pretty much as I'll describe—as long as Background Printing is turned off in the Chooser—

THE DOWNLOAD DIALOGUE

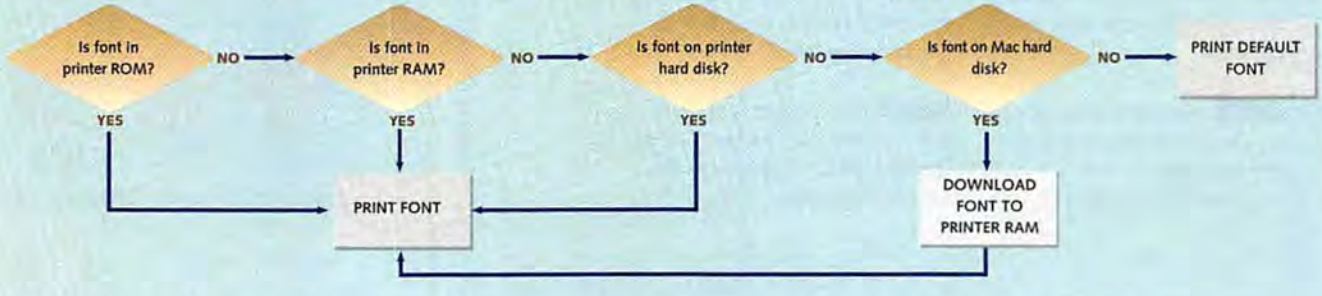
When you print from your Mac to a PostScript printer, the two go through a dialogue to ensure that the fonts you want are the fonts you get—no matter where those fonts reside. The utilities covered in "Font Downloaders" let you download fonts to save time.

PostScript printers come with some fonts preinstalled in their read-only memory (ROM); these fonts are available to the printer immediately.

Fonts that have been downloaded to the printer's random access memory (RAM) are available to the printer immediately.

Fonts that are on a hard disk connected to the printer are always available, but it takes the printer some time to search the disk and load the fonts into RAM.

If fonts are on the Mac's hard disk but not on the printer, the Mac finds the fonts and downloads them into the printer's RAM. When the job is done, the printer flushes those fonts from RAM.



To find out what fonts are in your printer's ROM, use a font downloading utility. Both LaserWriter Utility and Apple Printer Utility let you print a catalog of fonts.

To download fonts to RAM in advance, use any of the downloading utilities. To determine how much RAM the printer has, use LaserStatus, LaserWriter Utility, or Apple Printer Utility.

To download fonts to a hard disk connected to a printer, use LaserWriter Utility, Apple Printer Utility, or Downloader.

If a font is not on the printer or the Mac, the printer uses its default font (usually Courier).

there are some exceptions, and exceptions to exceptions, more than I have room to discuss here. For the skinny on font downloading and PageMaker, check out the excerpt from *Real World PageMaker 6* (Peachpit Press, 1996) posted in the Macworld Online Software Library.

Avoiding Downloads

How do you avoid repetitive automatic downloads? By using a utility to download frequently used fonts into your printer's memory in advance. When your Mac asks the printer whether the font is available, the printer says "Yes," so the Mac doesn't have to download it. Manually downloaded fonts stay in your printer's memory until you turn the printer off (and why would you ever want to do that?). The number of fonts you can download is limited by your printer's available memory. If you exceed this limit, the printer will crash and reset, flushing from memory all downloaded fonts.

If your printer has a SCSI port, you can attach a hard disk and download hundreds of fonts onto it. Those fonts stay there until you decide to remove them, and you never have to worry about whether they're available. RAM-resident fonts print faster than fonts on an attached hard disk (the printer looks in RAM before looking on the hard disk), so it is worth having frequently used fonts in RAM, but you're still ahead if the fonts are on the printer's hard disk. You won't see those font-downloading messages as often, but I swear you'll never miss them. **m**

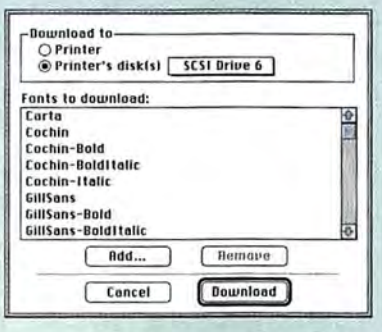
Contributing editor STEVE ROTH is president of Thunder Lizard Productions, a company based in Seattle that produces the PageMaker, QuarkXPress, Photoshop, and Illustrator Conferences nationwide.

FONT DOWNLOADERS

There must be at least a dozen PostScript downloading programs available for the Macintosh, ranging in price from free to thousands of dollars, and from barebones to feature-rich. Here is a rundown of cheap and free downloaders; the dialog boxes below highlight each utility's font-downloading tools.

LaserWriter Utility 7.7

This downloader from Apple comes with System 7.5 (in the Apple Extras:Printing folder). You can use it to download fonts (including TrueType fonts) to the printer's memory or hard disk. LaserWriter Utility lets you download fonts in batches, but it can't save that information; you must gather the fonts each time you download them. LaserWriter Utility can print a catalog of fonts or sheets of sample output, and it offers several other printer-management features.

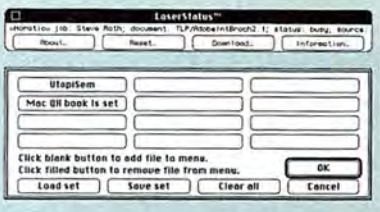


Apple Printer Utility 2.0

An updated version of LaserWriter Utility 7.7, Apple Printer Utility 2.0 (which comes with LaserWriter 8.3) has nearly identical features and a fancier interface, is much slower, and requires 1448K of RAM compared with LaserWriter Utility's 256K. Now *that's* progress.

LaserStatus 3.0.4

This venerable utility is part of Prairie Group's $19.95 MockPackage Utilities (515/225-3720, *http://members.aol.com/prairiesft/*). LaserStatus, which works with Systems up to 7.5.3 and LaserWriter drivers up to 8.3 (the other utilities are System 6–specific), won't let you drag and drop to download fonts to a printer's hard disk, but you can save Sets (lists of fonts for LaserStatus to download—a big time-saver), get information on available printer fonts, and easily monitor printers on the network to see who's printing what—all in only 20K of memory.



Downloader 5.0.5

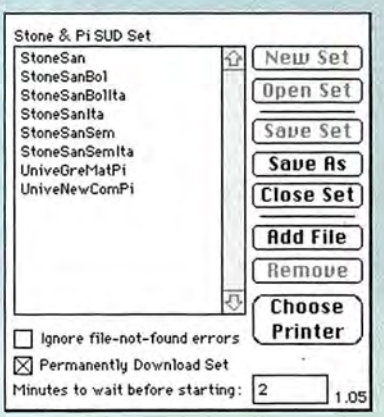
Adobe's utility comes free with most Adobe products. It's surely on one of the half-dozen Type On Call CDs you've got lying around. It doesn't offer LaserWriter Utility's printer-management options, and you must find all the fonts you want to download every time, but you can drag and drop them onto an icon in the Finder.

Startup Downloader 1.0.6

Manuel Veloso's $20 shareware control panel (it's in the Macworld Online Software Library on AOL and on the Web at *http://www.macworld.com*) does just one thing: create sets of fonts for downloading. When you save a set, Startup Downloader creates an applet. Double-clicking launches the applet, which downloads fonts in the background, then quits. You can put the applet in your Startup Items folder, for automatic downloads at start-up; use a macro to launch the applet; or put its alias in your Apple menu.

Some problems: you can't download to a printer's hard disk; you must select the right printer before running an applet; and the applets require a 7.X LaserWriter driver (so you must keep one in the Extensions folder).

But these are minor inconveniences; Startup Downloader and LaserStatus are inexpensive, easy-to-use downloaders that all desktop publishers should have.



MIKE SALISBURY

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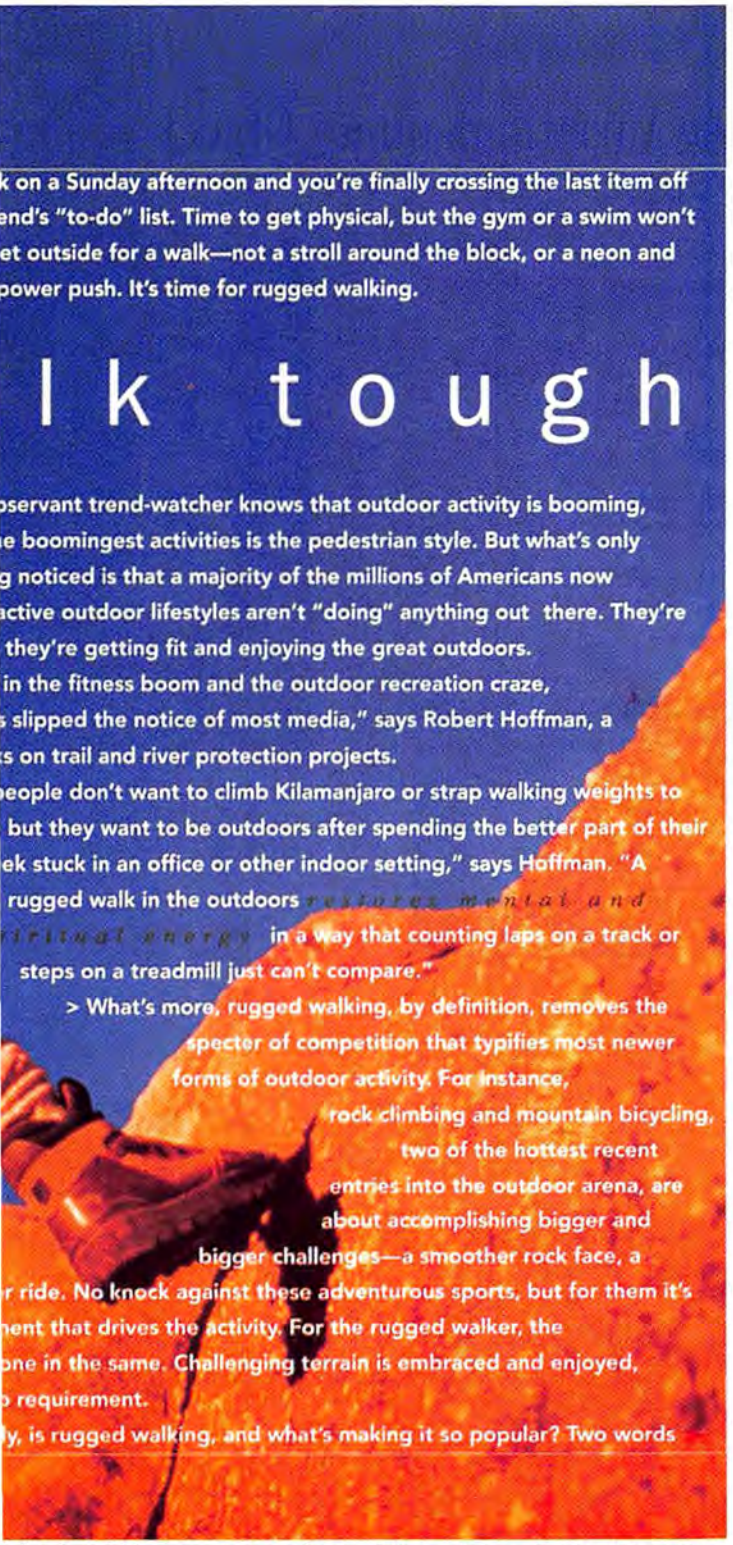
on PageMaker 6.0.



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Mike Salisbury uses Adobe™ PageMaker™ to create designs so powerful they've become part of our collective consciousness. Layouts for Rolling Stone magazine, posters for Jurassic Park and Aliens, and Michael Jackson album covers bear his imprint. Now there's a radically new Adobe PageMaker 6.0 upgrade. "The interface is so natural, it never interferes with my ideas", says Salisbury, "and this new version is really over the top. I'm getting dead-on color from start to finish because it's locked into Kodak's Precision Color Management System." Hot new features include multiple master pages to streamline the creation of different page designs in a single publication; grouping and ungrouping to combine elements into a single movable, editable unit; integrated automatic trapping for color publications; and full compatibility with Adobe Acrobat™ and HTML so any document can be sent anywhere electronically. Adobe PageMaker 6.0 is here, so even if you're not creating professional design, this is the tool to give you professional looking results. Call 1-800-521-1976, Ext. K1272 for more information or visit our web site at http://www.adobe.com/.

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Graphics Workshop

Using Clipping Groups to Make Variations on an Object

by Cathy Abes

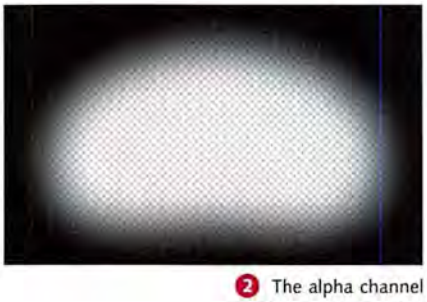
ARTIST From his San Francisco Bay Area studio, Bert Monroy has produced photo-realistic imagery for clients such as Apple and Adobe, and matte paintings for movies, including *Forrest Gump*. He's also the coauthor of *The Official Adobe Photoshop Handbook* (Bantam, 1991) and *Adobe Photoshop: A Visual Guide to the Mac* (Addison-Wesley, 1996).

HOW IT WAS DONE In building this photo-realistic image of bins full of beans, Monroy used a clipping group within Photoshop layers to generate numerous, slightly differing objects from one simple image—a technique used to create all the beans in the foreground. Putting textures, color, shading, and highlights into individual layers and repositioning these layers creates subtle variations. Used as a shape to define the object, the base layer provides a mask through which all layers within the clipping group are visible.

Because the clipping group allows you to reposition each layer within the confines of the shape, it's easy to create many versions of the same image—for example, you can move the highlight and shadow from one side to the other to indicate light coming from a different direction. Once you've defined the layers, you can option-merge them (to preserve the original layers for later use). You can then rotate, scale, or otherwise manipulate the merged object.

THE TOOLS **Hardware:** Power Mac 8100 with 96MB of RAM and 250MB internal hard drive; FWB Hammer 9GB drive; PLI Infinity Optical Disk; SyQuest 88; Iomega Bernoulli 150MB; SuperMac 19" monitor; Apple 13-inch monitor. **Software:** Adobe Photoshop 3.0.4. m

1 The bean-shape outline became the base layer Monroy used to create the clipping group that includes all the other layers.



2 The alpha channel with Gaussian Blur applied (set to a 50-pixel radius on a 300-dpi image), used to select areas for shadows and highlights.

3 After adding the color layer, Monroy created the clipping group so he could see the shape of the bean instead of just a layer filled with color. As he created each subsequent layer, he added it to the clipping group. Here, Monroy made the bean shape, color, highlight, and shadow visible so he could correct the positioning of the highlight and shadow.

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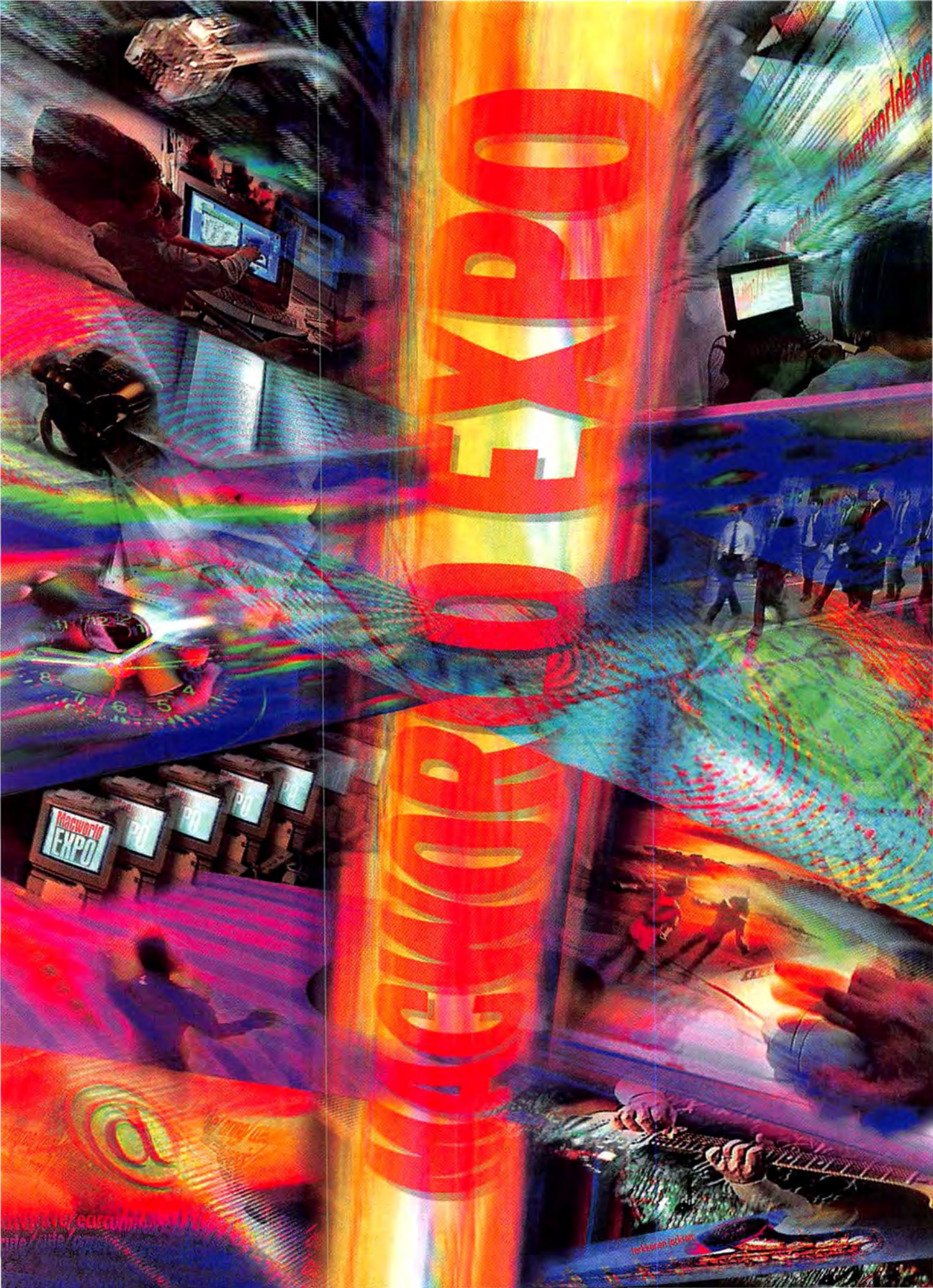
7 A variation of the first bean; Monroy offset the highlight and shadow layers by dragging them to new positions with the Move tool.

6 The first finished bean, which Monroy created by merging the original six layers. Once he'd brought this bean into the main illustration and positioned it correctly, he was ready to go back to his layers and create another one.

5 Holding down the option key while selecting Merge Layers in the Layers pop-up dialog let Monroy merge all layers into one while leaving the original layers intact. He then added the merged layer to his illustration, rotating it into position. This technique enabled him to use the original layers as a sort of graphical template to create many variants of the bean.

