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Model Name	Millennia® C400	Millennia C400	NEW! Millennia C466
Processor	Intel Celeron processor 400MHz	Intel Celeron processor 400MHz	Intel Celeron processor 466MHz
RAM	64MB SDRAM	64MB SDRAM	64MB SDRAM
Hard Drive	4.3GB Ultra ATA hard drive◊	8.4GB Ultra ATA hard drive◊	8.4GB Ultra ATA hard drive◊
DVD ROM	40X var. speed CD-ROM drive°	40X var. speed CD-ROM drive°	40X var. speed CD-ROM drive°
Modem	3Com USRobotics V.90 WinModem**	3Com USRobotics V.90 WinModem**	3Com USRobotics V.90 WinModem**
Graphics	8MB nVidia Riva 128ZX AGP 2X graphics	8MB nVidia Riva 128ZX AGP 2X graphics	8MB nVidia Riva 128ZX AGP 2X graphics
Micron U	1-year free^4 training @ Micron U online	1-year free^4 training @ Micron U online	1-year free^4 training @ Micron U online
Warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty
Operating System	Microsoft Windows 98	Microsoft Windows 98	Microsoft Windows 98
MConnect	Micron pays for 1-year EarthLink Sprint TotalAccess°°	Micron pays for 1-year EarthLink Sprint TotalAccess°°	Micron pays for 1-year EarthLink Sprint TotalAccess°°
Factory Direct Price without monitor	$31/mo. $999 Business Lease 48 mos.**	$32/mo. $1,049 Business Lease 48 mos.**	$34/mo. $1,099 Business Lease 48 mos.**
Upgrade to:	Upgrade to: 128MB SDRAM 15" Micron 500Cx (13.9" display)	Upgrade to: 128MB SDRAM 17" Micron 700Cx (15.9" display)	Upgrade to: 128MB SDRAM 17" Micron 700Cx (15.9" display)
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For Additional product information and important sales terms, please see first page of the advertisement. ^1One year free with purchase of new Micron desktop or notebook system. Free subscription does not include books or software. ^11$239 is based on the unlimited EarthLink Sprint Internet service for one year. °CD-ROM speeds: 40X max./17X min.; 32X max./17X min.; 24X max./12X min. °°You will receive a coupon for a free upgrade to Microsoft Office 2000 when you purchase a Micron Millennia or TransPort TREK^2 equipped with Microsoft Office 97. This coupon must be redeemed by Aug. 30, 1999. Micron will send a you copy of Microsoft Office 2000 upon its release which is currently summer 1999. If system is returned, there will be no upgrade.

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Processor	Intel Pentium II processor 333MHz	Intel Pentium II processor 333MHz	Intel Pentium II processor 366MHz
RAM	64MB EDO DRAM	64MB EDO DRAM	128MB EDO DRAM
Hard Drive	4.3GB hard drive (removable)*	6.4GB hard drive	14GB hard drive
Monitor	14.1" XGA display	15" TFT XGA display	15" TFT XGA display
Extra Storage	3.5" floppy drive (dedicated bay)	3.5" floppy drive (dedicated bay)	3.5" floppy drive & SuperDisk LS 120
CD-ROM	24X CD-ROM drive° (dedicated bay)	24X CD-ROM drive°	2X DVD-ROM drive
Graphics	8MB AGP graphics accelerator	8MB AGP graphics accelerator	8MB AGP graphics accelerator
Training	1-year free[1] training @ Micron U online	1-year free[1] training @ Micron U online	1-year free[1] training @ Micron U online
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PC Computing April 1999

The Micron Millennia series has been recognized with numerous industry awards, and proven that its high-end capabilities will reach far into the next millennium. And now you can harness the power of the Millennia to capitalize on the potential of the Internet, giving your business a distinct competitive edge. Because right now, every award-winning Millennia includes a free turnkey e-commerce system, right on the desktop. The specialized software makes it easy for you to author your own Web pages, then send them to a host with the push of a button. Everything you need to design and maintain a lucrative Web presence is pre-loaded on your system. These days no aggressive business strategy is complete without an Internet component, and Micron makes it as simple as it can be.

Model Name	New! Millennia MAX 450	New! Millennia MAX 500	New! Millennia MAX 550
Processor	Intel Pentium III processor 450MHz	Intel Pentium III processor 500MHz	Intel Pentium III processor 550MHz
RAM	64MB 100MHz SDRAM	64MB 100MHz SDRAM	64MB 100MHz SDRAM
Hard Drive	8.4GB Ultra ATA hard drive*	13GB Ultra ATA hard drive*	15GB Ultra ATA hard drive*
DVD/CD-ROM	40X var. speed CD-ROM drive*	40X var. speed CD-ROM drive*	40X var. speed CD-ROM drive*
Speakers	Wavetable sound and stereo speakers	Wavetable sound and stereo speakers	Wavetable sound and stereo speakers
Network	3Com 3C905 network card	3Com 3C905 network card	3Com 3C905 network card
Warranty	5-year/3-year Micron Power™ Limited	5-year/3-year Micron Power Limited	5-year/3-year Micron Power Limited
Micron U	1-year free* training @ Micron U online	1-year free* training @ Micron U online	1-year free* training @ Micron U online
Factory Direct Price without monitor	$40/mo. Business Lease 48 mos.** $1299	$48/mo. Business Lease 48 mos.** $1559	$58/mo. Business Lease 48 mos.** $1899
Upgrade to:	Upgrade to: 128MB SDRAM 17" Micron 700Cx (15.9" display)	Upgrade to: 128MB SDRAM 17" Micron 700Cx (15.9" display)	Upgrade to: 128MB SDRAM 17" Micron 700Cx (15.9" display)
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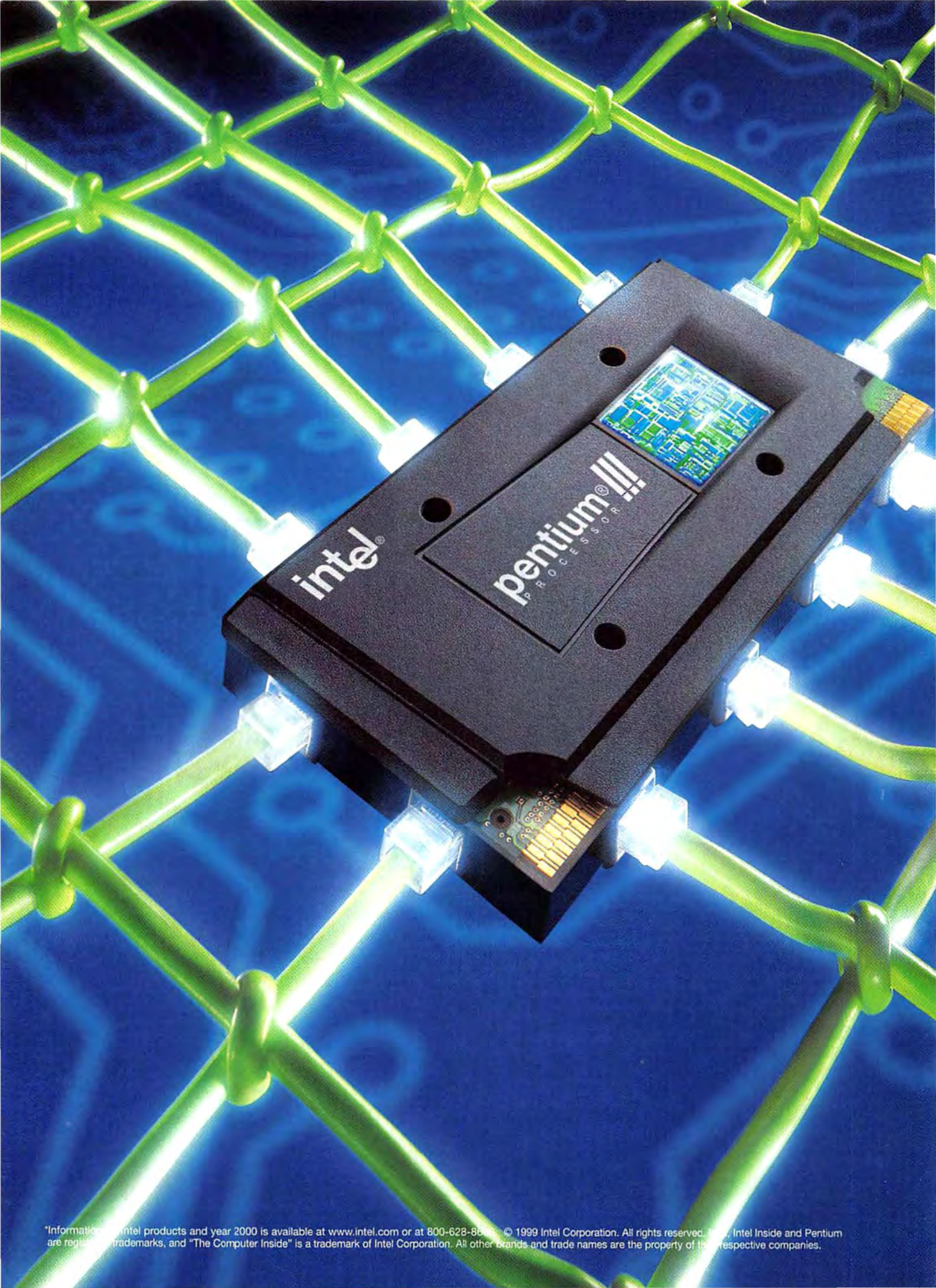