4 With the noise layer turned on, its accompanying layer mask (a copy of the original alpha channel) was used to soften the noise effect along the edges of the bean to give the illusion of depth.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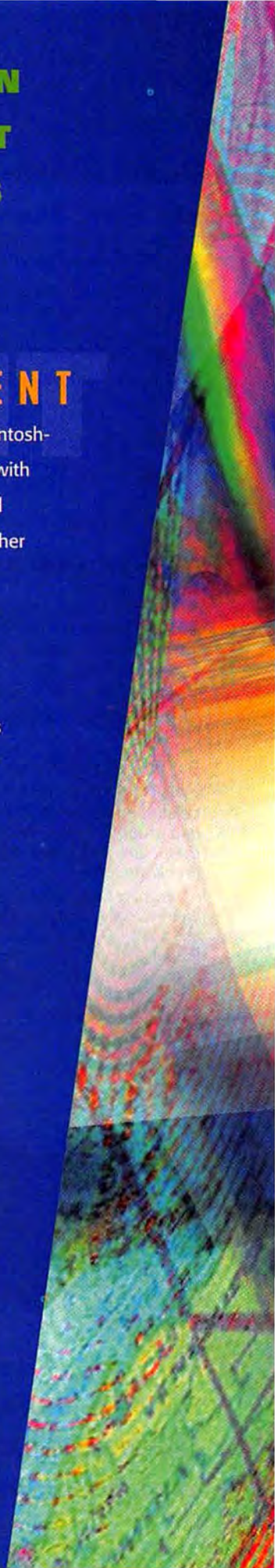

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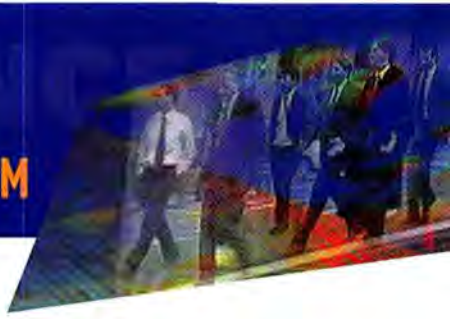

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❑ 9. Engineering/R&D
❑ 10. Government/Military
❑ 11. Health/Medical Services
❑ 12. Legal Services
❑ 13. Manufacturing (Computer Industry)
❑ 14. Manufacturing (Non-Computer Industry)
❑ 15. Marketing/Sales/PR/Communications
❑ 16. Printing/Publishing
❑ 17. Transportation
❑ 18. Utilities
❑ 19. Other_____

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❑ 22. Controller/Treasurer/Accounting/CFO
❑ 23. Corporate Executive
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❑ 27. Engineering/Scientific/R&D
❑ 28. Human Resources
❑ 29. Management/Department Head
❑ 30. Marketing/Sales
❑ 31. Network Management
❑ 32. Professional (Lawyer, Doctor, etc.)
❑ 33. Programming/Analysis
❑ 34. Purchasing
❑ 35. Training
❑ 36. Other_____

WHAT IS THE SIZE OF YOUR ORGANIZATION?
❑ 37. Under 50
❑ 38. 50-99
❑ 39. 100-499
❑ 40. 500-999
❑ 41. 1000 & Over

WHICH PERSONAL COMPUTERS DO YOU USE? (Check all that apply)
❑ 42. Macintosh Powerbook Series/Duo Series
❑ 43. Macintosh II Series
❑ 44. Macintosh Performa Series
❑ 45. Macintosh Centris Series
❑ 46. Macintosh Quadra Series
❑ 47. Macintosh Workgroup Series
❑ 48. PowerMac
❑ 49. Newton
❑ 50. Mac clone
❑ 51. IBM PC or compatible desktop
❑ 52. IBM Laptop/Notebook
❑ 53. Other_____

HOW MANY MACINTOSH COMPUTERS ARE USED IN YOUR ORGANIZATION?
❑ 54. 0
❑ 55. 1-10
❑ 56. 11-25
❑ 57. 26-50
❑ 58. 51-100
❑ 59. 101-500
❑ 60. 501+

ARE THE COMPUTERS AT YOUR ORGANIZATION NETWORKED?
❑ 61. Yes
❑ 62. No

WHICH APPLICATIONS DO YOU OR YOUR ORGANIZATION UTILIZE? (Check all that apply)
❑ 63. Accounting/Finance
❑ 64. Agenda Minder/Scheduler
❑ 65. CAD/CAM
❑ 66. CASE Tools
❑ 67. Database
❑ 68. Desktop Publishing
❑ 69. Digital Video
❑ 70. Education
❑ 71. Graphics
❑ 72. Multimedia
❑ 73. Project Management
❑ 74. Spreadsheet
❑ 75. Word Processing

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❑ 78. CompuServe
❑ 79. Netscape
❑ 80. Prodigy
❑ 81. Other_____

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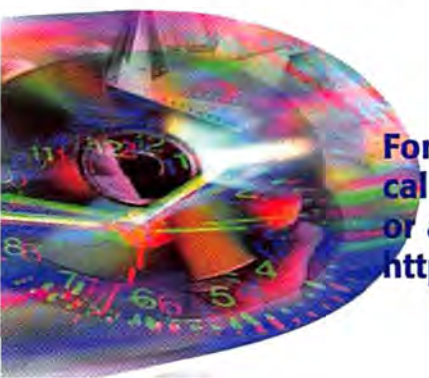

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WHICH 28.8-KBPS OPTIONS ARE WORTHY OF YOUR POWERBOOK?

by Peter M Stoller

ROBERT PERRY

Apple PowerBook users have waited far longer than their PC counterparts to enjoy the advantages of PC Cards (formerly known as PCMCIA cards), but it's been worth the wait. About the size of a credit card, these diminutive peripherals are ideal for portable computing. Apple's 500-series PowerBooks were the first to be PC Card–capable, but only when you added a $219 module; besides, their internal modems obviated the need for Mac-compatible PC Card counterparts. The PowerBook 5300 and 190 series, however, dropped the internal modem, inspiring an onslaught of new PC Card modems. But are they serving all the needs of Macintosh users?

To find out, we compared ten V.34 (28.8-Kbps) PC Card modems for real-world performance, connection reliability, features, and Mac savviness. We found ourselves holding a mixed bag, from which we pulled one outstanding Mac value.

What Makes a Macintosh Modem?

Strictly speaking, there's no such thing as a "Macintosh modem." If a PC Card modem designed for Intel laptops also falls within Apple's electrical specifications and works with Apple's Card and Socket Services software (essentially the PC Card driver), the vendor can print "Mac-compatible" on the box.

Most of the products we looked at reflect such a PC-oriented heritage; Angia Communications' SafeJack and Archtek America's SmartLink V.34 virtually flaunt it with their lack of Mac software and documentation, respectively. While these two are technically Mac-compatible, *real* Macintosh products should include Macintosh software, documentation, and support files.

To address this issue, Apple has established the Macintosh PowerBook Qualification (MPQ) Program. Few vendors seem to feel it's worth paying Apple for qualification: of the products we tested, only the Global Village Communication PowerPort Platinum PC Card and the TDK Systems DF2814 are MPQ certified.

Should qualification matter to the user? We think so. While the Global Village and TDK modems have two of the highest list prices, they're two of only three modems, along with the Dayna modem, that come with Mac CCL (Communications Control Language) scripts for Apple Remote Access (ARA) and online services. Then again, TDK's DF2814 fell short on performance, so the MPQ sticker alone is no guarantee of quality.

Portable Performance

Once we rounded up the CCL files, we ran a series of tests designed to simulate the typical experience of a PowerBook user on the road (see the benchmark, "PC Cards on the Line").

Initially, we had trouble connecting

Macintosh Modems, Phone Home

Company	Modem	Star Rating [A]	List Price	Company's Estimated Price [B]	Phone	Warranty (in years)	Adapter
Angia Communications	SafeJack	★★★/5.4	$299	$259	801/371-0488	lifetime	dual RJ-11, no cable
Apex Data	Mobile Plus Macintosh	★★★/5.4	$307	$275	510/623-1231	5	media coupler for single RJ-11 plug
Archtek America	SmartLink V.34 2834 PCA	★★/4.3	$349	$279	818/912-9800	5	media coupler for single RJ-11 plug
Dayna Communications	CommuniCard 28.8	★★/4.8	NP	$416 ($359 without cellular capability)	801/269-7200	5	media coupler for single RJ-11 plug
Epson America	EFM 288XJ	★★★/5.4	$299	NP	310/782-0770	3	retractable
Global Village Communication	Editors' Choice PowerPort Platinum PC Card	★★★★/8.0	$399	NP	408/523-1000	5	dual RJ-11
Hayes Microcomputer Products	Optima 288 V.34	★★★/6.6	$319	$299	770/441-1617	5	retractable
Megahertz	28.8 CruiseCard	★★★/6.3	$299	$270	801/320-7000	5	retractable
Practical Peripherals	MacClass 288 V.34	★★★/6.2	$299	NP	770/840-9966	lifetime	retractable
TDK Systems	DF2814	★★★/6.0	$379	$240	916/478-8421	5	media coupler for single RJ-11 plug

NP = not provided. [A] Based on features, implementation, innovation, performance, reliability, ease of use, and value. (See Star Ratings section for full explanation.) [B] Actual prices could be higher or lower protection is built in to the Global Village Clyde connector, not the PC card itself.

to a Shiva LANRover/E Plus for our ARA tests because of problems with version 2.0.1 of the ARA client software; the solution required manually editing CCL files. Only the PowerPort Platinum's bundled CCL allowed it to connect right out of the box.

We had no problems connecting to online services, and our ARA text-file–transfer tests showed no significant performance variances. For E-mail and small-document transfers, any of these modems will serve you equally well with the right CCL.

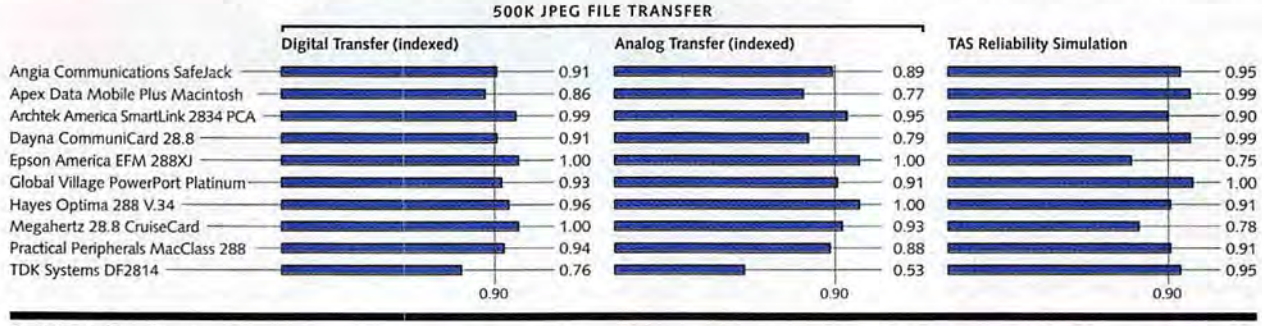
Performance differences between the modems emerged when we upped the ante and started transferring 500K JPEG files. Even under optimal line conditions, the TDK DF2814 was only three-fourths as fast as most of the others; under typical analog line conditions it slowed to half the speed of the fastest modems. TDK provided us with an alternative CCL, but it did not perform any better. TDK was unable to explain this degradation at press time.

Apex Data's Mobile Plus Macintosh and Dayna Communications' CommuniCard were also on the slow side, though not as sluggish as the TDK. Stay away from these if large ARA file transfers are a substantial part of your work. On the other hand, Epson's EFM 288XJ and

MW LAB

PC Cards on the Line

Longer bars are better. Results are times as fast as the fastest modem in each test (1.00 = fastest). Products are listed in alphabetical order.



Behind Our Tests

When you're on the road, reliability counts. In our PC Card modem tests, some modems performed reliably but not quickly, or vice versa. • To rate PC Card modems in environments that traveling Mac users might encounter, we tested for connect reliability, remote access, and file-transfer throughput, then indexed the results. For the throughput test we used a typical remote-access scenario with a Shiva LanRoverE/Plus connected to a small AppleShare file server–based network. We dialed in to the LanRoverE/Plus over both analog and digital lines, and downloaded text and graphics files from the server to the PowerBook. The results of the text-file downloads were so similar that we're showing only the graphics file results. For the connect reliability tests, we logged connect speeds using a TAS simulator, a device designed to duplicate various average line conditions found in the United States. • Based on the indexes, we recommend that you stick with PC Card modems that give you an indexed value of at least 0.90 on all three tests: that means those from Archtek America, Global Village, and Hayes. Based on other considerations, such as ease of use and adapter quality, we designated the Global Village PowerPort Platinum as Editors' Choice.—**Macworld Lab testing supervised by Matt Clark and Mark Hurlow**

Digital-Line Protection	Cellular Capable	Flash ROM Upgradable/ Mac Updater	Operating/Standby/ Sleep Power Ratings (in milliamps)	Bundled Software	Availability of Updated CCL Files [C]
yes	yes (requires $59 cable adapter)	yes/no	160/2/2	none	online
yes	yes (requires $69 cable adapter)	yes/no [D]	180/5/5	Smith Micro MacComCenter	online
no	no	no/no	290/60/60	Smith Micro QuickLink II	online
no	yes (adapters available on request)	yes/no [D]	190/12/12	STF Technologies Start Faxing	supplied with modem
yes	yes (requires third-party cable adapter)	no/no	275/40/15	Delrina Fax Lite	online
yes [E]	no [D]	yes/yes	200/11/11	GlobalFax, GlobalFax OCR, ZTerm terminal emulation	supplied with modem
yes	yes (requires third-party cable adapter)	yes/yes	250/5/5	Smith Micro MacComCenter	online
yes	no [D]	yes/yes	275/50/50	Aladdin SITcomm SE, Delrina Fax Lite	online
yes	no	yes/yes	250/5/5	Smith Micro MacComCenter	online
yes	yes (requires $99 connection kit)	yes/yes	255/22/10	Software Ventures Microphone LT, STF Technologies Start Faxing	supplied with modem

than the estimated street price provided by the company. [C] *Additional CCL files are available at* http://www.shiva.com *and* http://www.apple.com. [D] *Feature is under development.* [E] *Digital-line*

Megahertz's 28.8 CruiseCard were fast, but their call-connection reliability rates were both under 80 percent.

Global Village trumps the others with its own Card and Socket Services software, which lets you slip the PC Card in either slot (Apple's similar software forces you to choose one of the two slots) and lets you swap slots even when your communication software is running. Global Village also claims to have improved communication between the modem and the serial port, thereby netting greater throughput. ARA defeats this potential throughput advantage, but unlike some schemes the Global Village enhancement doesn't depend on having the same modem at the other end. (We also found Global Village's Global Fax software to be the best of the software bundles.)

Getting Connected

Performance ratings mean nothing until you get on an outgoing line. That's not always easy. Plugging into a high-current digital phone line, such as the kind you'll find in many hotel rooms and offices, can fry your PC Card modem. Fortunately, most of these modems have digital-line protection: circuitry that detects and diverts the higher current, protecting the modem. Only Archtek's SmartLink and Dayna's CommuniCard don't. For these modems, you should use a line tester, such as IBM's $29 Modem Saver (914/642-3000, *http://www.ibm.com*).

At the other end, card connectors are divided into two categories: plug-in and pop-out, each with advantages.

Thanks to their small size, plug-in adapters are easy to carry—and easy to misplace. Replacing them is inexpensive but inconvenient. Most are simple PC Card–to–RJ-11 cables, though Angia's adapter puts two jacks flush to the card. Then there's Global Village's adapter, called Clyde. On one end the adapter leaves free access to the second slot; the opposite end has two RJ-11 ports. The ends lock together to protect the jacks and loop securely around a strap or cable so the adapter won't stray.

Pop-out connectors, such as those on the Hayes and Megahertz modems, can't get lost or forgotten, and can't be surpassed for convenience. None of these modems offers a dual-jack version, however, so you can't connect the phone and the modem simultaneously unless you're carrying a line splitter—no more convenient than carrying a plug-in adapter. Also, while they don't seem especially flimsy, any damage to these small plastic connectors would require replacing the whole card—an expensive fix.

The Last Word

Street prices for nearly all these modems range from $240 to $299, so cost isn't a big differentiating issue. Only the Dayna CommuniCard 28.8—with an estimated street price of $416 (or $359 without the cellular capability)—is priced far beyond the others we tested. Some perform better than others, and some have better bundles or feature sets, but on balance, only one is more than adequate.

The PowerPort Platinum is the card that stands out from the pack. At $399, it's costlier than all save the high-end CommuniCard, but you get what you pay for: a complete, well-conceived mobile communications package for the Macintosh, not just a modem. Thus, the PowerPort Platinum PC Card sets the standard by which all other Mac PC Card modems should be measured. **m**

PETER M STOLLER (*afcpeters@aol.com*) is a Los Angeles–based Macintosh consultant who works with America Online's Mac OS forum.

PC CARD MODEMS

MW EDITORS' CHOICE Macworld Lab tested ten 28.8-Kbps PC Card modems. We tested connection reliability, measured data performance, and examined bundled software and connectors.

★★★★/8.0 **PowerPort Platinum PC Card** This modem card combines solid hardware performance with an excellent software bundle, including enhanced Card and Socket Services software and the fine GlobalFax. Weak OCR software aside, everything about this package—from the manual to the thoughtfully designed adapter—is top-notch. **Company:** Global Village Communication (408/523-1000, *http://www.globalvillage.com*). **List Price:** $399.

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by Don Sellers

What to Do When RSI Strikes

PART TWO OF A TWO-PART SERIES: HOW TO GET PROPER TREATMENT

COMPUTER USERS WHO suffer repetitive strain injuries (RSI) often face a stacked deck. Clinicians report increasing numbers of injuries, yet the constraints of our health-care system make it more and more difficult to get adequate treatment. Many employers continue to see workers as replaceable, and ignore prevention; others mislead workers about their range of treatment options, then fire workers who become disabled. Some state workers' compensation systems take the view that injuries from computer use don't exist. Some managed-care providers insist on a cookbook approach to computer injuries, discouraging access to specialists and physical therapists. And workers sometimes hide their injuries, whether out of fear or from ignorance. For the best chance of recovery, if you become injured as a result of computer use, you must take charge of your health care.

Last month I suggested some strategies for identifying a health-care professional who is well suited to treat RSI caused by computer use. This month I discuss how to get the most from a visit to the doctor and how to step through the hurdles of the health-care system.

Preparing for the Office Visit

Clinicians stress the difficulty of treating computer-related injuries. "What you're dealing with is a work-related problem that is multifaceted, and there are upward of 20 to 30 different possible contributing factors," states Dr. Emil Pascarelli, a physician with decades of experience treating RSI, and the coauthor, with Deborah Quilter, of *Repetitive Strain Injury* (John Wiley & Sons, 1994). "Each of these has to be chipped away at and eliminated from the equation." The doctor can use your help.

Before you set out for the doctor's office, do your homework. Bring to your examination a careful description and history of your symptoms. Consider creating a journal that includes when the symptoms first occurred, what you were doing at the time, whether the symptoms came on suddenly or gradually, how they have changed over time, what aggravates them, and what, if anything, provides relief. Be prepared to describe your workstation and work habits, including the heights and relative positions of your chair, monitor, keyboard, and telephone.

Gather prior tests and medical records. "It is critically important to know if there are associated diseases in your family," says Dr. Peter Bower, a specialist in musculoskeletal rehabilitation and a member of the faculty at the University of Virginia Medical School. "These include endocrine problems like diabetes, or thyroid problems. Rheumatoid arthritis is important." Some relevant neuralgic problems, though fairly rare, are important to know about.

A Maximized Meeting

Computer-savvy doctors stress the need for a complete evaluation because of the complexity of RSI. This often includes a thorough history of work, hobbies, exercise, other medical conditions, drugs taken, smoking, and patient demographics and background. The physician must take a history of the complaint. Most cases call for an extensive physical examination involving range of motion of joints, the soft tissue, and neuromuscular condition.

You have the right to ask questions that will help you determine whether a given provider is appropriate for you—and the right to expect honest, direct answers (see "The Doctor-Patient Interview"). Some warning signs that the physician may be inappropriate for you are a lack of experience with RSI, a cursory examination, or immediate recommendation of surgery.

Pascarelli stresses the importance of the physician's attitude: "There's a lot of cynicism . . . [and] antipatient feeling among physicians with regard to this problem, and I think it reflects the frustration of . . . trying to figure out what's going on. If you're not interested in the problem, then you're not going to do a good job of the kind of detective work that's necessary to figure out what's going on." When a physician doesn't seem right for you, don't be afraid to go elsewhere.

Battling Bureaucracy

Health-care systems vary widely, so it's hard to give meaningful advice that covers them all. Regardless, your first step is to educate yourself about your benefits. If you believe your injury is work-related, first notify your company's workers' compensation administrator. Then, look for a health-care practitioner who's experienced with your insurance plan and the

continues

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workers' compensation system and who understands the relationship of your injury with your work.

Health-care plans that are allied with your employer are potential sources of abuse. "Often the employer will blithely say, 'This is your physician,' and the workers will think that they don't have a choice in the matter," says Stephanie Barnes, executive director of the Association for Repetitive Motion Syndromes. Using a doctor you like may require delicate negotiation with a reluctant employer.

All too many insurance companies and employers take the shortsighted view that keeping your treatment brief and cheap will save them money. So before you begin the workers' compensation process, Barnes says, "know your system [and] how many doctors you can legally see. Interview the doctors before you start seeing them. Watch out for doctors who are closely aligned with the insurance company."

State-run insurance networks restrict your choice of doctors. Some states lock you into going to the first doctor you visit, whether that doctor is competent or not, for a certain period of time. That's just one reason RSI support organizations stress the importance of consulting a lawyer familiar with the workers' compensation system early in the process.

Managed-care programs, including HMOs, are particularly weak in treating chronic RSI. A common problem is primary-care physicians who initially prescribe muscle relaxants and splints, and then if the problems persist, resist chang-

Streetwise Shopper

DeltaGraph 4.0 DeltaPoint's upgrade to its graphing package DeltaGraph Pro 3.5 (Jan 96 ★★★★★) supports Microsoft Excel 5.0 and offers more formatting controls. The suggested retail price is $195; upgrades are $49.95 from version 3.5, $79.95 from older versions. DeltaPoint, 408/648-4000, *http://www.deltapoint.com*.

In Control for Workgroups 4.0 Attain has upgraded its planning and organization software, adding features such as support for Netscape bookmarks and Internet Config. The suggested retail price is $85; version 3.5 users can upgrade for $34.95. Attain, 617/776-1110, *http://www.attain.com*.

ClarisWorks 4.0v4 For $49, owners of version 4.0 (Oct 95 ★★★★) can upgrade to Claris's latest, which includes drag-and-drop support, as well as translators for WordPerfect 3.1 and RTF. Company's estimated price for the full version is $129. Claris, 408/727-8227, *http://www.claris.com*.

Bugs and Turkeys

Despite a note on the box stating its compatibility with Open Transport, WebStar 1.2.4, Quarterdeck/StarNine's Web-server software, does not serve files through Open Transport and an Ethernet connection. This includes Apple's latest release of Open Transport, version 1.1. A new, native trial version of WebStar should be available from StarNine's Web site by the time you read this. StarNine, 510/649-4949, *http://www.starnine.com*.

If you want to print just selected objects in an illustration using Adobe Illustrator 6—beware! If you turn on the Selection Only checkbox inside the Print dialog box and then save your illustration, Illustrator 6 will save only the selected objects. If nothing is selected, your file will be empty the next time you open it. Adobe tech support says the solution is either to be sure you uncheck this feature or to work on a copy of the file. Adobe Systems, 317/581-3500, *http://www.adobe.com*.

Iomega's Jaz drive, which began shipping for PCs in January, is still not shipping for Macs. According to Iomega's tech support, the delay centers around a lack of driver software for the Macintosh, although it confirms the availability of an unofficial Jaz driver for the Mac on America Online. The files are Jaz Installation Floppy and Iomega Jaz Tools 4.3, located in Iomega's Macintosh Software Library (AOL keyword: *Iomega*). Iomega, 801/778-1000, *http://www.iomega.com*.

Macworld will send you a Bug Report or Turkey Shoot T-shirt if you are the first to inform us of a turkey or a serious, reproducible bug that we report in this column. See How to Contact Macworld.

THE AMCOEX INDEX OF USED MACINTOSH PRICES

Machine (RAM/Hard Drive)	Average Sale Price	Monthly Change
PowerBook 140 (4MB/40MB)	$575	$0
PowerBook 165 (4MB/80MB)	$825	+$5
PowerBook 180 (4MB/80MB)	$1025	–$75
PowerBook Duo 230 (4MB/80MB)	$725	–$25
Mac IIsi (5MB/40MB)	$225	$0
Mac IIci (4MB/80MB)	$450	+$50
Mac IIfx (4MB/80MB)	$400	–$25
Centris 650 (8MB/230MB)	$775	–$50
Quadra 800 (8MB/230MB)	$1125	$0
Quadra 900 (8MB/160MB)	$925	–$50
Power Mac 7100/80 (8MB/350MB)	$1300	–$100
Power Mac 8100AV (8MB/500MB)	$2100	–$75

Index provided by the American Computer Exchange of Atlanta (800/786-0717). It reflects sales during week of April 19, 1996. Configurations include keyboard and exclude monitor and display board for noncompact models.

ing the treatment or referring the patient to a specialist. The insurance carrier may put a limit on the number of visits to physical therapists.

Combat this bean-counting approach to medicine by becoming a strong advocate for your own care. Ask to be referred to a specialty clinic, such as a sports-medicine facility. Maximize the time spent with therapists by ensuring that the one you see has a particular interest in RSI. If you don't get better, make noise. Start with the clinic's patient advocate, if one exists. Complain to the administration. If your health care comes through work, inform the administrator that you intend to complain to your manager about the lack of good care. Generally, you get the best results if you try not to embarrass the health-care organization, but threatening to do so is a last resort. Appearances are very important to them, especially in competitive markets.

Prevention—the Best Rx

Because we often receive excellent health care, many of us feel we can abuse our bodies until they break, and then rely on our doctors to fix the problem. RSI, although often treatable, can become intractable conditions that ruin careers and lives through permanent disability and pain. Over and over, experts have stressed to me that the best way to treat these injuries is to prevent them from ever happening. If you don't know how to practice safe computing, be a smart consumer and check out one of the many sources that will help (see part one of this series last month, and see "Safer Computing," *Macworld*, December 1994). ■

DON SELLERS is a documentary filmmaker and the author of *Zap! How Your Computer Can Hurt You—and What You Can Do About It* (1994) and *25 Steps to Safe Computing* (1995), from Peachpit Press.

Not getting the treatment you deserve? Or have you received heroic service? Write to the *Consumer Advocate* at *Macworld*, 501 Second St., San Francisco, CA 94107, or send us a fax at 415/442-0766.

The Doctor-Patient Interview

Questions like these can help you determine whether a health-care provider has the right experience and attitude to treat your RSI.

• What percentage of your patients have computer-related RSI? Don't expect your doctor to treat these complaints exclusively. An answer of 10 percent or more shows someone who has plenty of experience.

• Would you be interested in treating this problem that has been giving me a lot of difficulty? Watch for enthusiasm—you're looking for a physician who has taken a special interest in this area.

• Do you often suggest workplace intervention? You want a doctor who understands that modifying work habits or the workstation may be key in recovering from these injuries.

• Do you often suggest physical therapy? Physical therapy is often seen by clinicians as a critical element in successful recovery. Your doctor may need to press the health-care provider to ensure that you receive the proper amount of physical therapy.

A more extensive list of questions to ask during the examination can be found online through the FindADoc Web site (*ftp://ftp.engr.unl.edu/pub/eeshop/check.txt*).

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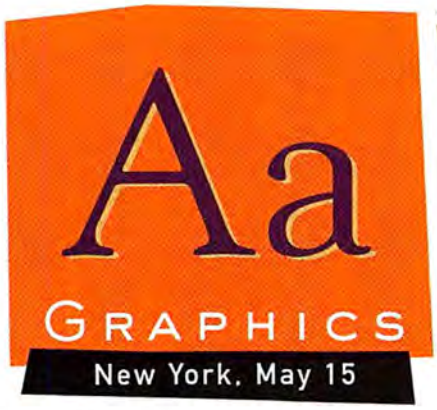

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Star Ratings

HARDWARE AND SOFTWARE PRODUCTS AT A GLANCE

Macworld Star Ratings lets you compare Macintosh products based on the authoritative assessments in our reviews and features. The number of stars indicates the product's level of quality; each product also gets a numeric score that provides a more exact assessment of the product's quality within that level. We evaluate seven factors to derive the Star Rating: feature set, design implementation, performance, reliability, ease of use, innovation, and value. We take these evaluations, weight their importance for each class of product, and calculate the final score. The higher the score, the better a product is, even among products with the same number of stars. The following list shows how the ratings and scores relate.

★★★★★	9.0 to 10.0	Outstanding
★★★★	7.0 to 8.9	Very Good
★★★	5.0 to 6.9	Good
★★	3.0 to 4.9	Flawed
★	0.0 to 2.9	Unacceptable

This section also lists products that have been awarded an **Editors' Choice** designation in a *Macworld* product comparison.

If a product has been upgraded since our last assessment, the most recent version number appears in parentheses after the main reviewed version number. To read a full review of any product in the listing, please consult the issue indicated at the end of the listing or search for the product via Macworld Online (keyword *Macworld* on America Online; URL *http://www.macworld.com* on the World Wide Web).

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

★★★★/8.8 **4th Dimension 3.5,** ACI US, 408/252-4444, $895. Leading Mac database gets important improvements. *Mar 96, p. 60*

★★★★ **ArcView 2.1,** Environmental Systems Research Institute, 909/793-2853, ext. 2050, $995. Sophisticated GIS program is easy to customize. *Jan 96, p. 55*

★★★★/8.4 **ClarisWorks 4.0,** Claris, 408/727-8227, $129 (estimated). The program's speed, clean design, and low resource requirements put the big boys to shame. *Jun 96, p. 98*

★★★★★/9.7 **Data Desk 5.0,** Data Description, 607/257-1000, $625. Classic statistics program adds dazzling new features. *Mar 96, p. 79*

★★★★★ **DeltaGraph Pro 3.5,** DeltaPoint, 408/648-4000, $195. Easy-to-use graphing software stands out from the pack. *Jan 96, p. 57*

★★★ **Equate 1.0,** Holosoft, 408/748-9648, $99. Newton spreadsheet is compatible with Excel. *Oct 95, p. 85*

★★★★/8.2 **FileMaker Pro 3.0,** Claris, 408/727-8227, $199 (estimated). FileMaker 3 is now relational, Power Mac native, and more useful than ever. *Jun 96, p. 98*

★★★★ **Helix Express 3.03,** Helix Technologies, 708/465-0242, $589. Latest release of visually oriented database adds speed and features. *Sep 95, p. 65*

★★★/6.1 **Mac Manager 3.1,** ELS, 352/375-0558, $79. Desktop security takes on a Copland-style look, complete with a few ragged edges. *May 96, p. 78*

★★★★ **MapInfo 3.0,** MapInfo, 518/285-6000, $1295. Mapping software includes advanced geographic-analysis and geocoding tools. *Oct 95, p. 66*

★★/4.4 **MapLinx 3.0,** MapLinx, 214/231-1400, $149.95. Useful tool if you only need to see where your customers are located. *Apr 96, p. 82*

★★/4.6 **McAfee VirusScan,** McAfee Associates, 408/988-3832, $65. Virus-detection package falls short on features compared with other commercial competitors. *May 96, p. 74*

★★★ **Meeting Maker XP 3.1,** On Technology, 617/374-1400, $249; $890 for 10 users. Group scheduling program is useful for small and midsize businesses. *Jan 96, p. 69*

★★★★/7.1 **Microsoft Excel 5.0,** Microsoft, 206/882-8080, $295 (estimated). Although it's the only game in town for number-crunching professionals, Excel 5 is a glutton for RAM and disk space. *Jun 96, p. 98*

★★★★/7.1 **Panorama 3.0,** ProVue, 714/841-7779, $290 (estimated). This database program features easy, flexible forms, hypertext links, and fast network abilities. *Jun 96, p. 98*

★★★ **PhoneDisc 95 PowerFinder,** Digital Directory Assistance, 617/639-2900, $249. CD-ROM–based phone directory is convenient, but must be updated periodically. *Oct 95, p. 91*

★★★ **QuickFigure Pro 2.1,** PelicanWare, 503/221-1148, $49.95. Newton spreadsheet includes charting and linear equation solving. *Oct 95, p. 85*

COMMUNICATIONS/NETWORKS

★★★★ **ASAP 1.5,** MicroBeam, 813/546-2727, $695; $795 with Windows client program. Convenient utility makes file-transfer operations quick and easy. *Sep 95, p. 72*

★★★/6.5 **BBEdit 3.52,** Bare Bones Software, 508/651-3561, $119. This Web-authoring tool targets power users. *Jun 96, p. 61*

★★★★/8.0 **CommuniGate 1.0,** Stalker Software, 415/383-7164, free for 5 users; 25 users $200; unlimited users $600; gateway modules $100 each. CommuniGate lets you send mail, faxes, print jobs, and electronic pages. *Apr 96, p. 63*

★★/4.6 **COPSTalk for Windows 1.2f,** CoOperative Printing Solutions, 770/840-0810, $179 per user. Windows 95–compatible software gives PCs AppleTalk capability. *Mar 96, p. 67*

★★★/5.8 **CU-SeeMe 1.0,** White Pine Software, 603/886-9050, freeware. Great for avoiding long-distance phone charges, but Internet is poor vehicle for video transmission. *May 96, p. 82*

★★★★/7.4 **DragNet 1.03,** OnBase Technology, 714/830-5682, $39.95. DragNet helps you sort and categorize Internet addresses. *May 96, p. 52*

★★★★/8.6 **Emailer 1.0,** Claris, 408/987-7000, $69 (estimated). This inexpensive little gem automates sending and receiving mail over the Internet and online services. *Jun 96, p. 106*

★★★ **GrabNet 1.0,** ForeFront Group, 713/961-1101, $19.95. Simple, affordable utility captures Web pages. *Nov 95, p. 85*

★/1.4 **httpd4Mac 13b,** Bill Melotti, free. Minimalist freeware: feature-poor and unreliable Mac Web server. *Apr 96, p. 86*

★★★/5.2 **InterServer Publisher 1.0.1,** Intercon, 703/709-5500, $795. Fast and functional, but missing key features and documentation. *Apr 96, p. 86*

★★★/6.4 **LANsurveyor 3.0,** Neon Software, 510/283-9771, 5 zones, $395; unlimited zones, $695. LANsurveyor maps and monitors your AppleTalk network. *May 96, p. 70*

★★★★ **MacAdministrator,** Hi Resolution, 508/463-6956, $395 (10-user pack). Group administration tool is a great helper for network administrators. *Dec 95, p. 75*

★★★/6.3 **MachTen 4.0,** Tenon, 805/963-6983, $695. Fast but hard to use, requiring Unix administration skills. *Apr 96, p. 86*

★★/4.0 **MacHTTP 2.2,** Quarterdeck/StarNine, 510/649-4949, $95. Capable Mac Web server shareware but unreliable under heavy load. *Apr 96, p. 86*

★★★/5.0 **MailKeeper 1.0.2,** Nisus Software, 619/481-1477, $35. Quick online information database could be more convenient. *Apr 96, p. 70*

★★★★/7.4 **Navigator 2.0,** Netscape Communications, 415/528-2555, $49 without manual, $69 with manual. Netscape pushed beyond Web browsing. *May 96, p. 50*

★★★★/7.3 **NetMeter 1.0,** AG Group, 510/937-7900, $395. Keep tabs on your Ethernet network

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Star Ratings

via sights and sounds. *Jun 96, p. 73*

★★★★/7.8 **NetPresenz 4.0,** Stairways Shareware, no phone, $10 (shareware). Internet server on a shoestring. *May 96, p. 55*

★★★/6.9 **PageMill 1.0,** Adobe Systems, 415/961-4400, $149. Drag-and-drop Web publishing software masks HTML complexities. *Mar 96, p. 56*

★★★★/8.8 **PageNow 1.5,** Mark/Space Softworks, 408/293-7299, $119. Alphanumeric paging software gets the message across. *Mar 96, p. 70*

★★★/5.8 **Personal MacLAN Connect 5.51,** Miramar Systems, 805/966-2432, $199 per user. Windows 95–compatible software lets PC and Mac users communicate via AppleTalk. *Mar 96, p. 67*

★★★★ **Skyline/Satellite,** AG Group, 510/937-7900, 1-station pack $795; 5-station pack $1195; 10-station pack $1995. Remote monitoring engines keep an eye on LAN traffic. *Sep 95, p. 74*

★★★ **SnapMail 2,** Casady & Greene, 408/484-9228, $250 (5 users); $420 (10 users); $1940 (50 users). E-mail software is easy to install, but its gateway interface is kludgy. *Dec 95, p. 75*

★★★/5.5 **Timbuktu Pro for Networks 2.0,** Farallon, 510/814-5000, single user $139; 2-user pack $189; 100-user pack $3999. Remote control and file-sharing standby gets a ho-hum upgrade. *May 96, p. 68*

★★ **TurboTalk 1.0,** Information Presentation Technologies, 805/541-3000, $160 to $495. Network utility's performance is unimpressive on some network configurations. *Oct 95, p. 83*

★★★★/7.3 **WebStar 1.2.1,** Quarterdeck/StarNine, 510/649-4949, $795. Polished, capable, reliable, easy to use, and reasonably fast Mac Web server. *Apr 96, p. 86.* Editors' Choice for best Web server software.

DESKTOP PUBLISHING

★★★★ **Adobe PageMaker 6.0,** Adobe Systems, 206/622-5500, $895. Page-layout program's upgrade includes practical and powerful improvements. *Nov 95, p. 60*

★★★ **ColorDrive 1.0,** Pantone, 201/935-5500, $199. Color-management software supports a broad range of color models. *Nov 95, p. 70*

★★★★/7.2 **FontMonger 1.5.7,** Ares Software, 415/578-9090, $149.95. Easy font modifications, from redrawing characters to converting font formats. *Apr 96, p. 102*

★★★★ **FrameMaker 5.0,** Adobe Systems, 408/975-6000, $895. Page-layout program is a good choice for technical-document creation. *Nov 95, p. 63*

★ **HoTMetal Pro 2.0,** SoftQuad, 416/239-4801, $195. Web authoring software is hampered by a poorly designed interface. *Jan 96, p. 65*

★★★★ **Icefields 2.3,** The Color Partnership, 619/259-8688, $895. Professional printers will appreciate this stochastic-screening software. *Nov 95, p. 75*

★★★★/7.0 **PageTools 2.0,** Extensis, 503/274-2020, $99.95. Plug-ins add power and precision to PageMaker. *May 96, p. 65*

★★★★/7.4 **theTypeBook 4.02b,** Rascal Software, 805/255-6823, $49.95. Creates font reference books from ready-to-print specimen pages. *Apr 96, p. 102*

★★★/5.1 **Xdream 1.0,** Vision's Edge, 904/386-4573, $149. Single Quark XTension comprises 24 tools ranging from useful to indispensable. *Jun 96, p. 50*

★★★★/7.1 **XPert Tools 1.0,** XChange, 970/229-0620, $99 per volume, $169 for both. If you need to go beyond Quark's feature set, XPert Tools will take you there. *Jun 96, p. 50*

EDUCATION/ENTERTAINMENT

★★★★/8.1 **Alien Tales,** Broderbund, 415/382-4700, $45. Broderbund enlivens classic literature for kids. *Jun 96, p. 56*

★★★/6.8 **The Amazing Writing Machine,** Broderbund, 415/382-4700, $45 CD, $35 floppy. Creative writing with a spin. *Jun 96, p. 56*

★★★ **AmoebArena 1.0,** Casady & Greene, 408/484-9228, $49.95. Engaging strategy game pits amoeboid against amoeboid. *Jan 96, p. 75*

★★★★/8.6 **The Cartoon Guide to Physics,** HarperCollins Interactive, 212/207-7000, $49.95. Entertaining introduction to basic kinematics. *Apr 96, p. 78*

★★★★ **The Daedalus Encounter,** Virgin Interactive Entertainment, 714/833-8710, $59.95. Escape from a doomed spacecraft in this interactive adventure. *Sep 95, p. 73*

★★★★/8.5 **Descent 1.0,** MacPlay, 714/553-3530, $49.95. Which way is up? 360-degree 3-D maneuverability will leave you spinning. *Apr 96, p. 72*

★★★ **FrenchNow 3.0,** Transparent Language, 603/465-2230, $99 to $129. While it doesn't replace a class, software can help you learn French. *Dec 95, p. 83*

★★★★ **Full Throttle,** LucasArts, 415/472-3400, $49.95. Biker adventure game is witty and action-packed. *Jan 96, p. 73*

★★★/6.9 **Fun With Electronics,** Philips Media, 310/444-6500, $44.99. Multimedia updates a hobby-shop classic. *May 96, p. 80*

★★ **Haight-Ashbury in the Sixties,** Compton's NewMedia, 619/939-2500, $49.95. If you can remember the sixties, you probably don't need this CD-ROM. *Dec 95, p. 84*

★★★★/8.8 **In the 1st Degree,** Broderbund, 415/382-4700, $49.95. Realistic, interactive legal thriller. *Apr 96, p. 80*

★★★ **King's Quest VII: The Princeless Bride,** Sierra Online, 206/649-9800, $59.95. Adventure game is entertaining, but adults might find its plot silly. *Jan 96, p. 75*

★★/4.4 **Learn the Art of Magic,** Broderbund, 415/382-4700, $35. Lots of tricks, but on-camera magician is unbearably irritating. *May 96, p. 62*

★★★/5.6 **Learn to Speak Spanish 6.0,** The Learning Company, 510/792-2101, $109. Comprehensive, but doesn't adapt to your needs or progress. *May 96, p. 60*

★★★ **The Legend of Kyrandia, Book 3,** Virgin Interactive Entertainment, 714/833-1999, $34.95. Enjoyable adventure game features good graphics and sound. *Jan 96, p. 77*

★★★/5.8 **Life's Greatest Mysteries,** A.D.A.M. Software, 770/980-0888, $39.95. CD-ROM explains imponderables for the medically curious. *Jun 96, p. 75*

★★★★ **The Lost Mind of Dr. Brain,** Sierra On-Line, 206/649-9800, $44.95. Hilarious brainteasers are presented in an imaginative, arcade style. *Oct 95, p. 93*

★★★★ **Links Pro CD,** Access Software, 801/359-2900, $69.95. An excellent simulation of golf's many challenges. *Jan 96, p. 73*

★★★★/7.0 **Magic: An Insider's View,** HarperCollins Interactive, 212/207-7000, $39.95. Superb on-camera magician, stale between-trick segments. *May 96, p. 62*

★★★★/8.5 **Marathon 2: Durandal,** Bungie Software Products, 312/563-6200, $79. A well-crafted action-adventure game, but it's not for the squeamish or those disturbed by violence. *Mar 96, p. 85*

★★ **Merriam-Webster's Collegiate Dictionary on CD-ROM,** Merriam-Webster, 413/734-3134, $69.95. Powerful search capabilities don't make up for this dictionary's interface flaws. *Nov 95, p. 79*

★★★★ **Nile: Passage to Egypt,** Discovery Channel Multimedia, 301/986-1999, $49.95. Armchair adventurers will enjoy this multimedia journey on CD-ROM. *Oct 95, p. 93*

★★★ **Out of the Sun,** Domark software, 415/513-8929, $44.95. Flight-simulation game presents historic and custom battle scenarios. *Jan 96, p. 77*

★★★★★ **Passage to Vietnam,** Against All Odds Productions/Interval, 800/558-3388, dept. 100, $39.95 to $59.95. Stunning photojournalism CD-ROM sets a new standard for multimedia projects. *Dec 95, p. 83*

★★/3.9 **Rebel Assault II,** LucasArts Entertainment, 415/472-3400, $54.95. *Star Wars*–inspired game handicapped by minimal game play. *Jun 96, p. 63*

★★★★/7.5 **RedShift 2,** Maris Multimedia, 415/492-2819, $54.95. RedShift 2 lets you explore space from any planet. *May 96, p. 71*