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VOLUME 17 ◆ NUMBER 7

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100 **BEST PRODUCTS OF 1999**

It's the end of the millennium: What hardware, software, and services should take you into year 2000? *PC World*'s 17th Annual World Class Award winners include the best PCs, software, peripherals, Web sites, and more—67 in all. We also list promising newcomers. Plus, our No-Class Awards honor the year's most notable underachievers.

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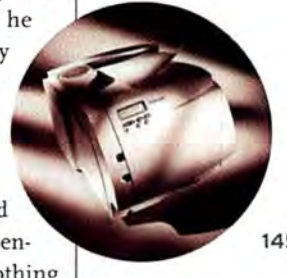

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Whether you're looking to fill an entry-level position or trying to track down a new, high-octane CEO, the Web can help you in your search in this tight job market. Here's how to compete online for top talent.

COVER *Photography by Stan Musilek*

ICONS: JEFFREY PELO

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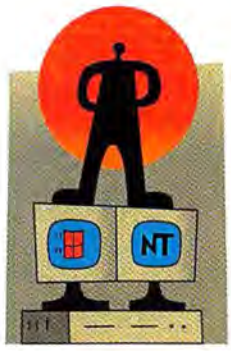

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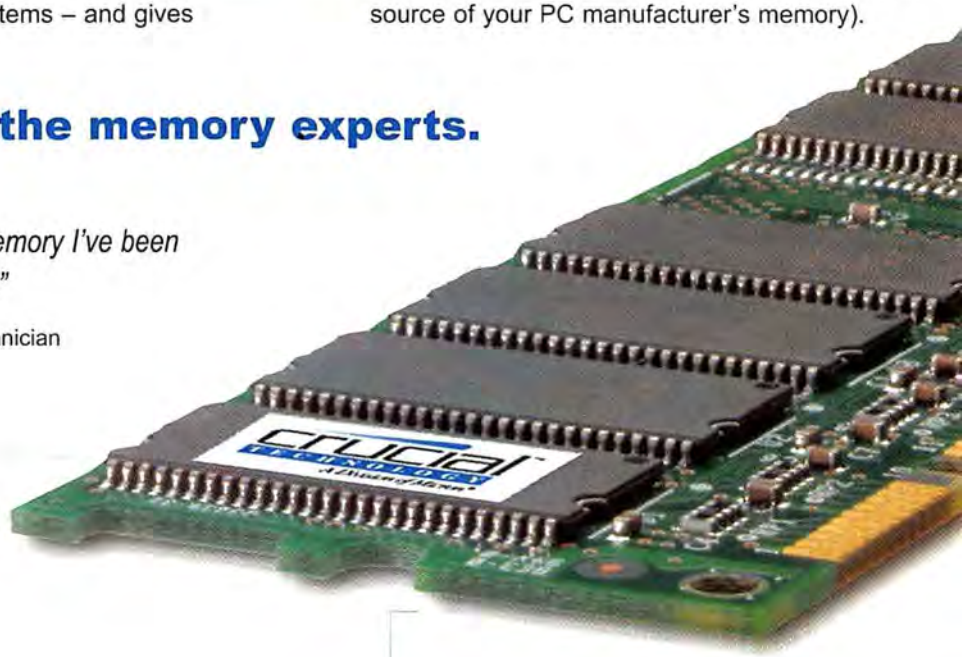

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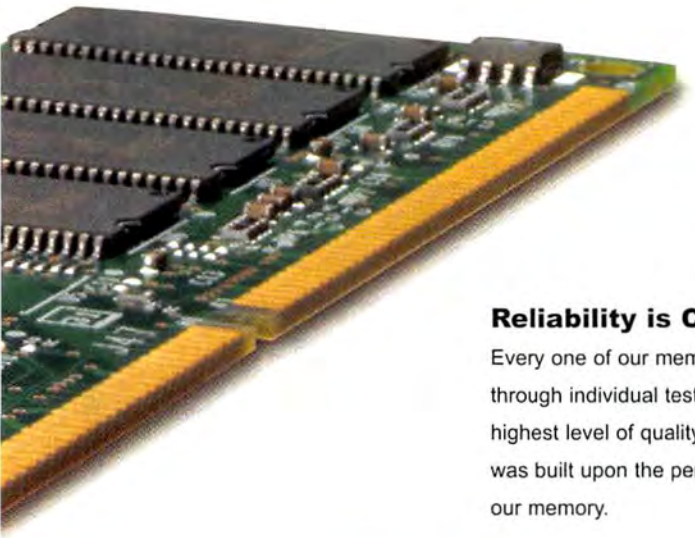