★★★/6.2 **Spanish Native Guide 1.0,** Native Guide Software, 415/802-8085, $49.95. Adapts to your progress, but pronunciation help is missing. *May 96, p. 60*

★★★/5.3 **Spanish Now 4.0,** Transparent Language, 603/465-2230, $129. Engaging approach, but poor documentation and confusing interface. *May 96, p. 60*

★★★/6.6 **Table Magic,** Arc Media, 416/410-4429, $19.95. Few tricks, but the ones that are here are original. *May 96, p. 62*

★★★★/8.3 **X-Wing Collector's CD-ROM,** LucasArts Entertainment, 415/472-3400, $59.95. The learning curve is steep, but X-Wing delivers action-packed adventure. *Jun 96, p. 63*

★★★★/8.9 **You Don't Know Jack,** Berkeley Systems, 510/540-5535, $30. "Jeopardy!" with a bad attitude. *Mar 96, p. 85*

FINANCE/ACCOUNTING

★★★★/7.1 **Kiplinger TaxCut 95 1995,** Block Financial Software, 816/751-6000, $39.95; state modules $24.95. Tax-prep program has an easy-to-use interface and elegant organization but lacks a state version. *Apr 96, p. 66*

★★★★/8.6 **MacInTax Deluxe 1995,** Intuit, 520/295-3110, $49.95; state modules $25. Not only guides you effortlessly through your return, but also gives helpful financial-planning advice. *Apr 96, p. 66*

★★★★ **Managing Your Money 7.0,** MECA Software, 203/255-1441, $79.95. Personal financial software includes advanced investment features. *Oct 95, p. 81*

★★★★ **M.Y.O.B. 5.0,** BestWare, 201/586-2200, $139; $239 with payroll. Well-designed interface makes double-entry accounting easy. *May 95, p. 63*

★★★/5.2 **Personal Tax Edge 1995,** Parsons Technology, 319/395-9626, $19; state modules $19. Produces high-quality printed forms but has DOS-inspired interface. *Apr 96, p. 66*

★★★★/7.7 **QuickBooks Pro 4.0,** Intuit, 415/944-6000, $189. Can be customized for your business; Business Library and some Windows features not included. *Jun 96, p. 55*

★★★★/8.3 **Quicken Deluxe 6,** Intuit, 520/295-

3220, $59.99. The best-selling package gets bigger and mostly better. *Feb 96, p. 65*

★★/4.9 **WealthBuilder 4.01,** Reality Online, 610/277-7600, $49.95. This financial planner doesn't quite add up. *May 96, p. 74*

GRAPHICS

★★★ **AddDepth 2.0,** Ray Dream, 415/960-0768, $99. 3-D effects software provides a simple way to give depth to illustrations. *Nov 95, p. 81*

★★★★/8.4 **Adobe After Effects 3.0,** Adobe Systems, 415/961-4400, $995 base version; $1995 Production Bundle. Must-have video-design package enhances motion control and adds effects. *Mar 96, p. 54*

★★★★/7.1 **Adobe Illustrator 6.0,** Adobe Systems, 415/961-4400, $595. Don't let the version number fool you: this is a minor upgrade. Its minor tweaks aren't enough to surpass FreeHand 5.5. *Apr 96, p. 54*

★★★/6.3 **Adobe PhotoDeluxe 1.0,** Adobe Systems, 415/961-4400, $129. "Photoshop Lite" makes questionable compromises in order to appeal to consumer market. *Apr 96, p. 59*

★★★★/8.5 **Adobe Photoshop 3.0.5,** Adobe Systems, 415/961-4400, $895. Remains the single most significant and capable image editor, but its imperfections and omissions leave some artists searching for alternatives. *Jun 96, p. 78*

★★★★/7.4 **Adobe Premiere 4.2,** Adobe Systems, 415/961-4400, $795. Video editor offers significant enhancements, including CD-ROM Movie Maker plug-in. *Mar 96, p. 90*

★★★ **Adobe TextureMaker 1.0 (2.0),** Adobe Systems, 415/961-4400, $199. Texture generator creates backgrounds for multimedia or printed projects. *Oct 95, p. 89*

★★★ **Black Box 2.0,** Alien Skin Software, 919/832-4124, $119. Photoshop image filters are useful and worth their modest price. *Nov 95, p. 87*

★★★/6.9 **Boris Effects 1.01,** Artel Software, 617/566-0870, Premiere version $350; Media 100 version $695. Plug-in for Premiere and Media 100 adds video-effects control. *Feb 96, p. 85*

★/1.5 **Chagall 2.0.2,** Technosystems USA, 502/351-0108, $299. Image-editing application flunks test. *Feb 96, p. 78*

★★★★/8.0 **Claris Impact 2.0,** Claris, 408/987-7000, $99. Easy and affordable business-graphics software. *Feb 96, p. 66*

★★★ **Colorize 2.0,** DS Design, 919/319-1770, $495. Colorizing software is effective, but expensive for a one-trick pony. *Dec 95, p. 81*

★★★★/7.5 **Dabbler 2,** Fractal Design, 408/688-5300, $69. Drawing package offers an easy, affordable natural painting option. *Mar 96, p. 63*

★★★★/7.3 **DrawTools 1.0,** Extensis, 503/274-2020, $149. Extensions add color, shape, and object tools to FreeHand and Illustrator. *Feb 96, p. 71*

★★★★ **SmartSketch 1.0,** FutureWave Software, 619/637-6190, $69.95. Innovative, easy-to-use graphics program unites painting and drawing. *Sep 95, p. 58*

★★/4.5 **Envelopes 1.0,** Letraset USA, 800/343-8973, $99. Distorts objects but inserts extraneous anchor points as well. *Mar 96, p. 106*

★★ **FloorPlan Plus 1.1,** ComputerEasy International, 602/829-9614, $49.95. Affordable 2-D CAD program is intended for rudimentary design tasks. *Sep 95, p. 85*

★★★★ **Infini-D 3.0,** Specular International, 413/253-3100, $899. 3-D software does professional-quality rendering and animation. *Jan 96, p. 54*

★★/3.3 **Infinite FX 1.0,** Beinfinite, 404/552-6624, $149. Many automated reshaping effects, mired by poor organization. *Mar 96, p. 106*

★★★ **Intellihance 1.0,** DPA Software, 214/517-6876, $129 to $299. Photoshop plug-in automates the process of improving scanned graphics. *Sep 95, p. 71*

★★★★/8.3 **Kai's Power Tools 3.0,** MetaTools, 805/566-6200, $199. More-powerful plug-ins, more-baffling interface. *Feb 96, p. 57*

★★★★/8.9 **KPT Final Effects 3.0,** MetaTools, 805/566-6200, $695. Superb effects library for Adobe After Effects. *Apr 96, p. 69*

★★★★/8.5 **KPT Vector Effects 1.0,** MetaTools, 805/566-6200, $199. Combines excellent experimentation functions with thoughtful interface design. *Mar 96, p. 106.* **Editors' Choice** for best natural draw software.

★★★/6.2 **LightningDraw GX 1.0,** Lari Software, 919/968-0701, $299. Lets you combine colors and shapes and experiment with QuickDraw GX fonts. *Mar 96, p. 106*

★★★★/7.2 **Live Picture 2.5,** Live Picture, 408/464-4200, $995. Live Picture stills lacks support for the blend modes and numerical focus controls and can only edit the topmost visible layer, but the program is superfast and its core technology remains as superior as ever. *Jun 96, p. 78*

★★★★/8.1 **Macromedia FreeHand 5.5,** Macromedia, 415/252-2000, $595. Draw program outperforms competitor, for now. *Feb 96, p. 74*

★★★★/8.5 **MapArt Cartographic Data Bank 1.0,** Cartesia Software, 609/397-1611, $249 per volume, $399 for both. Detailed, editable maps spice up your layouts. *May 96, p. 72*

★★★★/7.8 **MapArt Designer Series 1.0,** Cartesia Software, 609/397-1611, $129 per volume, $199 for both. Detailed, editable maps spice up your layouts. *May 96, p. 72*

★★★★/8.1 **MiniCad 6,** Graphsoft, 410/290-5114, $795. Nothing's small about this modular package. *Mar 96, p. 65*

★★★★ **Paint Alchemy 2.0,** Xaos Tools, 415/487-7000, $199. Flexible image editor is an appealing add-on for digital artists. *Sep 95, p. 70*

★★★★/8.9 **Painter 4.0,** Fractal Design, 408/688-5300, $549. Painter 4.0 is the program most artists should own; its painting and special-effects capabilities simply can't be beat. *Jun 96, p. 78*

★★★ **PhotoFix 2.8.8,** Microspot USA, 408/253-2000, $249. Image-editing/photo-enhancement program is a useful tool. *Sep 95, p. 81*

★★ **PhotoFusion 2.0.3,** Ultimate, 818/993-8007, $695. Photoshop compositing plug-in is hampered by a poor interface. *Oct 95, p. 83*

★★★★ **Poser 1.0,** Fractal Design, 408/668-5300, $199. 3-D illustration tool generates posable human figures. *Oct 95, p. 63*

★★★★ **PowerCADD 2.0,** Engineered Software, 910/299-4843, $795. CAD program features exceptional speed and an extensive array of tools. *Oct 95, p. 77*

★★★★/7.2 **QX-Tools 1.0,** Extensis, 503/274-2020, $149. Ten XTensions that make QuarkXPress more powerful. *Feb 96, p. 73*

★★★/6.9 **Ray Dream Studio 1.0,** Ray Dream, 415/960-0765, $499. These 3-D design tools are competent and affordable. *May 96, p. 58*

★★★★/8.7 **SmartSketch 1.0,** FutureWave Software, 619/637-6190, $69.95. Makes drawing and editing paths as easy as painting. *Mar 96, p. 106.* **Editors' Choice** for best natural draw programs.

★★★/6.5 **theFONDler 4.0.1,** Rascal Software, 805/255-6823, $69.95. Font utility diagnoses problems. *Apr 96, p. 84*

★★★/5.0 **Tracer 1.0,** ScanVec, 508/694-9488, $795. Excellent but expensive autotracing. *Feb 96, p. 85*

★★★★ **Transverter Pro 3.0,** TechPool Studios, 216/382-1234, $395. Graphics-conversion tool deserves a place in every desktop publisher's toolbox. *Nov 95, p. 77*

★★★★/8.7 **upFront 2.0.1,** SketchTech, 612/379-1435, $299. A new vendor—SketchTech—improves Alias's venerable entry-level 3-D modeling package. *Mar 96, p. 86*

★★★ **Working Model,** Visual Basic, 415/574-7777, $2495. Motion-simulation system is a fine product, but a Power Mac version is needed. *Dec 95, p. 79*

★★★/6.3 **xRes 2.0,** Macromedia, 415/252-2000, $799. Although considerably improved, fast, and easy to learn, this image editor still leaves room for improvement. *Jun 96, p. 78*

MATH/SCIENCE

★★★★ **The Fuzzy Logic Toolbox 1.0,** MathWorks, 508/653-1415, $895. Math-simulation aid incorporates fuzzy logic into models. *Sep 95, p. 89*

★★★★/7.5 **Igor Pro 2.0.4,** WaveMetrics, 503/620-3001, $495. Top-notch scientific graphing package. *Feb 96, p. 90*

★★★★ **LabView 3.1,** National Instruments, 512/794-0100, $1995. Instrumentation software can emulate most scientific and electronic test-bench instruments. *Nov 95, p. 62*

★★★★/7.2 **Minitab 10 Xtra,** Minitab, 814/238-3280, $895. Updated package offers a complete statistical tool kit. *Jun 96, p. 66*

★★★★/7.4 **Spreadware Statistics Menu 4.0,** Spreadware, 619/772-1758, $229. Excel users can put Spreadware's statistics to work in minutes. *Apr 96, p. 72*

★★★★/7.1 **SPSS 6.1,** SPSS, 312/329-2400, $695; modules $395 to $495. Mainframe statistics giant has new Mac interface. *Feb 96, p. 82*

★★★★/8.3 **StatView 4.5,** Abacus Concepts, 510/540-1949, $595. Statistics and graphing package. *Feb 96, p. 81*

ORGANIZATION/PRODUCTIVITY

★★★/6.8 **Claris Organizer 1.0,** Claris, 408/987-7000, $49 (estimated). This simple little PIM is fast, easy to learn, and intelligently designed. *Jun 96, p. 106*

★★★★ **ClarisWorks 4.0,** Claris, 408/727-8227, $129. Integrated program's word processor and database are superb. *Oct 95, p. 62.* **Editors' Choice** for best integrated software. *Nov 95, p. 124*

★★★/6.9 **DateBook Pro 4.2,** Now Software, 503/274-2800, $69.95 (estimated). A well-designed but often sluggish calendar and scheduling program. *Jun 96, p. 106*

★★/3.7 **Day-Timer Organizer 2.0,** Day-Timer Technologies, 415/572-6260, $59.95. PIM has some rough edges. *Mar 96, p. 92*

★★★/5.2 **Full Contact 3.0,** Pitch Software, 408/374-5504, $199. Resurrected PIM has been improved—but not enough. *Jun 96, p. 70*

★★★/6.5 **In Control 3.5,** Attain, 617/776-1110, $219.95. This planner/outliner excels in list management, but not as a calendar or scheduler. *Jun 96, p. 106*

★★★ **InfoGenie 1.0.5,** Casady & Greene, 408/484-9228, $79.95. Free-form data manager is appealing

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but lacks some of the competition's features. *Nov 95, p. 87*

★★★/6.9 **InTouch 2.5.2,** Prairie Group, 515/225-3720, $49.95. A simple contact manager that doesn't force you to plug information into designated slots. *Jun 96, p. 106*

★★★/5.4 **KeyQuencer,** available online, shareware. Relatively powerful shareware macro program is inexpensive, but doesn't allow you to record macros. *Jun 96, p. 106*

★★★/6.9 **Micro Planner Manager 1.4,** Micro Planning International, 303/757-2216, $695. Project-management application takes scheduling seriously. *Jun 96, p. 65*

★★★★/7.3 **Now Contact 3.5,** Now Software, 503/274-2800, $99 (estimated bundle). Provides fast access to contact information and integrates seamlessly with Now Up-to-Date. *Jun 96, p. 106*

★★★★/8.2 **Now Up-to-Date 3.5,** Now Software, 503/274-2800, $99 (estimated bundle). Powerful and sophisticated scheduling program has a friendly, intuitive interface. *Jun 96, p. 106*

★★★★/7.4 **QuicKeys 3.0.1,** CE Software, 515/221-1801, $119. The hands-down winner for an easy way to automate repetitive tasks using macros. *Jun 96, p. 106*

★★★/6.9 **Tempo II Plus 3.0.9,** Affinity Microsystems, 303/442-4840, $179.95. Powerful macro program suffers from undue complexity and an awkward interface. *Jun 96, p. 106*

★★★/6.8 **TouchBase Pro 4.2,** Now Software, 503/274-2800, $69.95 (estimated). Slow, but offers up to 16 custom fields. *Jun 96, p. 106*

PRESENTATION TOOLS

★★★★/7.1 **Astound 2.0,** Gold Disk, 408/982-0200, $249. Presentation graphics with a multimedia twist. *Mar 96, p. 73*

★★★★ **Authorware Professional 3.0,** Macromedia, 415/252-2000, $4995. Multimedia authoring program is feature-packed but costly. *Dec 95, p. 66*

★★★ **CyberSound FX 1.0,** InVision Interactive, 415/812-7380, $129. Plug-ins for Premiere make audio more polished, but access is cumbersome. *Nov 95, p. 91*

★★★★/7.1 **Deck II 2.5,** Macromedia, 415/252-2000, $399. Deck II widens its lead over other software-only multitrack programs. *Jun 96, p. 52*

★★★ **HyperCard 2.3,** Apple Computer, 408/996-1010, $129. Authoring tool is an inexpensive solution for multimedia developers. *Nov 95, p. 66*

★ **MediaFactory 1.0,** Nuts Technologies, 408/980-7800, $199. Entry-level QuickTime movie editor has an awkward interface. *Nov 95, p. 89*

★★/3.5 **Mediagnügen 1.0.1,** Gnügen Software, 303/682-5380, $29.98. Almost useless as a serious browser; lets you view and copy collections of images, but not organize and sort them. *Apr 96, p. 67*

★★★★ **MediaPaint 1.0,** Strata, 801/628-5218, $695. QuickTime paint program lets multimedia developers edit ranges of frames. *Sep 95, p. 56*

★★★/6.9 **Microsoft PowerPoint 4,** Microsoft, 206/882-8080, $295 (estimated). A solid, simple-to-use slide machine. *Jun 96, p. 98*

★★★/6.5 **Movie Cleaner Pro 1.1.1,** Terran Interactive, 408/353-8859, $129. QuickTime-compression utility for crisp CD-ROM movies. *Apr 96, p. 69*

★★★/6.4 **Persuasion 3.0,** Adobe Systems, 206/470-7000, $259 (estimated). Hard to use, but offers every presentation effect a pro could need. *Jun 96, p. 98*

★★/4.0 **ProView 1.1,** E-magine, 818/881-4757, $69.95. Adequate tool for assembling an electronic portfolio or online manual. *Apr 96, p. 67*

★★★★/7.0 **SoundEdit 16 2.0,** Macromedia, 415/252-2000, $399. The premier Mac sound-editing program just gets better. *Jun 96, p. 52*

★★/4.9 **STIP Professional 2.1,** MacVonk, 403/232-6545, $1295. Multimedia authoring program is promising but flawed. *Apr 96, p. 75*

PROGRAMMING

★★★★ **AppWare 1.2,** Novell, 801/429-7000, $495. Development system features an easy-to-use graphical programming method. *Oct 95, p. 68*

★★★★/8.4 **CodeWarrior Gold 7,** Metrowerks, 512/305-0400, $399. Key Power Mac compiler gets yet another face-lift. *Mar 96, p. 69*

★★★★ **FaceSpan 2.0,** Software Designs Unlimited, 214/578-6700, $199. AppleScript interface builder lets developers create sophisticated applications. *Nov 95, p. 64*

★★★★ **JAM 6,** JYACC, 212/267-7722, $2000. Development tools enable creation of large-scale corporate client-server databases. *Oct 95, p. 70*

★★★★/8.0 **LS FORTRAN 1.1,** Fortner Research, 703/478-0181, $695. FORTRAN rides again, running science programs on the Power Mac desktop. *Feb 96, p. 95*

★★★★/7.0 **Roaster DR1,** Natural Intelligence, 617/876-4876, $299. Java-for-Mac perks up the Web. *May 96, p. 53*

★★★ **Script Debugger 1.0,** Late Night Software, 604/929-5578. $129. Script-development software improves on AppleScript, except in the debugging department. *Nov 95, p. 85*

★★★★/8.4 **Scripter 1.0.1,** Main Event Software, 202/298-9595, $199. AppleScript development system offers serious debugging power. *Mar 96, p. 88*

★★★★/7.0 **Tools Plus 2.6,** Water's Edge Software, 416/219-5628. For Symantec's C/C++ and Pascal, $149 each; for both, $199; for CodeWarrior Bronze, $199; for CodeWarrior Gold, $249. Programmers' tool kit saves time. *Feb 96, p. 92*

UTILITIES

★★★/6.4 **ACT 2.5,** Symantec, 541/334-6054, $249.95. This full-featured contact manager offers strong database features, but the interface is not easy to use. *Jun 96, p. 106*

★★★★/7.3 **Adobe Fetch 1.2,** Adobe Systems, 415/961-4400, $149. Catalog graphics, text, and more for easy organization and retrieval. *Apr 96, p. 102*

★★ **Adobe ScreenReady 1.0,** Adobe Systems, 415/961-4400, $199. PostScript image rasterizer can aid multimedia developers but has some flaws. *Dec 95, p. 71*

★★★★/8.7 **Adobe Type Manager 3.9,** Adobe Systems, 415/961-4400, $39.95. Accurately renders PostScript fonts at all sizes on screen and on any printer. *Apr 96, p. 102*

★★★★★ **Conflict Catcher 3,** Casady & Greene, 408/484-9228, $99.95. Extension-management utility offers a friendly, flexible approach to conflict resolution. *Sep 95, p. 69*

★★★★/7.3 **AliasZoo 2.0.5,** Blue Globe Software, shareware, $15. Locates and fixes orphaned aliases and deletes unneeded ones. *Apr 96, p. 102*

★★★/6.9 **Anubis 2.54,** CharisMac Engineering, 916/885-4420, $129.95. Disk formatter is reliable, easy to use. *May 96, p. 76*

★★★ **Arcserve for Macintosh 1.5,** Cheyenne Software, 516/484-5110, $245 (5 users); $495 (20 users). A good backup program for mixed-platform networks. *Jan 96, p. 63*

★★★★★/9.3 **AreaCodeFinder 4.0,** John Calande, shareware, $15. Identifies the location (and time zone) of a telephone area code and vice versa. *Apr 96, p. 102*

★★★/6.2 **At Ease 3.0,** Claris, 408/727-8227, $46. This desktop alternative lets you share your Mac and worry less. *Feb 96, p. 81*

★★★★ **At Ease 3.0 for Workgroups,** Apple Computer, 408/996-1010, $295. Desktop alternative is a handy tool for network administrators. *Nov 95, p. 83*

★★★★ **BeyondPress 1.0,** Astrobyte LC, 303/534-6344, $595. QuarkXPress XTension is a great way to convert documents to Web pages. *Dec 95, p. 73*

★★★★/7.3 **Calc+ 2.0,** Abbott Systems, 914/747-4201, $29. Simple calculator has a resizable, scrollable, editable, printable tape. *Apr 96, p. 102*

★★★/5.7 **Captivate 4.5,** Mainstay, 805/484-9400, $89.95. Screen grabber fumbles but survives. *Jun 96, p. 74*

★★/3.8 **CD AutoCache 1.1,** CharisMac Engineering, 916/885-4420, $79.95. Offers nice interface, but is buggy and provides minimal performance boost. *Jun 96, p. 62*

★★★/5.4 **CD-ROM ToolKit 2.0.1,** FWB Software, 415/325-4392, $79. Offers attractive interface and reliable performance, but is RAM-hungry with minimal performance boost. *Jun 96, p. 62*

★★★★/7.6 **DeBabelizer 1.6.5,** Equilibrium Technologies, 415/332-4343, $399. Endlessly talented and exasperating batch processor for bitmap graphics. *Apr 96, p. 102*

★★★★/8.6 **Desktop Dialer 1.4.2,** Sophisticated Circuits, 206/485-7979, $75. Dials phone numbers appearing in any document. *Apr 96, p. 102*

★★★★/7.8 **DiskExpress II 2.20,** Alsoft, 713/353-4090, $89.95. Intelligently defragments hard drives for optimum drive performance. *Apr 96, p. 102*

★★★/6.8 **DOS Mounter 95 1.0,** Software Architects, 206/487-0122, $100. Windows-to-Mac file-transfer utility gets Win 95–savvy. *Mar 96, p. 74*

★★★★/8.1 **DragStrip 2.0,** Natural Intelligence, 617/876-7680, $59.95. Feature-packed file launcher well worth the premium price. *Apr 96, p. 102*

★★★★/8.3 **Exodus 5.2.1,** White Pine Software, 603/886-9050, $295. All around, the best for price/performance and X protocol support. *May 96, p. 108.* **Editors' Choice** for best X Window server software.

★★★ **File Genie Pro 1.1,** Duet Development, 408/559-3838, $89. Disk- and file-management utility is fast but has limited search and sort criteria. *Oct 95, p. 87*

★★★ **Gear 2.5,** Elektroson, 610/617-0850, $799. CD-recordable mastering software is a mixed bag. *Sep 95, p. 91*

★★★/6.7 **GrabNet 2.0,** ForeFront Group, 713/961-1101, $19.95. Bookmark manager for Netscape Navigator grabs Web graphics and text. *Apr 96, p. 102*

★★★ **Here & Now 1.0,** Software Architects, 206/487-0122, $89.95. File-transfer utility facilitates putting a Mac disk in a PC. *Nov 95, p. 81*

★★★★ **InstantReplay 1.0,** Strata, 801/628-5218, $149. Utility records on-screen activity and saves it as a QuickTime movie. *Sep 95, p. 89*

★★★★/7.6 **MacLinkPlus/Translators Pro 8.06ia,**

DataViz, 203/268-0030, $149. Excellent PC to Mac (or reverse) conversions for word processor, spreadsheet, or database documents. *Apr 96, p. 102*

★★/4.5 **MacOpener 1.0,** DataViz, 203/268-0030, $75. Unintuitive Mac-to-Windows file-transfer utility. *Mar 96, p. 75*

★★★/6.7 **MacTools Pro 4.0,** Symantec, 541/334-6054, $149.95. A respectable troubleshooting and data-recovery program for a reasonable price. *Jun 96, p. 106*

★★★/6.7 **MacX 1.5,** Apple Computer, 408/996-1010, $295. Window server software offers acceptable performance, but it's not the leader in the category. *May 96, p. 108*

★★★ **Menu Master Mac,** Electronic Learning Systems, 904/375-0558, $99; 15-site license $299. Security software is useful but could use some additional features. *Sep 95, p. 95*

★★★/6.8 **Norton Utilities 3.2,** Symantec, 541/334-6054, $149.95. An easy-to-use tool kit that works wonders on bad disks, corrupted files, and crashed hard drives. *Jun 96, p. 106*

★★★★/7.6 **Now Utilities 5.0 (5.0.2),** Now Software, 503/274-2800, $89 (estimated). This utility package streamlines your work with fast access to frequently used files, folders, and programs. *Jun 96, p. 106*

★★★★/7.1 **OmniPage Pro 6.0,** Caere, 408/395-7000, $699. Flagged-text feature is indispensable; handles gray-scale graphics. *Jun 96, p. 54*

★★★ **On Cue II Utilities 3.0,** ComputerEasy International, 602/829-9614, $99.95. Eight utilities add functionality to the Mac Operating System. *Sep 95, p. 93*

★★★/5.1 **OneClick 1.0.1,** Westcode, 619/487-9200, $129. Promising button-based macro utility needs fine-tuning. *May 96, p. 67*

★★★★/7.1 **OptiMem RAM Charger 2.12,** Jump Development Group, 412/681-2692, $129. Increases RAM available for applications by allocating it more efficiently. *Apr 96, p. 102*

★★★★/8.3 **PopupFolder 2.0.1,** Inline Software, 617/938-8088, $79. Improves Finder navigation via ubiquitous pop-up menus. *Apr 96, p. 102*

★★★★ **Power Secretary Power Edition 2.0,** Articulate Systems, 617/935-5656, $2495. Speech-recognition program learns your voice patterns as you use it. *Sep 95, p. 60*

★★★★/8.6 **RAM Doubler 1.6,** Connectix, 415/571-5100, $99. Fools your Mac into thinking it has twice the RAM it actually does. *Apr 96, p. 102*

★★★★/8.9 **Retrospect 3.0; Retrospect Remote 3.0,** Dantz Development, 510/253-3000, Retrospect $249; Retrospect Remote (10 users) $449. Backup programs now even more powerful, easier to use. *Apr 96, p. 61*

★★★★ **S/Link 2.0,** Synclavier, 603/448-8887, $249. Utility is a valuable aid for anyone who does audio file conversion. *Nov 95, p. 91*

★★★★/8.4 **SCSI Director Pro 4.0,** Transoft, 805/897-3350, $99.95. Hard disk formatting and testing utility. *Feb 96, p. 86*

★★★★/8.9 **Speed Doubler 1.0.2,** Connectix, 415/571-5100, $99. Connectix makes a Power Mac's 680X0 emulation feel native. *Feb 96, p. 56*

★★★★/7.9 **StuffIt Deluxe 3.5,** Aladdin Software, 408/761-6200, $129.95. Macintosh, PC, and Internet file compression and decompression. *Apr 96, p. 102*

★★★★/8.9 **SuperATM 3.9,** Adobe Systems, 415/961-4400, $69. ATM's PostScript font rendering plus intelligent substitution of missing fonts. *Apr 96, p. 102*

★★★★/7.0 **TextBridge Pro 3.0,** Xerox, 508/977-2000, $349. Easy to select and supports graphics, but does not flag unrecognized text. *Jun 96, p. 54*

★★★★/7.2 **Transverter Pro 3.0.1,** TechPool Software, 216/291-1922, $399. Batch-process PostScript files or preview them to catch mistakes before printing. *Apr 96, p. 102*

★★★★/7.5 **TypeIt4Me 4.5.1,** Riccardo Ettore, shareware, $30. Automatically expands user-defined abbreviations in any application. *Apr 96, p. 102*

★★★★/8.5 **TypeTamer 1.1.1,** Impossible Software, 714/470-4800, $59.95. Every conceivable Font menu improvement in one well-designed program. *Apr 96, p. 102*

★★★ **ultraSecure 3.524,** usrEZ Software, 714/756-5140, $239. Security program offers a comprehensive set of protection tools. *Sep 95, p. 81*

★★★/6.5 **XoftWare for MacOS 3.0,** NetManage, 619/755-3998, $295. X Window server software taken from Apple's MacX code, XoftWare turns in similar performance at a similar price. *May 96, p. 108*

★★★★/8.1 **XTen 6.0,** Tenon Intersystems, 805/963-6983, $350. A speed demon, but be sure you're willing to be a Unix guru before choosing it. *May 96, p. 108.* Editors' Choice for best X Window server software.

VERTICAL MARKETS

★★★★/8.1 **Finale 3.5.1,** Coda Music Technology, 612/937-9611, $545. Music-notation software goes Power Mac native. *May 96, p. 81*

★★★★ **FreeStyle 1.01,** Mark of the Unicorn, 617/576-2760, $200. Music sequencer with notation is a good choice for beginners. *Nov 95, p. 70*

★★★★ **Nightingale 2.0,** TAP Music Systems, 206/462-1007, $495. Music-notation software is fast, feature-laden, and easy to learn. *Oct 95, p. 81*

★★★/6.9 **Quicken Family Lawyer 6.0b,** Parsons Technology, 319/395-9626, $49. Helps you prepare 61 legal documents. *Feb 96, p. 88*

★★★ **StoryBoard Artist 1.5,** PowerProduction Software, 310/937-4411, $499. Storyboard-creation software is useful but expensive. *Oct 95, p. 91*

★★ **Visual Arranger 1.0,** Yamaha Corp. of America, 714/522-9240, $59.95. Song-building software is innovative, but replacing notation with icons doesn't work. *Nov 95, p. 89*

WRITING TOOLS

★★/3.0 **Indexicon 1.0,** Iconovex, 612/896-5100, $129. Word 6 indexing tool has trouble identifying indexable terms. *Apr 96, p. 77*

★★★/6.7 **Microsoft Word 5.1,** Microsoft, 206/882-8080, $320 (estimated). Fast, sleek, stable, and probably the most widely used Mac word processor on earth. *Jun 96, p. 98*

★★★/5.1 **Microsoft Word 6.0.1,** Microsoft, 206/882-8080, $295 (estimated). Word 6, the most bloated word processor on earth, may be mandatory in big corporations. *Jun 96, p. 98*

★★★★/7.1 **Spelling Coach Professional 4.1,** Deneba Software, 305/596-5644, $69.95. Adds dictionary and thesaurus to almost any application. *Mar 96, p. 80*

★★★★/7.4 **WordPerfect 3.5,** Corel, 613/728-8200, $129 (estimated). In speed, interface efficiency, and Macintosh integration, WordPerfect beats all competitors. *Jun 96, p. 98*

★★★/6.7 **WordPerfect 3.5,** Novell Business Applications, 801/225-5000, $189. Popular word processor adds HTML editor. *Feb 96, p. 61*

hardware

INPUT DEVICES

★★/4.7 **Adjustable Keyboard,** Apple Computer, 408/996-1010, $119. Adjustable split keyboard, but with small function keys. *May 96. p. 98*

★★★★ **ArtZ II,** Wacom Technology, 360/750-8882, $389.99. Graphics tablet has unique stylus that erases as well as draws. *Dec 95, p. 79*

★★★/6.1 **BAT Personal Keyboard,** Infogrip, 805/652-0770, $199. Chording device takes time to learn. *May 96, p. 98*

★★★ **ChoiceStick 1.0.2,** Kernel Productions, 302/456-3026, $69.95. Port lets you attach a pair of joysticks to a Mac. *Sep 95, p. 85*

★★★/6.0 **Comfort Keyboard,** Health Care Keyboard, 414/536-2160, $795. Expensive keyboard has separate sections that adjust independently. *May 96, p. 98*

★★★/5.8 **DataHand,** DataHand Systems, 602/860-8584, $995. Costly, but requires much less arm and hand motion than other text-input devices. *May 96, p. 98*

★★★/6.0 **Desktop GlidePoint,** Alps Electric, 408/432-6000, $99.95. Average touchpad whose biggest selling points are adjustable base and edge-detection. *May 96, p. 98*

★★★/6.0 **GlidePoint Desktop,** Cirque, 801/467-1100, $99.95. Similar to Alps input device, but without detachable base. *May 96, p. 98*

★★★★/7.5 **Hitachi StudioPad,** Hitachi Digital Graphics, 408/747-0777, $199.99. Graphics tablet for tight quarters. *Apr 96, p. 70*

★★ **Jetstick,** CH Products, 619/598-2518, $74.95. Joystick's hardware is fine, but its manual and software are inadequate. *Sep 95, p. 95*

★★★/5.2 **MacTrac Deluxe,** MicroSpeed, 510/490-1403, $99. Good, basic trackball. *May 96, p. 98*

★★★/5.6 **Microsoft Natural Keyboard,** Microsoft, 800/426-9400, $99.95. Inexpensive split keyboard with integrated wrist rest. *May 96, p. 98*

★★★/5.1 **Mouse Pen Mac 3.0,** Fellowes, 708/893-1600, $39.99. Versatile, inexpensive penlike pointing device. *May 96, p. 98*

★★★/6.2 **Mouse-Trak,** Itac Systems, 214/494-3073, $179. Well-built trackball with good ball dynamics. *May 96, p. 98.* Editors' Choice for best input devices.

★★★/5.0 **PenDirect ADB,** FTG Data Systems, 714/995-3900, $398. PenDirect controls cursor on monitors, but with less precision than touch screen. *May 96, p. 98*

★★/4.4 **PointPad,** Hagiwara Sys-Com, 619/546-9989, $89. Responds to direct pressure but awkward for dragging. *May 96, p. 98*

★★★/6.4 **RemotePoint,** Interlink Electronics, 805/484-1331, $159.95. Wireless pointer works well for stand-up presentations. *May 96, p. 98*

★★★★/7.4 **Thinking Mouse 5.0,** Kensington Microware, 415/572-2700, $89.99. Four-button mouse with excellent ergonomics and software. *May 96, p. 98.* Editors' Choice for best input devices.

★★/4.3 **TouchPad,** Touché Technologies, 415/331-6622, $59.95. This touchpad suffers from small buttons that can't be customized. *May 96, p. 98*

★★★ **Trackball Pro ADB,** CH Products, 619/598-2518, $119.95. Inexpensive trackball falls short in programmability and overall functionality. *Sep 95, p. 91*

★★★/6.7 **Tru-Form,** Adesso, 213/294-4300, $89 to

continues

Star Ratings

$99. Good split keyboard design with integrated pointing device. *May 96, p. 98*

MISCELLANEOUS HARDWARE

★★/4.0 **Brother MFC 4000ML,** Brother, 908/356-8880, $1000 plus $89 for Mac interface. Fax-copier-printer's top-notch fax features are marred by touchy printing. *May 96, p. 69*

★★★/6.4 **Chinon ES-3000,** Chinon America, 310/533-0274, $1095. Digital camera zooms in but with the high price doesn't measure up to Kodak Digital Camera 40's. *Mar 96, p. 77*

★★★ **Kodak Digital Camera 40,** Eastman Kodak, 716/726-7260, $995. Digital camera can use 37mm lens but has some flaws. *Jan 96, p. 59*

★★ **Smart Label Printer EZ30,** Seiko Instruments USA, 408/922-5800, $199. Label printer's print quality and speed are disappointing. *Nov 95, p. 72*

★★★ **SoftBoard Model 205,** Microfield Graphics, 503/626-9393, $2795. Electronic whiteboard is expensive but does the job. *Jan 96, p. 71*

★★★/5.9 **Sony PC Cam,** Sony Electronics, 941/731-4940, $499. This desktop camera lacks AV strength; its competitor—VideoLabs' FlexCam—is simply the better camera. *Apr 96, p. 77*

MODEMS/NETWORK HARDWARE

★★★/6.9 **3Com Impact,** 3Com, 408/764-5000, $549. This ISDN terminal adapter features easy-to-use installation software. *May 96, p. 54*

★★★★/7.7 **BitSurfr Pro,** Motorola, 205/430-8000, $495. This ISDN terminal adapter offers a good value. *May 96, p. 54*

★★/4.6 **Courier I-Modem with ISDN/V.34,** U.S. Robotics, 847/676-7010, $895. This ISDN terminal adapter is expensive and lacks features. *May 96, p. 54*

★★★ **GeoPort Telecom Adapter Kit,** Apple Computer, 408/996-1010, $129.95. Adapter unlocks the capabilities of Apple's GeoPort modem. *Oct 95, p. 75*

★★★ **Internet Server Solution for WWW,** Apple Computer, 408/996-1010, $2909. Web server is ideally suited for small-business sites. *Oct 95, p. 65*

★★ **Manta 500EN; Starfish Ethernet Access Point,** Digital Ocean, 913/888-3380, Manta $799; Starfish $1850. Wireless-communications package is capable but much too expensive. *Dec 95, p. 77*

★★★★ **OneWorld Combo,** Global Village Communication, 408/523-1000, $1499 without modems; $2099 with modems. Server is the very model of a multiuser modem pool. *Sep 95, p. 78*

★★★ **Power Class 28.8 Data/Fax Modem,** Motorola, 205/430-8000, $395. Fax modem's hardware is superb, but it's hampered by mediocre software. *Oct 95, p. 89*

★★★/6.3 **QuickStream/3,** Sonic Systems, 408/736-1900, $995; dial-out option $249. Three-port remote-access server is priced right but has its limitations. *Apr 96, p. 62*

★/2.6 **Smart One 2834VLXMac,** Best Data Products, 818/773-9600, $269. This voice modem is not a smart choice. *Jun 96, p. 76*

★★★★/8.2 **TribeLink2,** Tribe Computer Works, 510/814-3900, $1295; dial-out option $200; additional PPP client licenses $145 for 10 users to $1495 for 500. Two-port remote-access server features Web-based administration. *Apr 96, p. 62*

PRINTERS

★★★/5.2 **1060E,** QMS, 334/633-4300, $2399. Average quality, but supplies available only from QMS. *Jun 96, p. 116*

★★★/5.3 **1660E,** QMS, 334/633-4300, $3999. This average-quality printer doesn't print envelopes. *Jun 96, p. 116*

★★★/5.6 **4520mp,** Xerox, 716/442-4028, $4070. Slightly above-average speed and quality, and comes with three input trays. *Jun 96, p. 116*

★★★/5.7 **Accel-a-Writer 8200,** Xanté, 334/476-8189, $4495. Can handle large paper and offers halftone calibration, but output quality only average. *Jun 96, p. 116*

★★★★ **Apple Color StyleWriter 2200,** Apple Computer, 408/996-1010, $419. Portable ink-jet printer is ideal for color output when you're on the road. *Nov 95, p. 66*

★★★★/7.0 **Apple Color StyleWriter 2200,** Apple Computer, 408/996-1010, $419. The (almost) perfect printing companion for your PowerBook. *Apr 96, p. 133*

★★★★/7.2 **Apple Color StyleWriter 2400,** Apple Computer, 408/996-1010, $429. Very good print quality at a reasonable price. *Apr 96, p. 133.* Editors' Choice for best midrange color ink-jet printers.

★★★/6.2 **Canon BJC-210,** Canon Computer Systems, 714/438-3000, $299. Small footprint and low price, but only an average performer. *Apr 96, p. 133*

★★★★/7.1 **Canon BJC-4100,** Canon Computer Systems, 714/438-3000, $399. Excellent print quality and can be used with a PC. *Apr 96, p. 133.* Editors' Choice for best midrange color ink-jet printers.

★★★★/7.2 **Epson Stylus Pro,** Epson America, 310/782-0770, $999. Top-notch 720-dpi output, sprightly performance; a bargain alternative to dye-sub printers. *Apr 96, p. 133.* Editors' Choice for best high-end color ink-jet printers.

★★★★ **Fargo FotoFun,** Fargo Electronics, 612/941-9470, $399.95. Dye-sublimation printer produces good output at a reasonable price. *Jan 96, p. 61*

★★/3.9 **FS-1600A,** Kyocera, 908/560-3400, $2495. This inexpensive printer is slow and offers poor print quality. *Jun 96, p. 116*

★★/4.1 **FS-3600A,** Kyocera, 908/560-3400, $4278. Good paper-handling options, but slow for graphics and poor print quality. *Jun 96, p. 116*

★★★/5.1 **HP Color LaserJet 5M,** Hewlett-Packard, 800/752-0900, $9195. HP loses on all counts to the Tektronix Phaser 550. *Jun 96, p. 51*

★★★/5.4 **HP CopyJet M,** Hewlett-Packard, 800/752-0900, $3649. Color copier and ink-jet printer in a single unit. *Feb 96, p. 77*

★★★/6.3 **HP DeskWriter 660C,** Hewlett-Packard, 208/323-2551, $499. Poor color accuracy, blocky text and slow print speeds; easily networked. *Apr 96, p. 133*

★★★/5.2 **LaserJet 4M Plus,** Hewlett-Packard, 408/246-4300, $2479. Good print quality but below-average speed. *Jun 96, p. 116*

★★★/6.0 **LaserJet 4MV,** Hewlett-Packard, 408/246-4300, $3549. Strong tabloid-size printer with good speed and adequate print qualty. *Jun 96, p. 116*

★★★/6.5 **LaserJet 5Si MX,** Hewlett-Packard, 408/246-4300, $4899. Pricey, but offers top speed and quality. *Jun 96, p. 116.* Editors' Choice for best workgroup printer.