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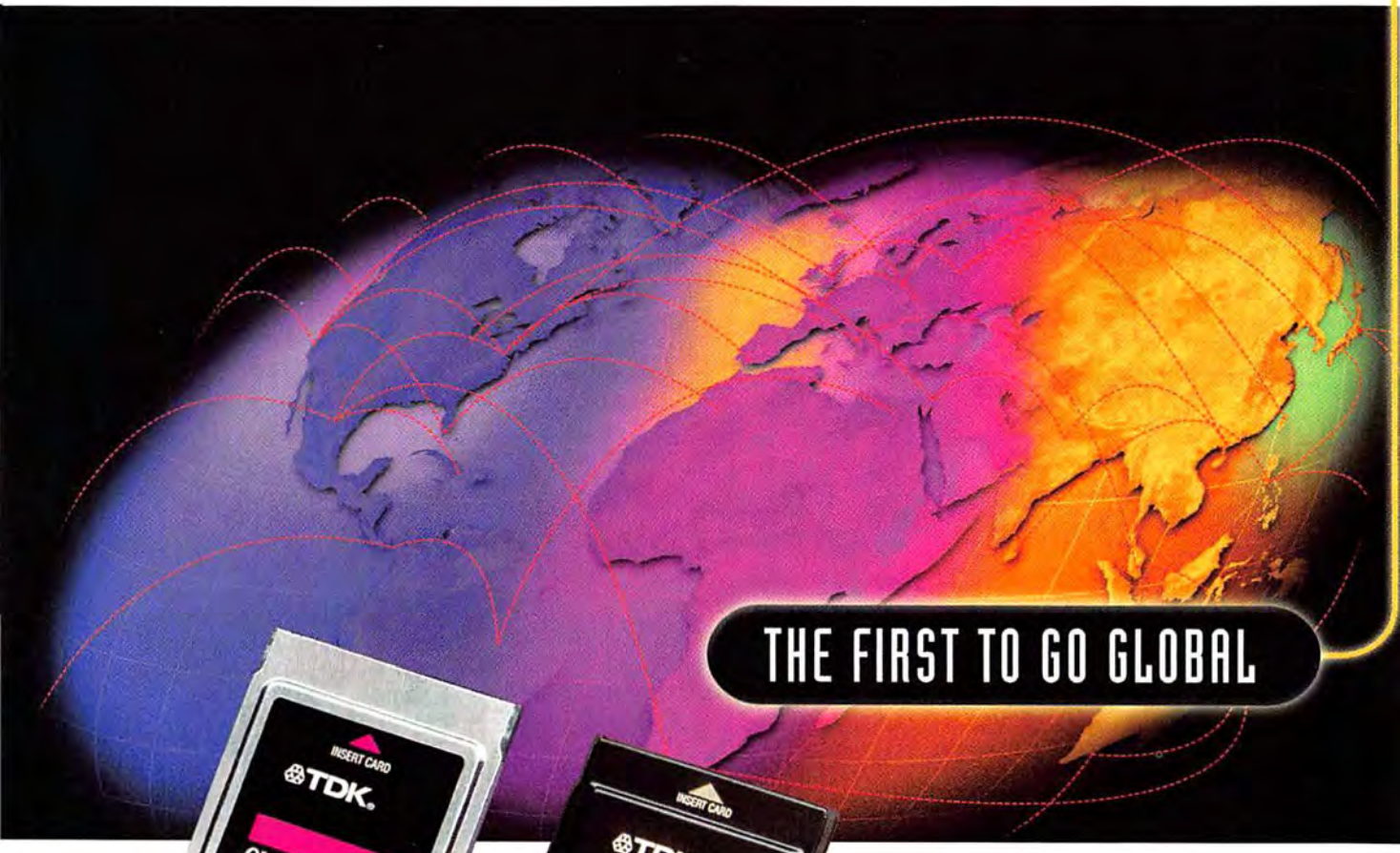

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Your Worst Nightmare, or What?

IN MID-MAY, AT&T announced a $58 billion deal designed to kickstart high-speed Internet access. With its impending acquisition of Media One, AT&T will become the nation's largest cable company, with access to more than 60 percent of households. The communications giant will be able to deliver cable Internet access and digital TV to more than 25 million homes, and local phone service over cable to more than 56 million homes. AT&T's goals are aggressive: It says it will offer cable modem service to at least 80 percent of its customers by the end of next year. For bandwidth-starved PC users, what's not to like?

For starters, take AT&T WorldNet's recent track record. Complaints from *PC World* readers poured in earlier this spring after we rated WorldNet the number one Internet service provider. Not so, countered readers, who cited constant busy signals, dropped connections, and torpid transfer speeds that resulted from the ISP's influx of customers, which occurred after we tested the service. If AT&T couldn't handle a couple of million customers, how on earth will it deal with 25 million?

To the rescue...Microsoft! The software giant plans to make a $5 billion investment in AT&T. The communications company will use the funds to upgrade its newly acquired cable networks. In exchange for the cash, AT&T will use Microsoft's Windows CE operating system on 7 1/2 to 10 million TV set-top boxes.

IF AT&T couldn't handle a couple of million customers, how will it deal with 25 million? To the rescue...Microsoft!

THE WORST OF BOTH WORLDS

THE TWO MEGACOMPANIES intend to deliver digital services to homes in three cities next year. In two cities, AT&T will use Windows 2000 as its server operating system, along with parts of Microsoft's WebTV service. According to Microsoft, its cable software system will download updates automatically, diagnose problems, and permit personalized services. In the third city, AT&T will pair Windows CE with server software from a third party.

Imagine the possibilities: The year 2000 comes and goes with no sign of cable access because Windows 2000 *still* isn't shipping. On the other hand, if Win 2000 does ship, rebooting your TV suddenly becomes the least of your worries. Now the cable company has to reboot its Win 2000 servers a couple of times a day. Meanwhile, you upgrade Win CE with the latest service pack, though CE still doesn't sync properly with 2000. Or you need to upgrade your set-top box to handle the new software, but the box you want comes with a Java operating system that refuses to work quite right with Microsoft's software. Then hackers infiltrate the system and broadcast your bedroom activities over the Web, but you can't make your way through voice-mail hell to reach Microsoft and AT&T customer support. And to top it off, you can't decipher your exorbitant cable Internet-TV-phone bill, but you think you're getting double-charged. You get the idea.

THERE'S NOTHING ON TV

COMPLICATING THE picture is the question of who controls the content that flows over the cable wires and through the Microsoft system software. As part of its Media One deal, AT&T gets partial control of Time Warner's Road Runner cable Internet access provider and 25 percent of Time Warner Entertainment. AT&T and Time Warner could make it harder and more expensive for rivals' programs to be distributed over their cable system. AT&T also controls the At Home cable ISP. With its stake in both Road Runner and At Home, AT&T could control the content and services delivered when Internet customers log on. It could, for example, feature Excite's portal, which At Home recently bought, or it could award prime positions to Microsoft sites like Expedia and Car Point.