★★★/5.7 **LaserWriter 16/600 PS,** Apple Computer, 408/996-1010, $1950 (estimated). Good performance at a modest price, but lacking some convenience features. *Jun 96, p. 116*

★★★★ **LaserWriter 4/600 PS,** Apple Computer, 408/996-1010, $929. Compact printer produces great-looking 600-dpi output. *Dec 95, p. 60*

★★/3.3 **microLaser PowerPro/12,** Texas Instruments, 817/774-6000, $1998. Inexpensive, but offers poor output quality and very slow Photoshop printing. *Jun 96, p. 116*

★★ **Nikon Coolprint,** Nikon Electronic Imaging, 516/547-4355, $2350. Color dye-sublimation printer is fast, but print quality is flawed. *Sep 95, p. 83*

★★★/5.8 **Optra Lx+,** Lexmark, 606/232-2000, $3249. Good print quality and paper handling are offset by slow speed for graphics. *Jun 96, p. 116*

★★★★/7.9 **Tektronix Phaser 550,** Tektronix, 503/682-7377, $6995. The Phaser 550 beats HP Color LaserJet 5M on speed, resolution, and price. *Jun 96, p. 51*

★★★/5.3 **Typhoon 16,** Dataproducts, 805/578-4000, $3699. Solid printer, especially for mixed-platform environment; average output quality. *Jun 96, p. 116*

★★★ **Typhoon 8,** Dataproducts, 818/887-8000, $3100 (600 dpi, 4MB of RAM); $5199 (1200 dpi, 36MB of RAM). Workgroup printer offers top-notch 1200-dpi output but is a bit pricey. *Dec 95, p. 64*

★★ **Xerox 4510ps,** Xerox, 800/349-3769, $1745. Printer has neither the performance nor the quality to justify its price. *Dec 95, p. 68*

SCANNERS

★★/3.3 **ArtiScan Z1-600,** Tamarack, 714/744-3979, $649. The ArtiScan Z1-600's poor software, manual, and scanning performance make it hard for us to recommend it, even at its low price. So we won't. *Mar 96, p. 118*

★★/3.7 **Biz Card Manager,** Electronic Document Technology, 408/733-7309, $369. Fast card scanner but more expensive, no automatic scanning or data transfer to contact managers, and makes errors. *Apr 96, p. 64*

★★/3.7 **Biz Card Reader,** Umax Technologies, 510/651-8883, $245. Exports automatically scanned data to contact managers, but uses a nonstandard SCSI connector and has no on/off switch. *Apr 96, p. 64*

★★/3.3 **Color OneScanner,** Apple Computer, 408/996-1010, $859. The Color OneScanner's anemic software bundle and lackluster performance would make it an unexceptional offer even if reasonably priced. *Mar 96, p. 118*

★★/3.1 **CS-300,** Ricoh, 408/954-5326, $599. The CS-300 scanner has one thing going for it: it's dirt cheap. Unfortunately, with performance, software, and documentation this weak, it's still overpriced. *Mar 96, p. 118*

★ **Digital Fotovix IIIS-D,** Tamron Industries, 516/484-8880, $2299. Video slide scanner's image quality doesn't measure up to the competition. *Jan 96, p. 67*

★★★/5.4 **EasyPhoto Reader,** Storm Software, 415/691-6600, $259. Small-format photo scanner has its limits. *May 96, p. 66*

★★★★/7.2 **ES-1200C,** Epson, 310/782-0770, $1299. The ES-1200C scanner has great image quality, respectable speed, and good software, all at a reasonable price. *Mar 96, p. 118.* Editors' Choice for best midrange scanners.

★★★★/7.1 **Gemini D-16,** Umax, 510/651-4000, $1895–$1995. The Gemini D-16 is unique in being both a 400-dpi and 800-dpi scanner, depending on the scanning area. But for several hundred dollars above its competitors, you'd better need that extra

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resolution. *Mar 96, p. 118*

★★★★ **HP ScanJet 3c,** Hewlett-Packard, 208/323-2551, $1179. Economical scanner offers a broad tonal range and accurate colors. *Oct 95, p. 79*

★★★/6.1 **HP ScanJet 4c,** Hewlett-Packard, 208/396-2551, $1175. The HP ScanJet 4c is a respectable performer in all categories, though not exceptional. Limited software is its greatest weakness. *Mar 96, p. 118*

★★/3.8 **IX-4015,** Canon, 714/438-3000, $799. Boasts desk-space economy and an exceptional warranty, but its performance and software bundle are mediocre. *Mar 96, p. 118*

★★★/6.9 **Mac IRISPen,** Image Recognition Integrated Systems, 407/395-7831, $299. Portable, accurate pen OCR scanner. *Apr 96, p. 75*

★★★/6.6 **PageOffice,** Umax Technologies, 510/651-4000, $349. Personal page scanner shortchanges Mac users. *Jun 96, p. 58*

★★★★★/9.6 **PaperPort Vx,** Visioneer, 415/493-9599, $369. Desktop document scanner just gets bettter. *Mar 96, p. 82*

★★/4.0 **Paragon 1200SP,** Mustek, 714/250-8855, $899-$1000. The Paragon 1200SP is a disappointment, from its performance to its bare-bones manual. Proof that a 600-dpi, 30-bit scanner for $899 isn't a bargain. *Mar 96, p. 118*

★★★/5.0 **ScanMaker IIsp,** Microtek, 310/297-5000, $499–$699 (street). The ScanMaker IIsp is a shaky performer at best, especially when it comes to capturing highlight detail (it doesn't), but it's an option for the bargain hunter. *Mar 96, p. 118*

★★★/5.8 **ScanTouch AX-1200,** Nikon, 516/547-4355, $1720. The ScanTouch AX-1200 is a solid performer, but at this price it should be closer to stunning. *Mar 96, p. 118*

★★★/5.6 **Silverscanner III,** La Cie, 503/520-9000, $1499–$1699. The Silverscanner III is a good performer in many respects, but its poor color accuracy and high price place it behind the Epson ES-1200C on which it's based. *Mar 96, p. 118*

★★★/5.9 **StudioScan IIsi,** Agfa, 508/658-5600, $900 (street). The StudioScan IIsi gets good performance from its 30-bit, 400-dpi engine. Agfa's software is powerful and flexible, but could be easier to use. *Mar 96, p. 118*

★★/3.8 **VIP Scan,** La Cie, 503/520-9000, $199. Scans automatically to contact manager; includes Now Contact; uses nonstandard SCSI connector. *Apr 96, p. 64*

SPEAKERS

★★★★/8.8 **Acoustimass,** Bose, 508/879-7330, $699. Full, rich, natural sound; treble slightly rolled off but clean. *Mar 96, p. 157.* Editors' Choice for best three-piece speakers.

★★★★/7.1 **ACS 52,** Altec Lansing, 717/296-2818, $128. Clean, reasonably solid presentation; crisp highs; powerful bass for such a small design. *Mar 96, p. 157*

★★★★/7.1 **AMX-16,** Radio Shack, 817/390-3300, $120 (street). Clean, reasonably crisp, slightly bright, decent bass, somewhat lacking in low-end heft. *Mar 96, p. 157*

★★★/6.8 **AppleDesign Powered Speakers,** Apple Computer, 408/996-1010, $179. Clean, reasonably solid presentation. Bass is good but doesn't shake the foundations. *Mar 96, p. 157*

★★/4.9 **AV270 Powered Speakers,** Advent, 708/317-3700, $179. Clean and smooth. Somewhat tinny quality to midrange and highs. *Mar 96, p. 157*

★★★/6.2 **AV622 Powered Speakers,** Advent, 708/317-3700, $299. Clean and smooth, with somewhat lightweight character. Slight treble emphasis. Bass has reasonable weight and impact. *Mar 96, p. 157*

★★★/5.2 **J-688AV,** Jazz, 818/336-2689, $149. Reasonably smooth sound, noticeably rolled-off high end, slightly harsh midrange becomes a bit fatiguing over a long listening session. *Mar 96, p. 157*

★★/4.7 **J-902,** Jazz, 818/336-2689, $150. Clear reproduction, with moderate bass emphasis and overemphasized treble. Generally thin sonic character because of the high-frequency emphasis. *Mar 96, p. 157*

★★★/5.8 **JPS 45,** Jensen, 708/317-3700, $149. Clean, reasonably crisp, slightly bright; an almost sandpapery affect on cymbals; adequate bass, somewhat lacking in low-end heft. *Mar 96, p. 157*

★★/3.5 **Labtec LCS-3210,** Labtec, 360/896-2000, $119 (street). Decent, slightly boomy bass, harsh midrange, rolled-off treble. Sound gets harsher when played at loud volumes. *Mar 96, p. 157*

★★★/6.2 **MA-12CP,** Roland, 213/685-5141, $319. Relatively warm, well-balanced sound; slightly lightweight bass. Tends to sound harsh when played at normal volume levels. *Mar 96, p. 157*

★★★★/7.8 **MediaMate,** Bose, 508/879-7330, $339. Full, warm, rich, natural sound. Cymbals had considerable clarity and detail and sounded realistic. Amazingly robust for such a small speaker. *Mar 96, p. 157.* Editors' Choice for best desktop speakers.

★★★/6.6 **MLI-95,** Midi Land, 909/592-1168, $120. Surprisingly good sound for the money. Clean, reasonably clear; fine musical details a wee bit indistinct, good voice reproduction, adequate bass. Smooth highs, accurate presentation. *Mar 96, p. 157*

★★★★/7.5 **MMS 557,** Audio-Technica, 216/686-2600, $150. Relatively clean, slightly bright, crisp sound. Surprisingly robust bass for a small box. *Mar 96, p. 157*

★★★★/7.9 **SoundWorks,** Cambridge SoundWorks, 617/332-5936, $220. Clean, well-balanced sound, slight upper midrange emphasis, good bass. *Mar 96, p. 157.* Editors' Choice for best low-end three-piece speakers.

★★★/5.7 **SurroundSound ACS 500,** Altec Lansing, 717/296-2818, $450. Robust sound, slightly smeared highs, and slight harshness when played at loud volume. Bass is powerful, but a bit boomy. *Mar 96, p. 157*

★★/3.7 **SW150,** Koss, 414/964-5000, $180. Weak bass, harsh midrange, rolled-off treble. No saving graces. *Mar 96, p. 157*

★★★/6.4 **TC1490-7SUB,** Multimedia Labs, 410/429-4300, $249. Clean sound and thin balance; adjusting subwoofer output just makes bass boom, but bass is always lightweight. *Mar 96, p. 157*

★★★/6.4 **YST-SS1010,** Yamaha, 714/522-9240, $350. Relatively warm, well-balanced sound, slightly rolled-off treble with slight smearing effect on cymbals, average bass impact with subwoofer. Tends to sound harsh when played at loud volume levels. *Mar 96, p. 157*

SYSTEMS/STORAGE

★★★/6.9 **81/110,** Radius, 408/541-6100, $3000. A relabeled Power Mac 8100, this NuBus system offers a lower price than a PCI Mac. *Feb 96, p. 96.* Editors' Choice for best science-and-engineering Mac. *Feb 96, p. 96*

★★★/5.1 **50 1GQ Series,** Liberty Systems, 408/983-1127, $699. Only its compact size and speed recommend this 1.1GB drive. *Jun 96, p. 153*

★★★/5.4 **50 2.1GQ Series,** Liberty Systems, 408/983-1127, $1099. 2.1GB drive offers good speed, good price, skimpy manual. *Jun 96, p. 153*

★★★/6.0 **Advantage 2000,** MicroNet Technology, 714/453-6100, $1080. 2.1GB drive is a top performer with a too-short warranty. *Jun 96, p. 153*

★★★/6.0 **APS MS 2.0,** APS Technologies, 816/483-1600, $800. 2.1GB drive's good performance is enhanced by an excellent manual and software bundle. *Jun 96, p. 153*

★★★/6.4 **Blue Storm 2000,** Microtech, 203/468-6223, $2882. Expensive, but 2.4GB drive's strong performance and stackability help offset that. *Jun 96, p. 153*

★★★/5.5 **DCM 1200,** Direct Connections, 612/937-6283, $322. A decent performer, this 1.2GB drive offers a five-year warranty and a low price. *Jun 96, p. 153*

★★/3.6 **DCM 2400,** Direct Connections, 612/937-6283, $685. A slow performer, this 2.4GB drive also has ungainly ergonomics. *Jun 96, p. 153*

★★★★ **EZ135,** SyQuest Technology, 510/226-4000, $249. Removable drive is fast and comes with a fine selection of bundled software. *Dec 95, p. 58*

★★★★/7.2 **Genesis MP 528,** DayStar Digital, 770/967-2077, $13,500 (estimated). It's not for everyone but it meets a real need for some high-end users. *Jun 96, p. 87*

★★★/6.7 **Hammer PE 2000,** FWB, 415/325-4392, $1079. For the fastest performance, the Hammer PE 2000 is the choice. *Jun 96, p. 153.* Editors' Choice for best 1.0GB to 2.5GB hard drive.

★★★★/8.3 **Jaz Drive,** Iomega, 801/778-1000, $599.95. Iomega thinks big with Zip's new sibling. *Jun 96, p. 48*

★★★/5.2 **Magic Seagate Barracuda,** MacProducts USA, 512/892-4070, $1006. More expensive than MacProducts' almost-as-fast, same-capacity (2.1GB) Hawk drive. *Jun 96, p. 153*

★★★/5.6 **Magic Seagate Hawk,** MacProducts USA, 512/892-4070, $858. Pass-through power connector and a nice warranty distinguish this 2.1GB drive. *Jun 96, p. 153*

★★★/5.3 **MiniPak 2100,** Optima Technology, 714/476-0515, $975. 2.1GB drive is inexpensive but only a poor-to-average performer. *Jun 96, p. 153*

★★★★/7.0 **PDC 2400,** ProDirect, 612/941-1805, $800. 2.4GB drive is tops for speed, value, and design. *Jun 96, p. 153.* Editors' Choice for best 1.0GB-to-2.5GB hard drive.

★★★/6.2 **PDI 1200,** ProDirect, 612/941-1805, $335. Average speed undermines 1.2GB drive's excellent design. *Jun 96, p. 153*

★★★/5.6 **Performa 5125CD,** Apple Computer, 408/996-1010, $2300. The all-in-one design is appealing, but the performance is just so-so. *Feb 96, p. 96*

★★★/5.1 **PocketHammer 2050,** FWB, 415/325-4392, $1479. Merely moderate performer. 2.1GB drive has hard-to-adjust settings. *Jun 96, p. 153*

★★★/5.8 **PowerBook 5300,** Apple Computer, 408/996-1010, $2300. A gray-scale screen and middling performance make this just an acceptable notebook. *Feb 96, p. 96*

★★★/5.9 **PowerBook 5300c,** Apple Computer, 408/996-1010, $4500. A great color screen and strong expandibility balance with so-so performance. *Feb 96, p. 58.* Editors' Choice for best portable Mac.

★★★/5.9 **PowerBook 5300cs,** Apple Computer, 408/996-1010, $3600. Good expansion, so-so speed, and a decent color screen make this fine for short-term use. *Feb 96, p. 96*

★★★/5.9 **PowerBook Duo 2300c,** Apple Computer, 408/996-1010, $3699 (8MB of RAM, 750MB hard

continues

Star Ratings

drive); $4699 (20MB of RAM, 1.1GB hard drive, 14.4-Kbps fax modem). This new Duo packs a lot of power into a little package. *Apr 96, p. 58*

★★★/5.1 **PowerShop,** Adaptive Solutions, 503/690-1236, $2000 (estimated). Worth considering if its few accelerated tasks are among those you perform regularly. *Jun 96, p. 87*

★★★★/8.1 **PR2-16828W,** ProMax Technology, 714/727-3977, $8890. Comparatively low price, can repartition with reconfiguring hardware. Has confusing installation guide for drives. *May 96, p. 57*

★★★/5.9 **Q1080,** APS Technologies, 816/483-1600, $350. 1.1GB drive is slightly above-middle-of-the-road performer. *Jun 96, p. 153*

★★★/5.1 **SCSI PowerPlug II,** Hot Wire Technology, 203/761-0651, $119.99. A fast way to swap SCSI devices. *Feb 96, p. 86*

★★★/6.5 **SledgeHammer 3500FMF PCI II,** FWB, 415/325-4392, $5129. Software easy to use, but cables sometimes difficult to attach. *May 96, p. 57*

★★★/6.9 **SledgeHammer 7000FMF PCI II,** FWB, 415/325-4392, $9439. Fastest array tested, but cables sometimes difficult to attach. *May 96, p. 57*

★★/4.5 **SSW-1800,** MicroNet Technology, 714/453-6100, $2185. 2.1GB drive is a slow performer all around. *Jun 96, p. 153*

★★★/5.8 **System 100,** Radius, 408/541-6100, $10,500. Radius bundles its mediocre digital-video cards on a relabeled Power Mac 8100—that's no wise investment. *Feb 96, p. 96*

★★★/6.5 **Taurus AV4221,** Micropolis, 818/709-3300, $1270. Stunning design, solid performance, and a five-year warranty make this 2GB drive shine. *Jun 96, p. 153*

VIDEO/DISPLAY

★★/4.2 **AlphaScan GLX,** Sampo Technology, 770/449-6220, $1495. Low price fails to outweigh poor image quality. *Feb 96, p. 165*

★★★★/7.8 **ATI Xclaim GA,** ATI Technologies, 905/882-2600, $449. Offers adequate video-display acceleration and super-fast Free and previews at a low price. *Jun 96, p. 93*

★★/3.3 **Datashow AV 4500,** Sayett Technology, 716/624-1290, $4875. Panel has inscrutable menus; lackluster video performance. *May 96, p. 139*

★★★/6.9 **Diamond Javelin Video 3400XL,** Diamond Multimedia, 408/325-7000, $569. Offers decent video acceleration and enhanced QuickTime display, but shows its true colors as a Windows product: no control panel and a missing 832-by-624-pixel setting. *Jun 96, p. 93*

★★★/5.5 **Diamond Pro 21TX,** Mitsubishi Electronics America, 714/220-2500, $2199. Washed-out colors hold back an otherwise strong contender. *Feb 96, p. 165*

★★★ **Encoder Pro,** P2 Systems, 206/525-2081, $259. Inexpensive Mac-to-TV adapter is a good value. *Jan 96, p. 69*

★★★★/7.5 **Eris 1.0,** RSI Systems, 612/896-3020, $3995. Dedicated box is easy to install, but the system is expensive and you need to supply your own camera. *May 96, p. 82.* Editors' Choice for best desktop videoconferencing system.

★★/4.4 **FlexScan F2 21,** Nanao, 310/325-5202, $2299. Blurry, dim image and too high a price. *Feb 96, p. 165*

★★★/6.8 **IMS TwinTurbo-128M,** Integrated Micro Solutions, 408/369-8282, $699. Slight screen-refresh artifacts and image shifts when changing bit depth detract from good video acceleration speeds. *Jun 96, p. 93*

★★★★/7.1 **MagnaByte M3xv,** Telex, 612/884-4051, $3995. Easy to use, good image quality, mid-range price. *May 96, p. 139.* Editors' Choice for best LCD projection panels.

★★★/5.2 **MagniView 488B,** Dukane Audiovisual Products, 708/584-2300, $4995. Image quality is a notch below average in all categories. *May 96, p. 139*

★/2.8 **Matrox MGA Millennium,** Matrox, 514/969-6320, $649. Video-display acceleration is disabled when floating palettes overlap document windows—a major flaw. FreeHand preview performance isn't great, either. *Jun 96, p. 93*

★★★/6.8 **Meet-Me 1.0,** Sat Sagem, 408/446-8690, $2995. Good audio and video, but more expensive than the Apple system it's based on. *May 96, p. 82*

★★/4.8 **Multigraph 445X,** Nokia Display Products, 415/943-4071, $2775. Adequate image quality, but at too high a price. *Feb 96, p. 165*

★★★/6.2 **Multiple Scan 20 Display,** Apple Computer, 408/996-1010, $2149. Not as vibrant as it could be, but good value. *Feb 96, p. 165*

★★★/5.9 **MultiscanTC,** Sony, 408/432-0190, $3950. Special color-adjustment tools don't overcome mediocre performance. *Feb 96, p. 165*

★★★★/7.3 **MultiSync XE21,** NEC Technologies, 508/264-8000, $1899. Rich, bright images complemented by excellent controls. *Feb 96, p. 165*

★★★/5.8 **MultiView 21,** Radius, 408/541-5700, $2149. Seductively rich colors, but too soft a focus. *Feb 96, p. 165*

★★★★/8.3 **Number Nine Imagine 128,** Number Nine Visual Technology, 617/674-0809, $999. If you want the fastest overall video acceleration of the PCI cards we reviewed, plus support for 1600-by-1200 resolution, the Imagine has both. They come at a relatively high cost, though. *Jun 96, p. 93*

★★★/5.0 **Ovation 810,** Proxima, 619/457-5500, $3295. A better value than Proxima's high-end Ovation 846C panel. *May 96, p. 139*

★★/4.7 **Ovation 846C,** Proxima, 619/457-5500, $5995. Design and features outshine image quality of this projection panel. *May 96, p. 139*

★★★/5.0 **PanaSync/Pro C2192P,** Panasonic Communications & Systems, 201/348-7000, $1999. Reasonable price fails to overcome weak image quality. *Feb 96, p. 165*

★★★/6.6 **Pivot 1700,** Portrait Display Labs, 510/227-2700, $1099. Good image quality but does not automatically switch views when rotated. *Mar 96, p. 70*

★★★/5.4 **Polaview 3000,** Polaroid Electronic Imaging Systems, 617/386-2000, $5295. Unremarkable overall image quality, but above-average video. *May 96, p. 139*

★★/3.5 **PowerView 950V,** In Focus Systems, 503/685-8888, $9499. Innovative concepts but substandard image quality; overpriced. *May 96, p. 139*

★★★★ **Presenter TView,** TView, 503/643-1662, $449. Reliable Mac-to-TV adapter produces an excellent picture. *Jan 96, p. 69*

★★★★/8.6 **PressView 21 SR,** Radius, 408/541-6100, $3999. The best professional-quality display gets better. *Feb 96, p. 62*

★★/4.3 **ProColor 1701,** Boxlight, 360/779-7901, $6499. Panel has substandard image quality and hard-to-use controls. *May 96, p. 139*

★★★/5.0 **QuickDraw 3D Accelerator Card,** Apple Computer, 408/996-1010, $400. Supports texture maps but only minor speed gains with major 3-D applications. *Apr 96, p. 60*

★★★ **QuickTake 150,** Apple Computer, 408/996-1010, $739. Digital camera is easy to use and includes close-up lens. *Jan 96, p. 59*

★★★★/7.1 **QuickTime Conferencing Kit 1.0,** Apple Computer, 408/996-1010, $2000. Good value, straightforward LAN- and ISDN-capable software, but no digitizer included and ISDN setup is complex. *May 96, p. 82*

★★ **Radius Telecast,** Radius, 408/541-6100, $9995. QuickTime-based video editor has potential, but software is not yet mature. *Jan 96, p. 65*

★★/3.5 **Radius Thunder 30/1600,** Radius, 408/541-6100, $1499. An incompatibility with FreeHand causes preview speeds to plummet, but otherwise this PCI video-display card offers solid performance and a nice control panel. *Jun 96, p. 93*

★★★★/7.2 **Rainbow 30/10,** Chisholm, 408/559-1111, $4995. Panel is carefully designed for ease of use; a good value. *May 96, p. 139.* Editors' Choice for best LCD projection panels.