The most disturbing vision conjured up by the AT&T-Microsoft megamarriage is one in which Microsoft's stranglehold over the desktop extends, with the help of a former communications monopolist, to digital cable boxes across the country. Granted, AT&T did not give Microsoft an exclusive contract to supply software for all its set-top boxes. But let's hope Microsoft doesn't extract exclusivity by bundling software and services in a deal that's too sweet for AT&T to pass up. And let's urge the FTC and FCC to keep consumer choice at the forefront as they consider the merits—and demerits—of the deal.

Cathryn Baskin is editor in chief of PC World. ■

Meet the Digital Duo

STARTING IN MAY, *PC World* columnist Stephen Manes began cohosting *Digital Duo*, a weekly series broadcast on public television stations. Along with *U.S. News & World Report* editor Susan Gregory Thomas, Manes helps consumers make sense of the latest, the greatest, and the flash-in-the-pan digital technologies. Who needs interactive TV?

PHOTOGRAPH: ERIK BUTLER

Toshiba's Small Door a Big Help

Opening on side makes servicing Equium easy

BY MICHAEL CATON, PC WEEK LABS

THE SIDE DOOR ON THE EQUIUM 7000S desktop PC is one of those small features that works so well that it's a wonder no vendor thought to include one like it before.

The side door on Toshiba America Information Systems Inc.'s $1,714 computer is designed to make

The Equium 7000S allows easy inside access.

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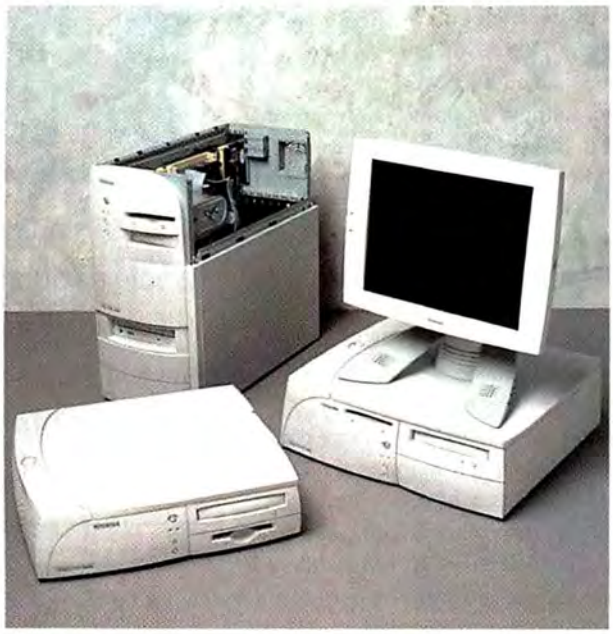

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Year 2000 Compliant	NSTL hardware tested
Wired for Management (WfM) Compliant	Yes
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Bus Speed	Matched with CPU Bus Speed

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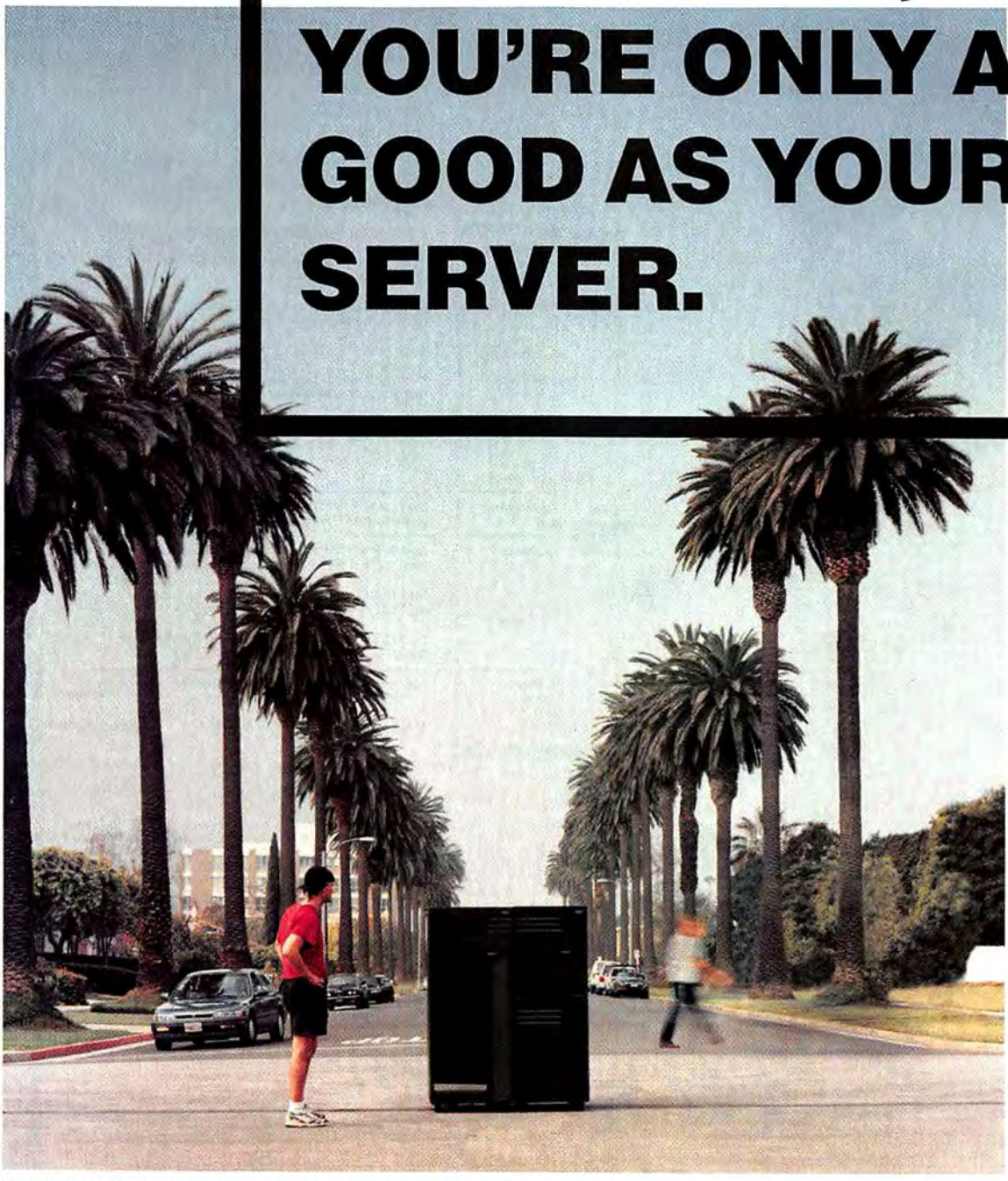

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YOUR TAKE ON: Net privacy ◆ Tech support ◆ Fear of software upgrades

YOU'RE BEING TRACKED—SO WHAT?

IT'S IRONIC THAT while we are in a furor over privacy and embedded serial numbers [*Top of the News*, April], it was these very tracking capabilities that apparently helped lead to the arrest of the alleged creator of the Melissa virus. Do we really need to lose sleep over Intel knowing where its chips end up or what sites those PCs visit? Does it matter if Microsoft keeps a record of the registration numbers and names of legitimate buyers? I don't care who knows where I've been, and I don't think most other users do, either. True, the information does allow a certain degree of "big brotherism" and creates a potential for abuse. But let's hear about the actual abuses. Let's hear what really was done with all those serial numbers and Web site addresses some nefarious chip or software maker collected. Then let's see if it all amounts to a hill of beans. My prediction is that it won't.

T. L. Rousseau
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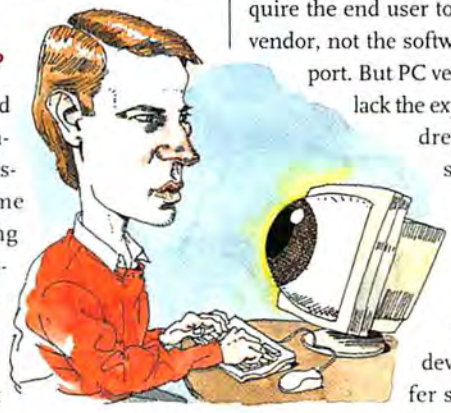
AWOL DEVELOPERS?



IN THE GOOD old days, software bundled with a new system was a welcome bonus, considering how complex program installations used to be, especially under DOS. One could contact the software developer for support and receive expert help. Now, practically every new PC comes with OEM (aka licensed) versions of software installed at the factory, including Windows and application suites, and with limited documentation.

OEM versions of software usually require the end user to contact the system vendor, not the software maker, for support. But PC vendors often seem to lack the expertise needed to address software-related system failures; and for their part, developers don't cooperate when contacted. My questions are: 1) Why do software developers refuse to offer support directly ▶

HOT BUTTON

Internet Privacy: Readers Turn On the Heat

CATHRYN BASKIN'S May editorial ["Do You Have a Right to Privacy?" *Up Front*] reminded me of a statement I heard at a seminar that among all Western countries, the United States had the weakest laws on the safekeeping and exchange of data.

I am horrified at current trends. When IE 5 crashes inexplicably after extended use, Microsoft's registration wizard claims it is "for security reasons" that the company must capture cookies and encrypt information on my hardware and my identity. Hotmail says it needs my digital address in a cookie so it can "know more about me." Our grocery store practically demands we use a smart card so it can track our purchases and give us great deals on diapers. What about a random purchase of Stoli or condoms? Who will buy and analyze that data?

Companies are developing data marts that will capture and provide to law enforcement (and marketing groups) information on any individual with an address: who lives with them, the names of their neighbors, what cars they own, how much equity they have in their house, you name it. All ostensibly public data, but now aggressively sought and sold. I refuse to play. And I won't buy products (I don't care who else uses them) that undermine my fundamental right to privacy.

Terri Walker, via the Internet

SHOULD INTERNET users expect to have privacy? The answer is a resounding NO! The user of a public resource does not have a right to anonymity.

Gerritt A. Holdrum, via the Internet

I'M SURE I'M NOT the first or only person to point out the irony (hypocrisy?) of the sidebar "Your Chance to Win $25,000" in the May *Up Front*. Wouldn't you know it? I have to submit my name, address, and phone number to complete your survey!

Paul MacDonald
Newport News, Virginia

EVEN MORE AMUSING than the information required by the survey is [PC World Online's] Privacy Policy. To access it, I had to wade through three cookies. The policy assures readers that the cookies PC World Online places on our computers are "for tracking purposes." In addition, the statement says "PC World Online is not responsible for the actions or policies" of third parties.

Do we have a right to privacy? If the activity hidden behind [Baskin's] editorial is any indicator, *PC World* has answered that question in the resounding negative.

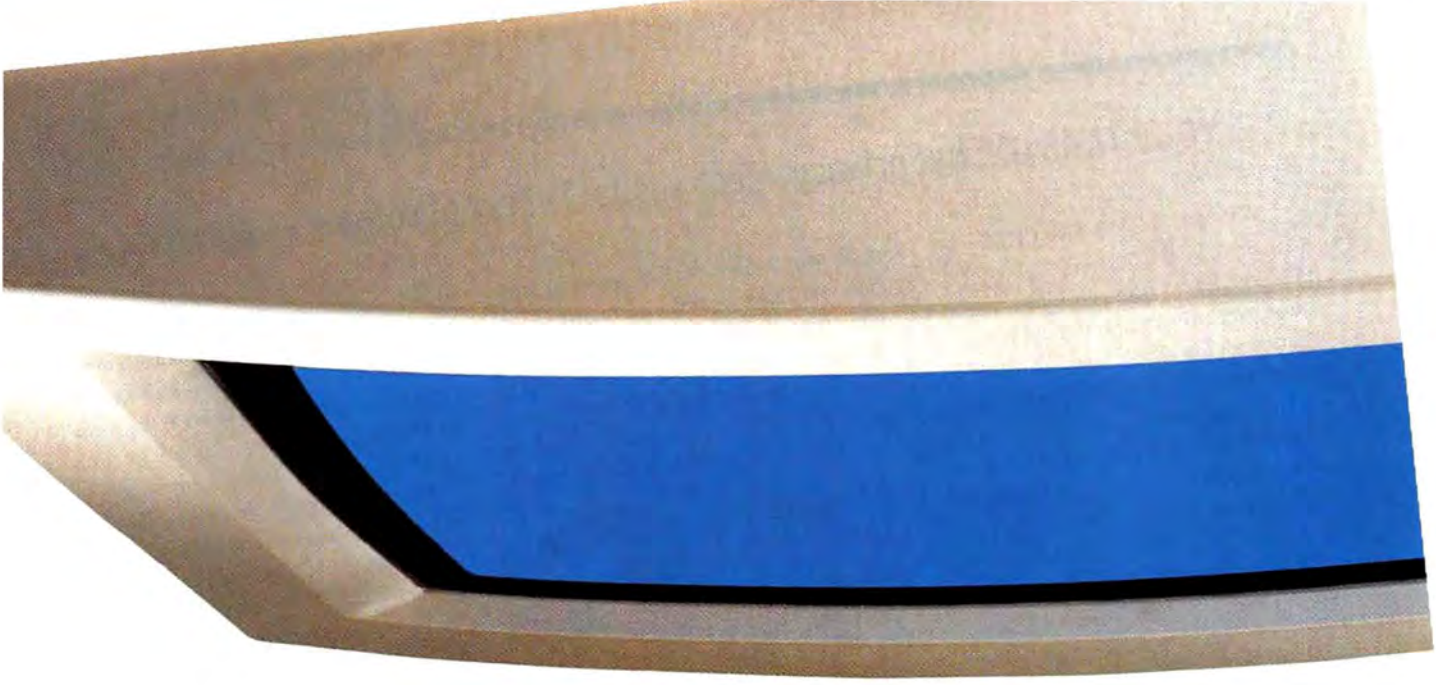
Dave Cook, Mt. Shasta, California

YOUR OWN SURVEY illustrates that ultimately, the issue of privacy on the Internet will be moot: Privacy isn't as profitable as a large, traceable, and quite exposed user base. Economics will decide how much privacy we get on the Net.