★★★★/7.3 **RasterOps SuperScan Mc 21,** NSA/Hitachi, 617/461-8300, $2299. Top performance plus sensible, intuitive controls create a winning combination. *Feb 96, p. 165.* Editors' Choice for best two-page monitor.

★★★/6.5 **ShareVision Mac3000 1.0,** Creative Labs, 408/428-6600, $1149. Easy to install with good sound quality, but small maximum frame size and poor synchronization are problems. *May 96, p. 82*

★★/4.0 **Sharp QA-2500,** Sharp, 201/529-8731, $9995. Panel offers overly complex image controls; expensive. *May 96, p. 139*

★★★/5.5 **SmartView 3600,** In Focus Systems, 503/685-8888, $3799. A solid LCD performer and a good value. *May 96, p. 139*

★★/4.1 **SyncMaster 20GLs,** Samsung Electronics America, 201/691-6200, $1599. Glare-catching, image-distorting tube and weak controls. *Feb 96, p. 165*

★★★★ **Targa 2000 1.2,** Truevision, 408/562-4200, $5495. Video board offers good picture quality and fully synced 16-bit audio. *Dec 95, p. 71*

★★★/5.8 **ViewSonic 21PS,** ViewSonic, 909/869-7976, $2095. Bright, vibrant, though not particularly sharp image. *Feb 96, p. 165*

★★★/5.3 **VisionMaster Pro 21,** Iiyama North America, 215/957-6543, $1995. Good image quality, but confusing controls. *Feb 96, p. 165*

★★★/5.9 **Vision Q3 LCD Panel,** Apollo Presentation Products, 516/467-8033, $6750. Top image quality but difficult to use. *May 96, p. 139*

★★★/5.2 **Visit Video 2.0 (2.1),** Northern Telecom, 214/684-1000, $2999. Good call management and supplies all hardware, but lacks H.320 support and has small on-screen frame size. *May 96, p. 82*

★★★/5.0 **VR-1000 3-D Stereoscopic LCD Projection Panel,** VRex, 914/345-8877, $6995. The only choice for projecting 3-D images, though stereo 3-D images don't integrate well with standard PowerPoint or Persuasion slide shows. *May 96, p. 139*

★/1.9 **Yarc Screamer,** Yarc Systems, 805/499-9444, $995. Supports texture maps but slower than using no board in some instances; chokes on simple models. *Apr 96, p. 60*

★★★/5.6 **Z215,** nView, 804/873-1354, $5695. Good image quality, very sleek and compact. *May 96, p. 139* m

Macworld

Advertiser Index

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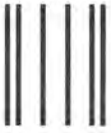

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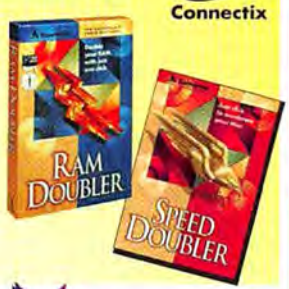

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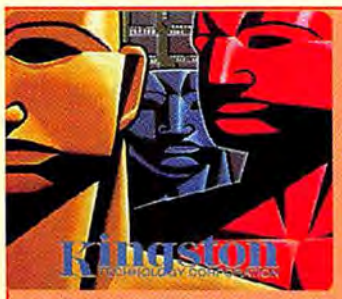

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Focus LapisColor MV8-EN (FOC LQAV8-EN) $249.99
Focus LapisColor MV16 (FOC LQAV16) $299.99

Scanners

Umax Vista-S6E
Color Flatbed Scanner
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$399.99 (UMX VISTASEMAC)

Visioneer PaperPort VX (VIR PAPERVXMAC) $299.99
Hewlett-Packard ScanJet 4P (HP C1138A) $499.99
Umax Vista-S12 PRO2 (UMX VS12MACPRO2) $899.99

Printers

Hewlett-Packard DeskWriter 660C Printer
•Prints 600 x 600 dpi black, 600 x 300 color •2-pages per minute black, 2-3 minutes per page in color •System 7+ and QuickDraw compatible •512K memory
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Hewlett-Packard 855Cse (HP C4575A) $499.99
Epson Stylus™ Pro (EPS STYLUS-PRO) $499.99
Hewlett-Packard LaserJet 4M Plus (HP C2039A) $1599.99

Removable Media

1GIG Jaz Cartridge
Iomega 1GIG Cartridge (BER MAC1GIGCART) ..each $139.99
Micronet 1GIG Jaz Cartridge (MNT CR1000JAZ) ....each $139.99

Iomega 100MB Zip Cartridge
(BER MAC100MBDSK) ...each $19.99
(BER MAC100MBTRI) .. 3 Pack $49.99
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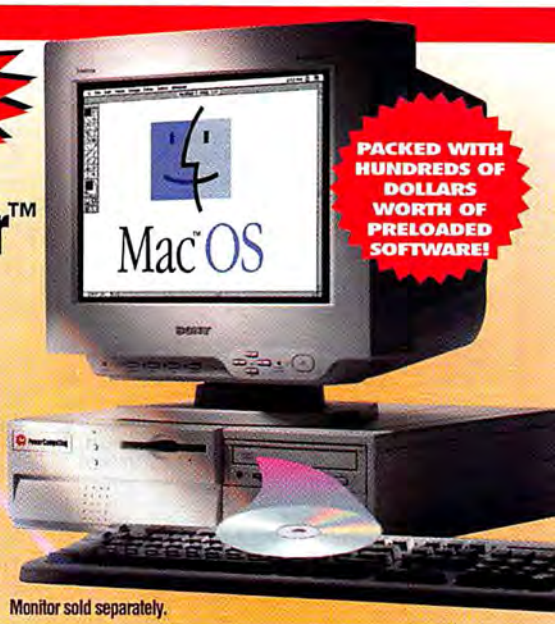

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NEC	4X	200ms	$175
Teac	6X	140ms	$289
NEC	6X	150ms	$325
Plextor	6X	145ms	$369
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NEC	4X	$899	$1489
Sony	4X	$959	$1599
Pioneer	4.4X	$1199	$2029
Plextor	4.5X	$1659	$2829
Teac	6X	$1439	$2439
NEC	6X	$1659	$2839
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MEDIA

		2-4	5-9	10-29
Tapes				
QW3080	[QW3080]	$32	$27	$25
4mm 90M	[DAT90M]	$15	$10	$8
4mm 120M	[DAT120M]	$27	$22	$20
8mm 112M	[DAT112M8MM]	$15	$10	$8
8mm 160M	[DAT160M8MM]	$23	$18	$16
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230MB	[FW230MEDIA]	$23	$19	$17
650MB 512K	[VBR5B2]	$51	$47	$45
650MB 1024K	[VBR5B4]	$51	$47	$45
1.3GB 512K	[VBR5E2]	$59	$55	$53
1.3GB 1024K	[VBR5E4]	$59	$55	$53
2.6GB 512K	[OC2.6GIG512]	$87	$83	$81
2.6GB 1024K	[OC2.6GI1024]	$87	$83	$81
SyQuest				
44MB	[SQ400]	$44	$40	$38
88MB	[SQ800]	$48	$44	$42
105MB	[SQ310]	$56	$52	$50
135MB	[EZDISK]	$26	$22	$20
200MB	[SQ2000]	$72	$68	$66
270MB	[SQ327]	$58	$54	$52
Iomega				
100MB ZIP	[ZIP100C]	$23	$18	$16
1Gig JAZ	[JAZC-1GIG]	$99	$95	$93
Cleaning Cartridges				
4mm	[DAT4MMCLEAN]	$20	$15	$13
8mm	[DAT8MMCLEAN]	$29	$24	$22
Miscellaneous				
650MB PD disks	[LMR650A]	$58	$54	$52

HARD DRIVE SPECIALS

		Internal	External
2 Gig	5400rpm	$475	$535
2 Gig	7200rpm	$569	$629
4 Gig	7200rpm	$889	$949
9 Gig	5400rpm	$1799	$1899

SCSI HARD DRIVES

SCSI	Speed	RPM	Brand	Model	Wty	Int	Ext
1050MB	9ms	5400	Seagate	ST31051N	3	$360	$420
1080MB	11ms	5400	Seagate	ST51080N	3	$248	$308
1280MB	12ms	5400	Quantum	FB1280S	3	$265	$325
2050MB	8.5ms	7200	Micropolis	MC4221	5	$585	$645
2050MB	8.5ms	7200	Micropolis	MC4221AV	5	$665	$725
2147MB	9ms	5400	Micropolis	MC4421	5	$539	$599
2147MB	9ms	5400	Seagate	ST32151N	5	$619	$679
2147MB	9ms	5400	Seagate	ST32430N	5	$599	$659
2147MB	8ms	7200	Seagate	ST32550N	5	$675	$735
2150MB	8ms	7200	Quantum	XP32150	5	$635	$695
4290MB	8ms	7200	Seagate	ST15150N	5	$999	$1059
4290MB	9ms	5400	Seagate	ST15230N	5	$889	$949
4294MB	8.9ms	7200	Micropolis	MC3243	5	$979	$1039
4294MB	8.9ms	7200	Micropolis	MC3243AV	5	$1039	$1099
4300MB	8.6ms	7200	Quantum	XP34300	5	$889	$949
9091MB	12ms	5400	Micropolis	MC1991	5	$1879	$1979
9091MB	12ms	5400	Micropolis	MC1991AV	5	$1979	$2079
9080MB	11ms	5400	Seagate	ST410800N	5	$1909	$2009
WIDE SCSI							
2050MB	8.9ms	7200	Micropolis	MC4221W	5	$625	$735
2050MB	8.9ms	7200	Micropolis	MC4221WAV	5	$769	$879
2147MB	8ms	7200	Seagate	ST32550W	5	$745	$855
2150MB	8ms	7200	Quantum	XP32150W	5	$689	$799
4294MB	8.9ms	7200	Micropolis	MC3243W	5	$1039	$1149
4294MB	8.5ms	7200	Micropolis	MC3243WAV	5	$1129	$1239
4294MB	8ms	7200	Seagate	ST15150W	5	$1089	$1199
4300MB	8.6ms	7200	Quantum	XP34300W	5	$979	$1089
9080MB	11ms	5400	Seagate	ST410800W	5	$2079	$2229
9100MB	12ms	5400	Micropolis	MC1991W	5	$2019	$2169
9100MB	12ms	5400	Micropolis	MC1991WAV	5	$2119	$2269

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HHCASEOPEN	1 HH	40W,1	2.3x9.7x10.4	$79
CDCASE	1 HH CD	40W,1	2.3x9.7x10.4	$89
FHCASE	1 FH or 2HH	65W,1	4x10x10.5	$139
DUALCASE	2 FH or 4HH	2x65W,2	11.9x7.5x12	$250
TOWERCASE	3 FH or 7HH	300W,2	19x9x13	$439
QUADCASE	4 FH or 8HH	4x65W,3	17.4x8.4x11.7	$539

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1280MB	12ms	5400	Quantum	FB1280A	3	$229
1700MB	11ms	4500	Quantum	SR31700A	3	$255
2167MB	10ms	5400	Seagate	ST32140A	3	$309
2500MB	11ms	4500	Quantum	SR32550A	3	$369
2 1/2"						
540MB	13ms	4200	Toshiba	MK1924FC	1	$309
810MB	13ms	4200	Toshiba	MK1926FC	1	$379
1350MB	13ms	4200	Toshiba	MK2720FC	1	$569

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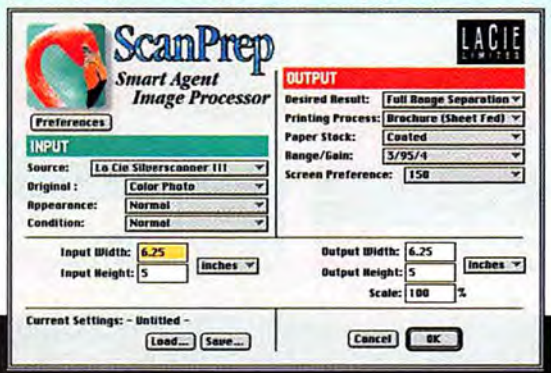

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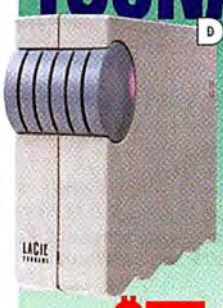

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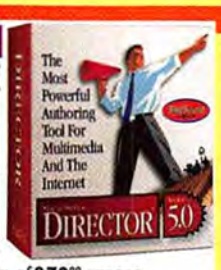

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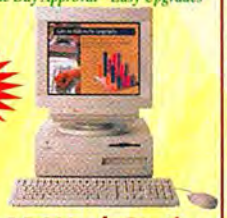

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Apple Quadra 610	4	68					74		139			279	536	
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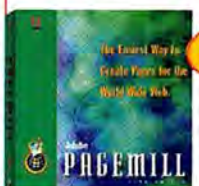

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91962	Spressa CD-Recorder CD CSP-9211S	$1,189.00
13166	SRS-D2K Speakers w/ Subwoofer	$134.98
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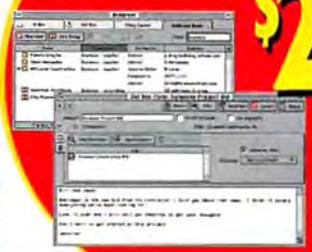

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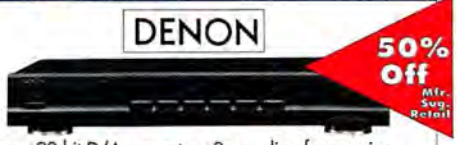

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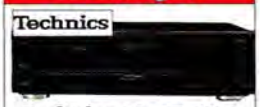

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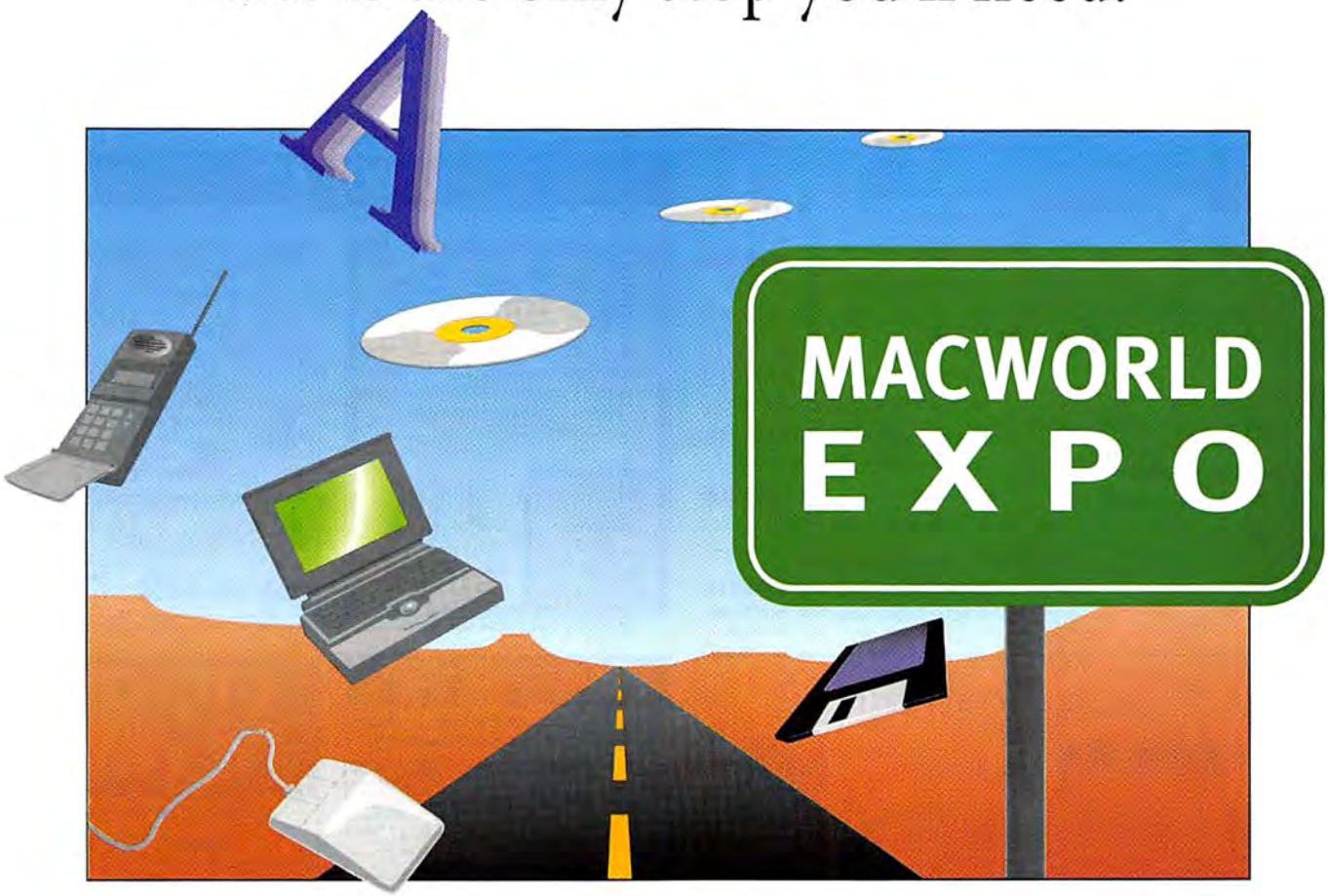

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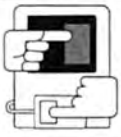

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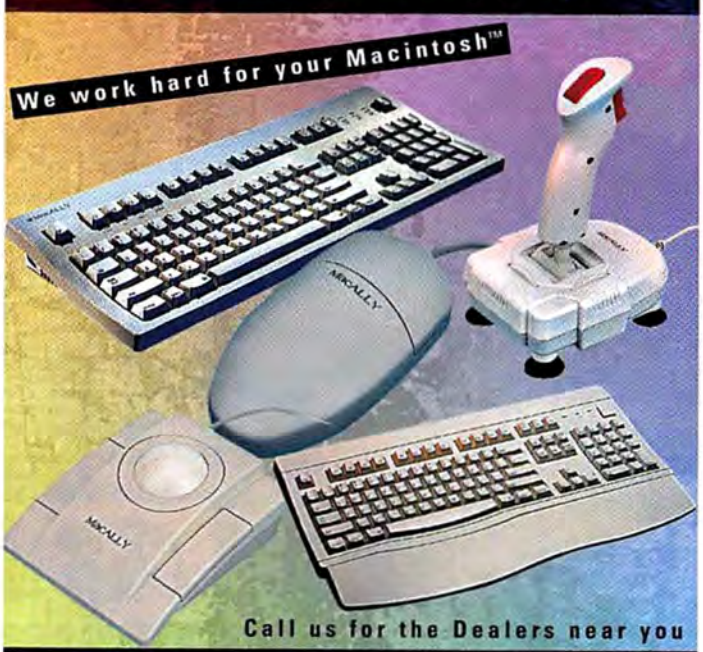

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Super CoolScan $1999

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Kodak RFS 2035	$6495
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Epson ES 1200C Pro	$1149