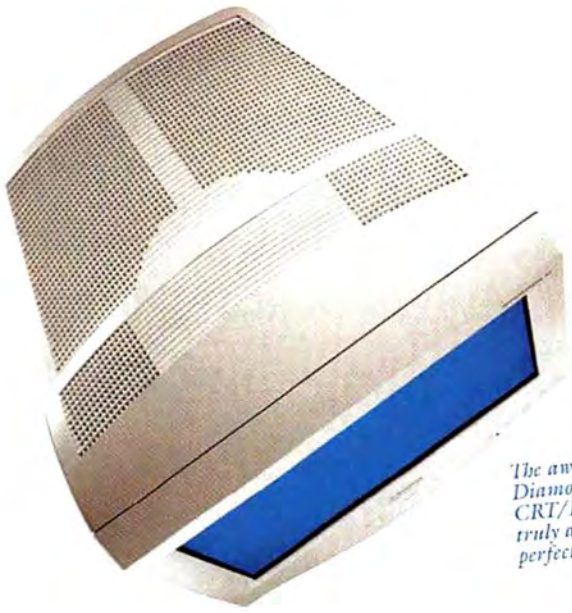
Keith Howe, Moscow, Idaho

Editor's response: My apologies to all who objected to our survey. We requested contact information so editors can reach respondents if needed and to meet the legal requirements of the sweepstakes. The survey is strictly for editorial research—we do not sell personal information to third parties. If you don't want to participate, we understand. We hope, though, that you'll choose to respond—we need your input, even the negative! We'll also look for less invasive ways of surveying readers. **—Cathryn Baskin**

ILLUSTRATION: JOE CIARDELLO



Has Your Monitor Been



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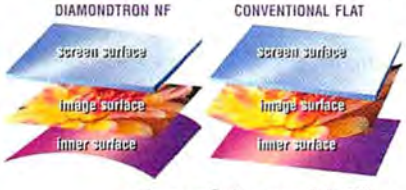

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HARDWARE TROUBLES SOLVED

Our hardware troubleshooting guide delivers advice and fixes for real-world questions. We dug up solutions to the problems we found—including glitches with new technologies like USB and FireWire. Also: Quick Tip advice and a Prevention Checklist.

EXPERTS PICK TOP UTILITIES

Is free software enough, or should you pay for a separate program or suite? Take our quiz to find the right type of utility for the chores you do. Then check our ratings of the top stand-alones and suites to pinpoint your choice.

HOW TO WIN AT WEB AUCTIONS

Looking for a steal on a digital camera or a high-end Pentium? How about Mark McGwire's rookie card? Our primer teaches you to bid like a native and avoid the bunco. We visited six big-name auction sites and learned the hard way so you don't have to.

THE TRUTH ABOUT LCDs

They don't cost ten grand anymore, but LCD monitors are still more than twice as expensive as comparable CRTs. Do the sexy flat panels warrant the price? Our roundup of 15-inch LCDs evaluates 19 models, from $949 to $1599.

ALSO NEXT MONTH

▶**The PC World Top 100:** The best Power and Budget Desktops, Notebooks, Home PCs, Printers, Monitors, Graphics Boards, and Modems.

▶**Here's How:** Internet Tips on getting your e-mail box ready for vacation, Windows Tips on banishing desktop clutter, Upgrade Guide on installing removable-media drives.

PC WORLD

to end users? After all, who better knows an application's intricacies?

2) Are the OEM versions the same as the full-blown retail versions, or are they "basic," buggy, beta, or otherwise limited? Judging from all the encouragement to upgrade, I suspect they are the latter.

Michael Guerard, Wenonah, New Jersey

FEAR OF SOFTWARE

I ENJOYED THE gutsy commentary "Software, Lies, and Videotape" by Stephen Manes [*Full Disclosure*, May]. I have used a home PC for over five years, but I am not a computer geek or expert.

As a result, every time there is a software upgrade or an operating system change, I cringe. I am frightened of changes that may occur in the innards of my microchips. One-third of the programs I've installed had a glitch that required valuable time to resolve.

Is this the "computer age" we are looking forward to enjoying?

Kenneth A. Deitcher, Albany, New York

THE SKINNY ON TIPS

WHY DO YOU now offer tips only on Microsoft products, as if no other spreadsheet or word processor existed? Yes, there have been occasional tips on WordPerfect, but I sometimes know easier or more correct methods than those you print. I suggest you rename your Here's How section Microsoft Applications Tips, to better identify the content.

Karl Pritchard, via the Internet

Editor's response: It's quite unusual for us to run only Office tips—as happened in May's *Word Processing* and *Spreadsheets* sections—and when it does occur, the underlying cause in most instances is print space constraints. At such times, we always post the remainder of the section's tips online, at www.pcworld.com/heres_how. **–Yael Li-Ron**

MORE FREE SUPPORT SITED

I ENJOYED your article on free technical support sites ["Great Support at a Great Price," *Got a Problem?* May]. Another one is David Chalk's site (www.chalk.com). PC users can find out about the latest products and get free computer help, plus information on Chalk's shows (both radio and TV).

As one of the technical support representatives available to answer questions and provide other help via the site, I feel this approach is a great opportunity, not only for the site's visitors who ask questions, but also for us techs. It gives us valuable experience troubleshooting problems, and the thanks we get is nothing short of extraordinary.

Dennis Deveaux, via the Internet

PC World *welcomes your suggestions, responses, and other letters to the editor.* *See page 12 for contact information.* ■

CORRECTIONS AND CLARIFICATIONS

CONTRARY to an assertion in June's "ISPs @ Risk" (*Top of the News*), customers of CTA, a California-based ISP, were not forced to change their e-mail or Web site addresses when the company was acquired by Mountain States Communications (www.mscomm.com).

Two tips in May's "The Ultimate Insider's Guide to Windows" need clarification:

In "Shortcuts to Success" on page 106, we indicated that some tasks have no shortcut with a standard keyboard. Actually, you can use standard Windows keystrokes. For example, to display the Run dialog box, press <Ctrl>-<Esc>, then press R (but press R more than once and then press <Enter> if pressing R calls up other Start menu items).

The tip for accessing the Link Check Wizard on page 109 was incomplete. To access this wizard, which lets you check for broken links and shortcuts, you must first install the Windows 98 Resource Kit from the Windows 98 CD-ROM (browse to Tools\Reskit and run setup.exe). After it's installed, you can find checklinks.exe on your hard disk in \Program Files\Win98RK.

In May's *Top of the News* story on notebook manufacturers, the chart "Notebook Name Game: A Guide to Who Builds What" should have indicated that for Packard Bell/NEC, FIC builds only the Versa Notes line; NEC itself builds the LX and SX lines.

In May's "AMD's K6-III Shifts Into Overdrive" (*Top of the News*), we incorrectly stated the amount of level 1 cache on all Intel processors since the Pentium MMX. The Pentium MMX, Pentium II, and Pentium III processors come with a 32KB level 1 cache.

PC World regrets the errors.