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StyleWriter 1500	$269

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Fargo Pictura 310E	$4295

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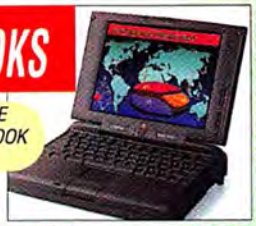

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32MB	Dimms	449
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Sony	CPD17SF2 17"	859
NEC	XV15+ 15"	475
NEC	XV17+ 17"	805
NEC	XP21 21"	1960
Hitachi	Superscan Pro 17"	675
Hitachi	Superscan MC 17"	875
Hitachi	Superscan Pro 20"	1285
Hitachi	Superscan MC 20"	1345
Hitachi	Superscan Pro 21"	1649
Hitachi	Superscan MC 21"	1849
Hitachi	Superscan Elite 21"	1899
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Quantum	2.1GB Atlas LP 3.5"	682
Quantum	4.3GB GrandPrix 3.5"	825
Seagate	4GB Barracuda 3.5"	1085

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Quantum	1.2GB Fireball 3.5"	349
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Quantum	2.1GB Atlas LP 3.5"	752
Quantum	4.3GB GrandPrix 3.5"	895
Seagate	4GB Barracuda 3.5"	1155
Syquest	EZ-135 Drive	199
Iomega	Zip Drive	189

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Umax	VistaS8 LE Scanner	635
Umax	VistaS12 LE Scanner	720
Umax	Powerlook2 Mac Pro	2275
Microtek	Scanmaker 35t	379
Microtek	ScanMaker III / Phtshp.	1929
Epson	1200C LE	925
Nikon	Super Cool Scanner	1895
Nikon	ScanTouch AX1200	1170
Visioneer	Paperport VX	299
Visioneer	Paperport	269
UMAX	Page Office	299

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Megahertz	CruzCard 28.8	289
Megahertz	CruzCard14.4	75

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Apple	Color StyleWtr 2200	279
Apple	Color StyleWtr 2400	289
Apple	StyleWriter 2500	389
Apple	LW 4/600PS	699
Apple	LW Select 360	1075
Apple	LW 12/600PS/Color	5895
Epson	Stylus Color II	335
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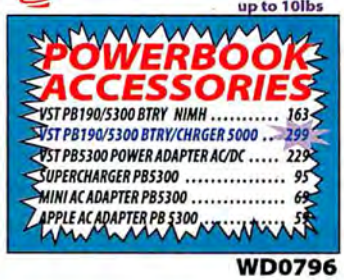

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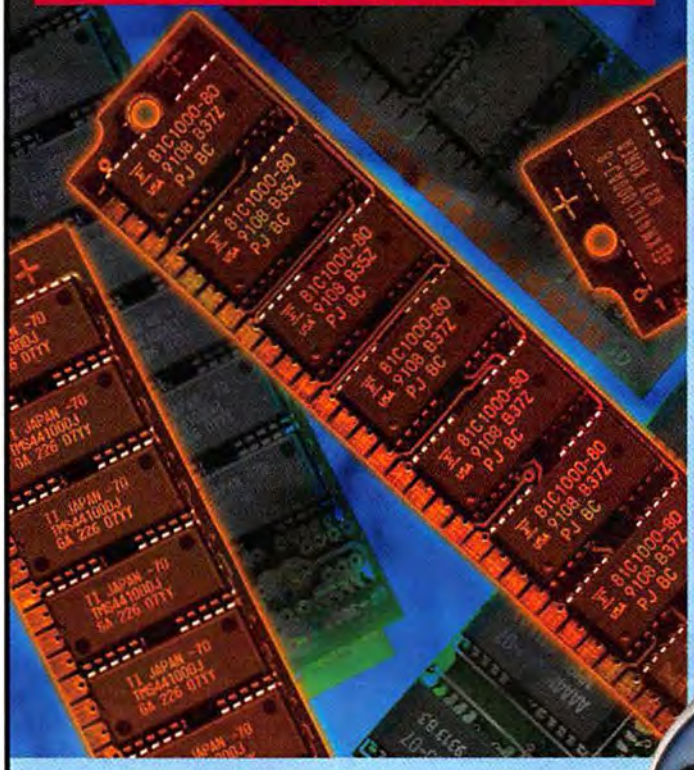

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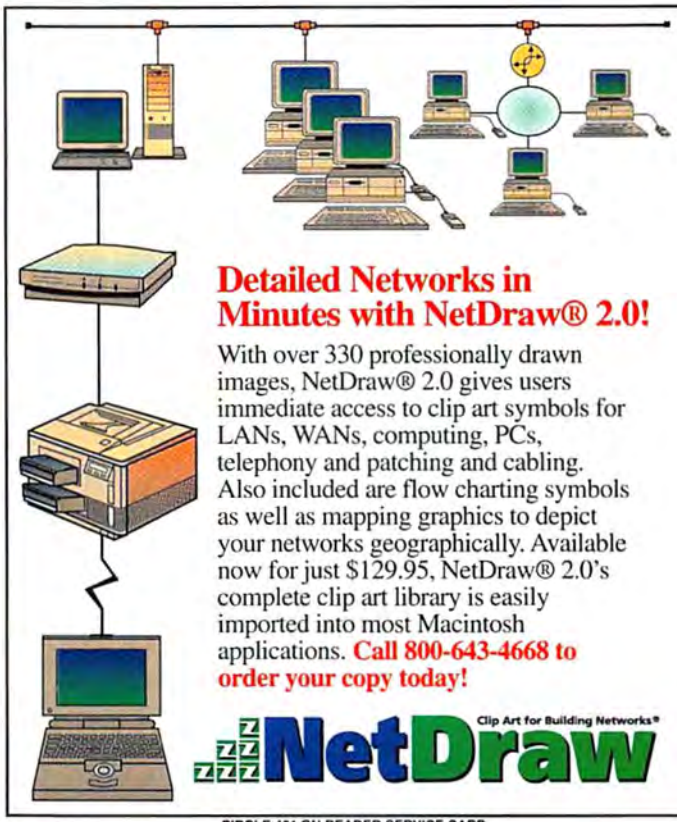

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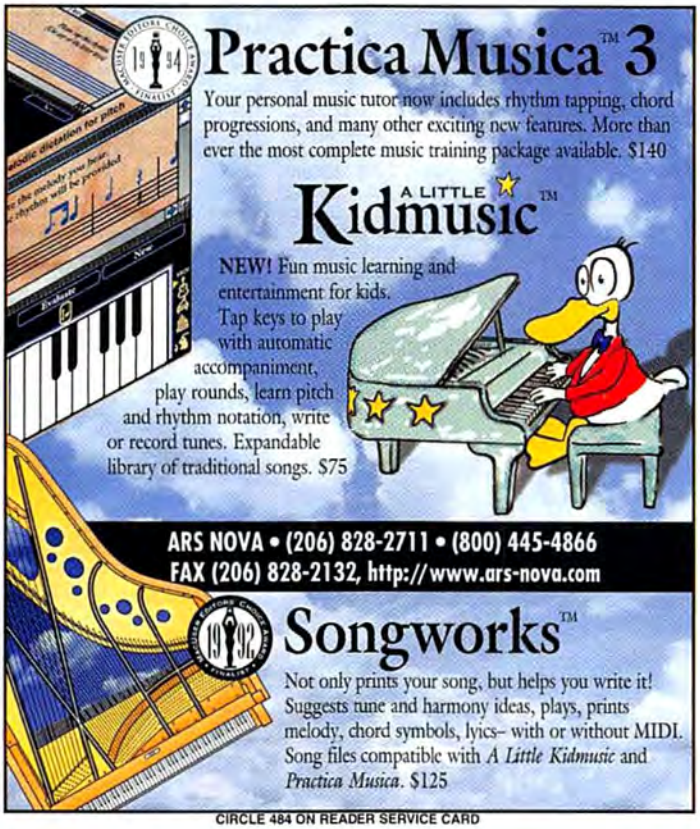

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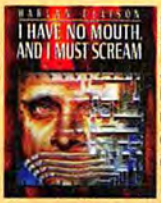

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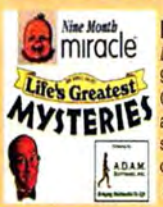

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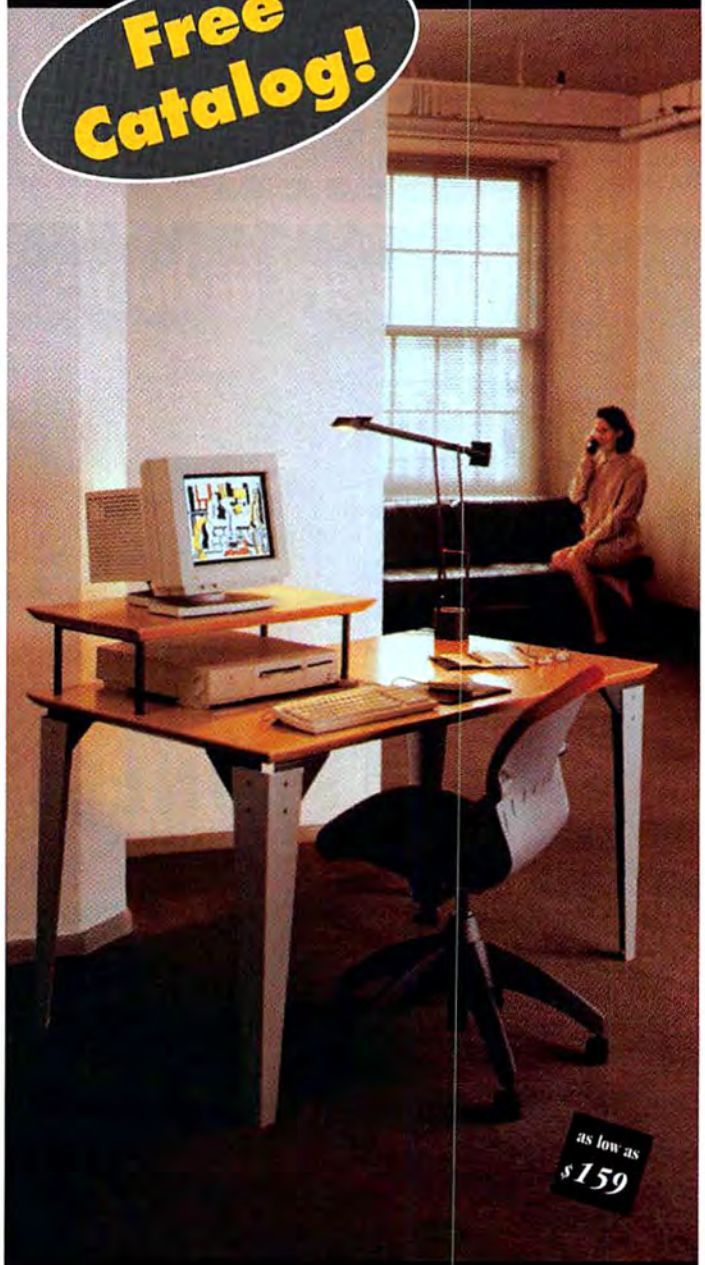

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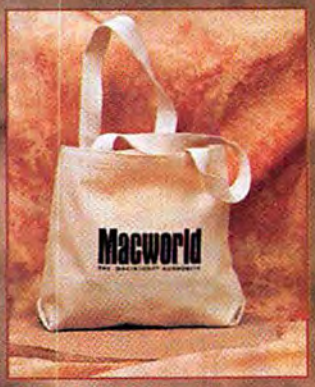

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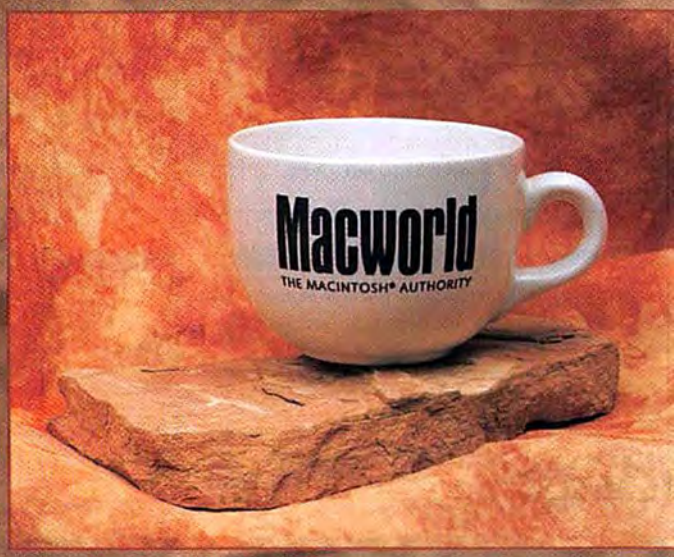

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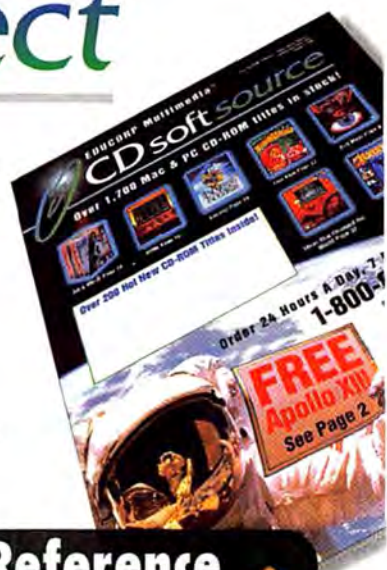

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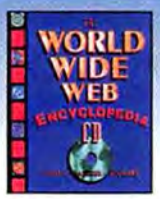

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by Irvin Muchnick

Protecting Writers' Rights Online

THE NATIONAL WRITERS UNION PROPOSES COLLECTIVE LICENSING

LAST MONTH SUZANNE Stefanac described the current, somewhat unsettled state of copyright law as it pertains to online publishing and the electronic reuse of creative works (*NetSmart*, June 1996). As one means of addressing the problem, the National Writers Union proposes a system called collective licensing, which it has begun to institute through its Publication Rights Clearinghouse (PRC). Although many print and electronic publishers—*Macworld* included—have expressed doubts about collective licensing, the NWU appreciates this opportunity to discuss this important public issue.

The PRC is based on the reality that freelance writers earn their living by selling their books and articles for publication. Generally, when an author sells a work, by custom and law the publisher is entitled to print it one time only; unless specified by contract, the right to republish it is not included. But with the rapid expansion of for-profit online publications, writers are falling victim to the unauthorized—and unpaid—reuse of their wares. This issue was the basis of a federal copyright suit filed in 1993 by a group of NWU members, led by president Jonathan Tasini, against the *New York Times*, Lexis/Nexis, and other players in the new electronic information industry. A ruling in the case is expected this summer.

In the meantime, in an attempt to secure writers' rights and protect their livelihood, the NWU launched the PRC, loosely fashioned after long-standing music-industry organizations such as the American Society of Composers, Authors and Publishers (ASCAP). Collective licensing is a transaction-based system for distributing royalties. Charter enrollees in the PRC include novelists, journalists, and poets—among them, Isabel Allende, Ben Bagdikian, and Barbara Kingsolver. This spring the PRC distributed its first pool of royalties from Knight-Ridder's UnCover, the world's largest database of magazine and journal articles.

How Collective Licensing Works

To enroll, authors pay a onetime fee and submit a work or a body of work, along with a statement confirming that they retain electronic rights. The PRC then offers its "repertoire" for sale to third-party publishers, of which UnCover is the first. The publisher pays a copyright fee to the PRC for each work ordered; the PRC then distributes the royalty (minus an administrative charge) to the individual writers on a quarterly basis.

The NWU views this program as a partial solution to the problem of assuring

CHRIS LENSCH

that freelance writers (as well as photographers, graphic artists, and other creators) get their fair share when their works are distributed via databases, CD-ROMs, and the World Wide Web.

The NWU is aware that some of our friends in the computer world view collective licensing with some suspicion. They are concerned, for example, that the NWU's plan would stamp out browsing and casual copying—two of the principal benefits of universal Internet access.

In fact, the NWU strongly supports a broad definition of fair use. After all, writers use computers too, and are themselves increasingly dependent on access to online research materials. By setting up a system to make copyright compliance cheap and easy, we are not targeting the individual end user who downloads articles to share with 1, or 10, or even 100 friends. Rather, our goal is to facilitate a process by which authors can be paid fairly when the emerging for-profit information industry, such as Lexis/Nexis, reuses their work.

Some wonder how the PRC can possibly monitor the electronic reuse of works. As the technology evolves and additional third-party publishers enter the system, different arrangements will probably evolve. UnCover faxes articles to users who request them from its online index and automatically transfers a copyright fee to the PRC for each request.

As more users gain access to the World Wide Web and download articles from it, more companies are trying to figure out ways to make a profit on the Web, raising additional questions. Right now it appears that advertising will figure prominently in for-profit Web publishing, just as it does in television and radio. And just as content producers for television and radio are paid for their work, writers and others whose work is published online deserve to be recompensed.

Not the Last Word Yet

In addition to setting up the PRC, the NWU is experimenting with a flat-fee one-year license for works posted at SkiNet, the Web site of The Times Mirror Company's *Ski* and *Skiing*, and we'll continue to examine other collective-licensing proposals. Ultimately, we don't care how writers get paid—only that they get paid fairly for the sweat of their brow. **m**

IRVIN MUCHNICK administers the National Writers Union's Publication Rights Clearinghouse. For information about NWU membership, visit *http://www.nwu.org/nwu/*. For information about the PRC, write *irv@nwu.org*.

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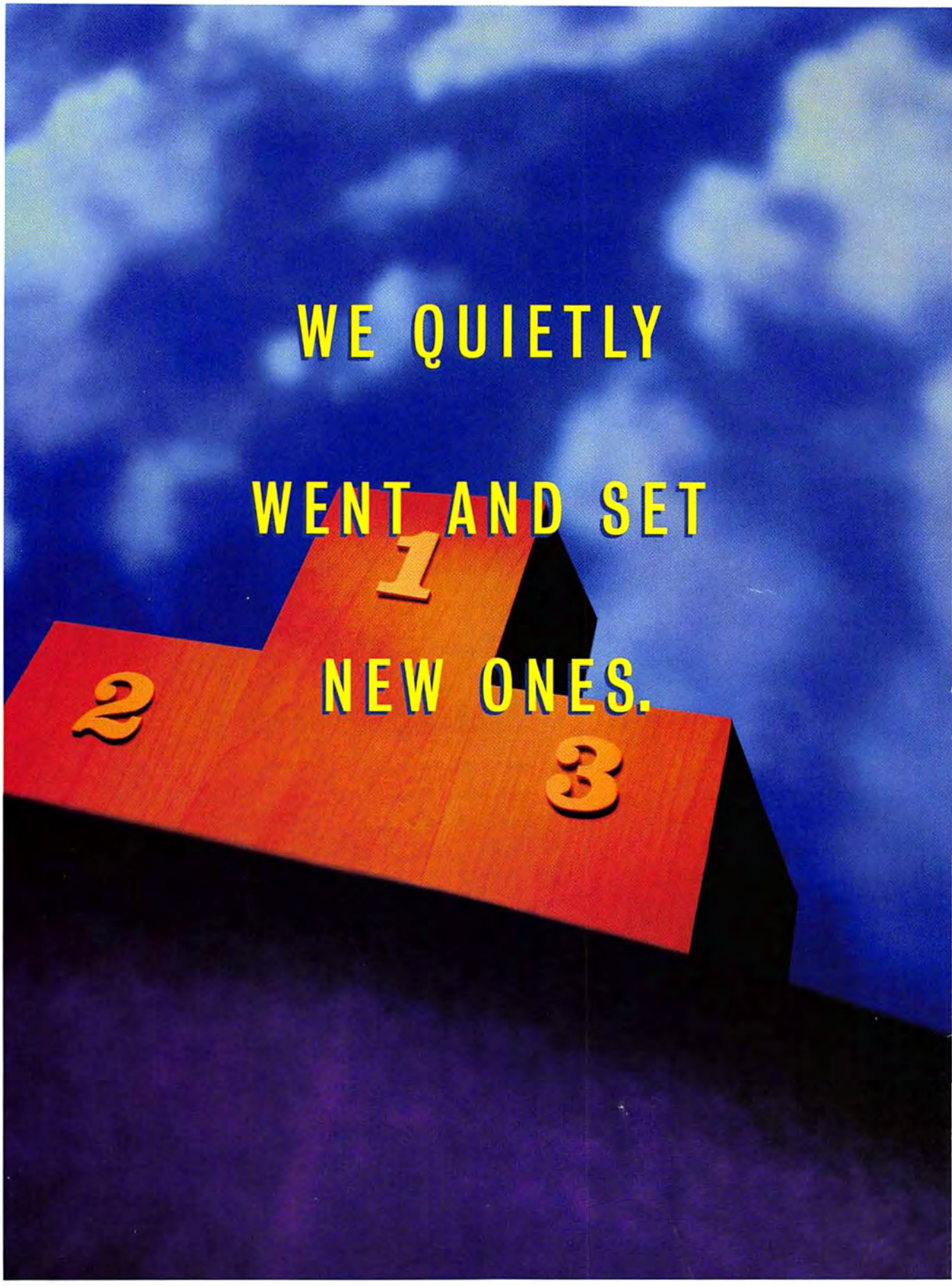
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