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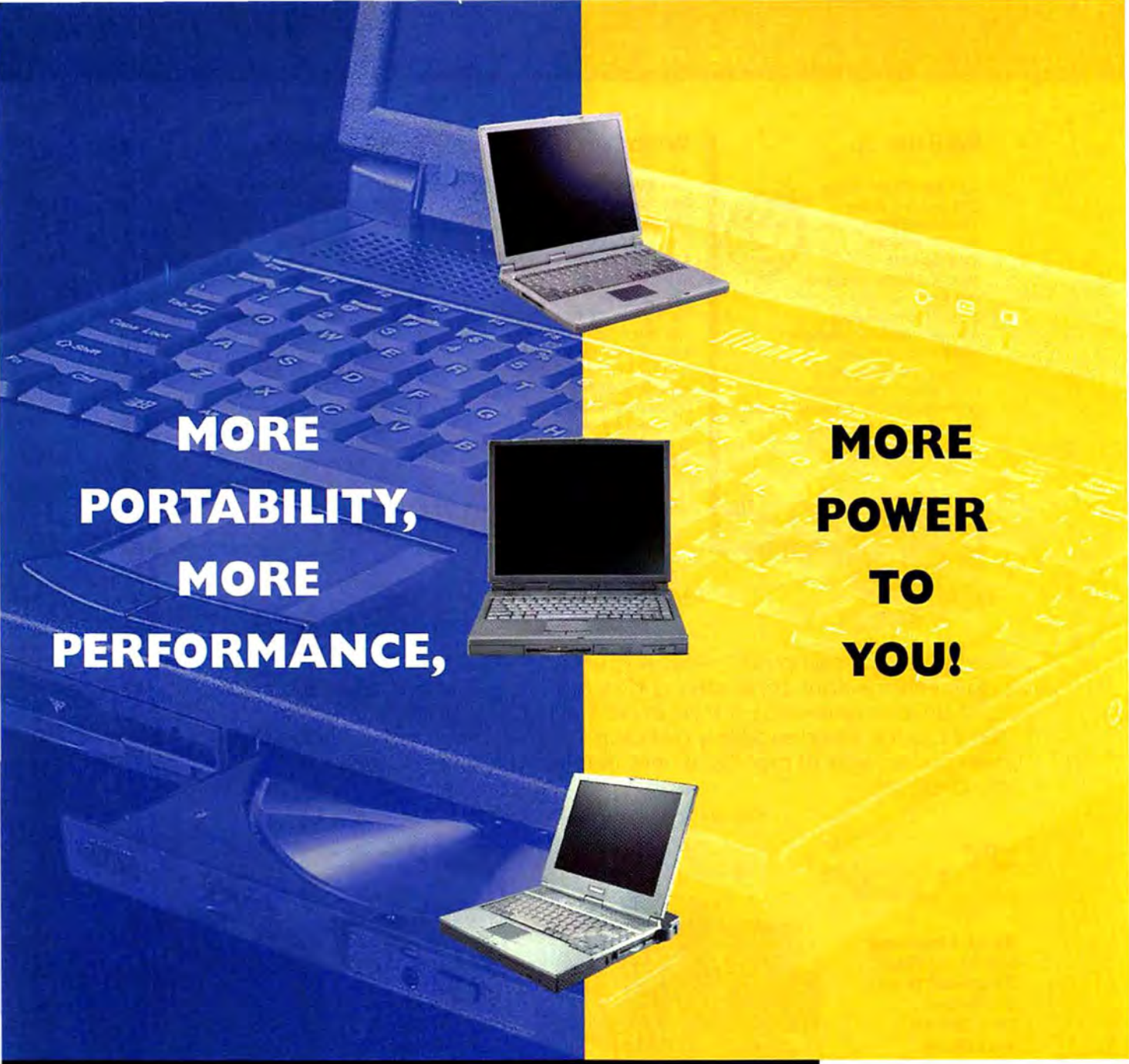

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On the Web You Have No Secrets

Everything you buy, say, or do online can be tracked. Do we need a law ensuring Internet privacy?

ILLUSTRATION: JORDIN ISIP

I'M CONSTANTLY TRYING to salvage a few minutes here and there from my jam-packed day. I'm a sucker for time-saving techniques and convenience foods. I'll willingly (though not gladly) pay a little more for an item if it will save me a half-hour of driving. The less time I spend working or running errands, the more time I have to sleep, spend with my family, or do absolutely nothing.

Folks like me are a dream come true for Web businesses. On the Web, I can order my latest book-group selection, stay on top of the day's high-tech news, and research my next column in half the time it would take me to do these things offline.

Lately, though, I've been balking at the asking price. You see, the cost for all this convenience is my privacy—my right to buy what I want, when I want, or visit whichever Web sites I want without someone collecting data about me or tracking my mouse clicks. And as much as I value my time, I value my privacy even more.

I'm not alone, either. Anyone who's spent time online has experienced some assault on his or her privacy: junk mail solicitations following a Web site visit, cookies dumped into the hard drive, or demands for detailed personal information in return for browsing a site.

In several recent surveys, consumers have said privacy concerns keep them from embracing the Web. And 71 percent of respondents to the 10th Annual Georgia Tech World Wide Web User Survey (www.gvu.gatech.edu/user_surveys) cast their votes in favor of new laws governing privacy in the Internet age.

Even the folks who gather our personal info are getting the message. In a survey of top executives of high-tech firms conducted by the Information Technology Association of America and Ernst & Young (www.itaa.org/software/research/indpulse/barriers.htm), 60 percent of respondents said they thought lack of privacy protections was the number one factor inhibiting the growth of e-commerce.

WHAT A DIFFERENCE A YEAR MAKES

FORTUNATELY, WEB SITES are beginning to address these concerns. In its survey of 1400 Web sites in June 1998, the Federal Trade Commission discovered that only 14 percent of all Web businesses informed visitors of their data gathering practices. A follow-up study of 364 commercial sites conducted in March 1999 by a Georgetown University professor found that nearly 66 percent of the sites had posted privacy policies. However, less than 10 percent of these policies could be considered comprehensive.

The increase in posted policies is due largely to the attention e-commerce leaders have given the issue over the past 12 months. Besides Truste (www.truste.org), an initiative formed in 1996 to develop a privacy seal for Web sites, we counted two business-sponsored efforts in 1998: The Online Privacy Alliance, a group of more than 80 businesses, launched last July to promote self-regulation as a solution to privacy concerns. More recently, the Better Business Bureau Online (www.bbbonline.org) went live with its own privacy program. ▶

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IBM has been a founding member of all three groups. In April of this year, Big Blue announced it would pull ads from any Web site that did not post a privacy policy. The move, says Harriet Pearson, director of public affairs for IBM, was the "natural next step" in IBM's ongoing efforts to encourage Web businesses to adopt and declare such policies.

As the second-biggest advertiser on the Internet, IBM has done more to promote consumer privacy than most PC vendors. Early indications are that many of the nearly 400 U.S.-based Web sites IBM advertised on in 1998 would post a policy before the company's June 1 deadline. But critics argue that IBM's bold threat to pull advertising isn't really so bold—or so great for consumers.

"It's a nice gesture, but I don't think it's going to change things very much," says privacy advocate Jason Catlett, president of Junkbusters, a Greenbrook, New Jersey, developer of Web surfing privacy tools.

"IBM isn't requiring specific minimum standards for privacy policies," says Catlett. "Companies could comply with its requirement by putting up a page saying, 'You have zero privacy anyway. Get over it.'"

Even a bald statement of no privacy, though inadequate, would at least let you know what you were dealing with.

EDUCATION OR LEGISLATION?

CATLETT'S COMMENTS illustrate how businesses on the one hand and legislators and privacy groups on the other differ on the need for regulation. IBM advocates self-regulation, while many others favor government intervention. Even a bald statement of no privacy, though clearly inadequate, would at least let you know what you were dealing with.

Congressman Bruce Vento (D-Minn.) lauds IBM's efforts but says industry efforts alone won't provide enough protection. Vento and Congressman Ed Markey (D-Mass.) plan to introduce bills requiring Web sites to divulge their privacy policies and to obtain users' permission before sharing their personal data with other businesses. In the Senate, Conrad Burns (R-Mont.) has introduced a bill that might become the Online Privacy Protection Act of 1999. The law would force sites to post policies, offer consumers a chance to opt out, and give users access to data about them that is shared with other entities.

"I'm glad [the industry] recognizes that this is a serious problem," says Vento. "But even if you get 90 percent of Web sites to [post a policy], what happens with the other 10 percent? If one-tenth of the sites do nothing, then for all practical purposes, the king has no clothes." The burden would still fall on users to check each site.

Russell Bodoff, chief operating officer of BBBOnline, disagrees. "We need education, not legislation," argues Bodoff. BBBOnline has tried to educate businesses about the value of good privacy policies.

Besides, asks Bodoff, who would enforce an Internet-specific privacy law? "We have laws governing fraud and credit card theft already, but the FTC and others haven't filed many [Internet] cases. They're overworked and understaffed as it is."

WORDS AREN'T ENOUGH

WHILE INDUSTRY PLAYERS and privacy groups argue over the need for legislation, representatives from both sides agree on one point: A few words under the heading "Privacy Policy" are not enough.

To get a clearer sense of how Web sites are implementing privacy policies, I studied a cross-section of sites. Though most of the three dozen sites I visited posted some type of privacy policy, these statements rarely told me everything I wanted to know. Often omitted were how the site used cookies, how I could update and verify data collected about me, and how the security and confidentiality of personal information were protected. In every case, it was up to consumers to say they didn't want to receive future mailings from the site or have personal data shared with others (the so-called "opt-out" provision).

It would have taken me hours (if not days) to correspond with every site and get clarification on their policies. ▶

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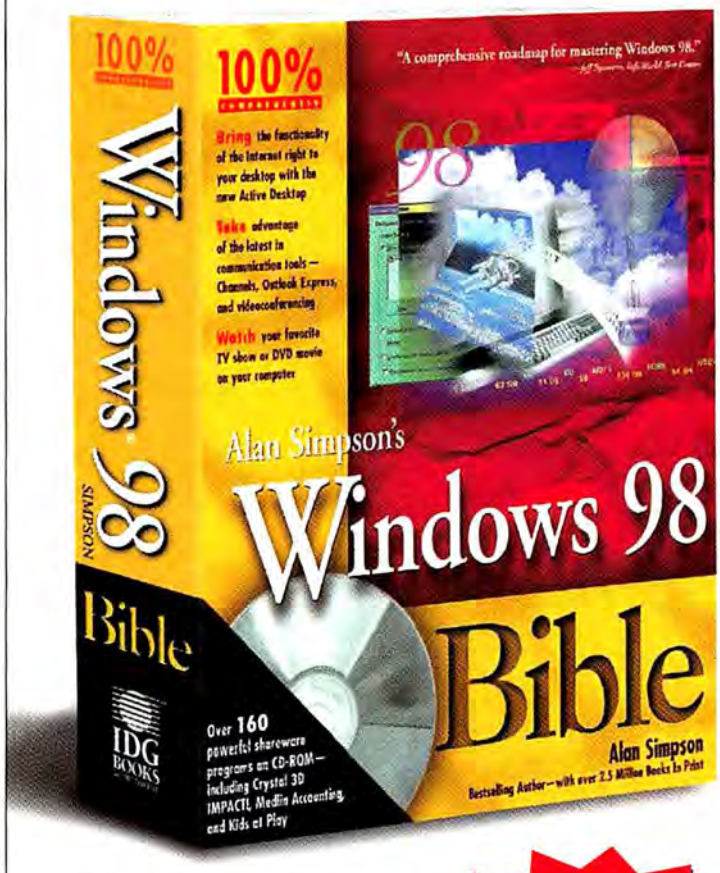

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Moreover—as an FTC case last summer against the GeoCities site illustrates—there's no guarantee that Web sites are following their posted privacy policies. In the first case to involve Internet privacy, the FTC charged GeoCities with misrepresenting how it used personal information about visitors to the popular Web site. Specifically, the FTC accused GeoCities of disclosing information to third parties, despite an explicit policy to the contrary.

TECHNOLOGY TO THE RESCUE?

GIVEN ALL OF THE attention focused on privacy these days, it should come as no surprise that developers are busily releasing software to fill the privacy vacuum.

Microsoft and Novell have announced software tools to enable your PC to digest those privacy policies automatically as you browse. Web sites could use the tools to post policies that a browser or a search engine could analyze, making it easier for consumers to match their priorities with the policies of specific sites. At the same time, companies are developing privacy tools for consumers: Privaseek and Lumeria have designed software that gives consumers control over what information is shared with sites. Other companies offer software to filter spam, collect cookies, and let you surf the Web anonymously.

Such tools represent good, constructive efforts to protect your privacy on the Web. But they aren't enough. Consumers should not have to install software and configure browsers to prevent Web sites from collecting personal information about them.

The FTC is understaffed, but we can't simply forgo privacy laws. We need to rethink law enforcement strategies at all levels to respond to the rise of e-commerce—and the inevitable abuses that follow.

We need to establish baseline privacy protections that all Web sites—not just those that feel like it—must adhere to.

We need a law that puts privacy on an equal footing with commerce.

Contributing Editor Roberta Furger is author of Does Jane Compute? Preserving Our Daughters' Place in the Cyber Revolution *(Warner Books, 1998).* *See page 12 for contact information.* ■

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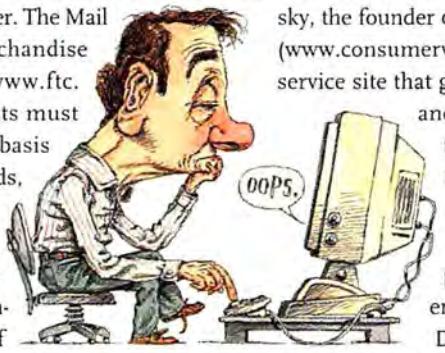
Fast and Loose: Online Merchants

LATELY, I'VE BEEN FEELING like the complaint office for the world's biggest department store: the Internet. One gripe I get a lot comes from people who've placed an order online—often with a well-known merchant—had their credit card charged, and discovered later that the product wasn't available. Shoppers think that they should be told right away if a product can't be sent.

There are laws about how merchants must handle situations in which they are unable to fill an order. The Mail or Telephone Merchandise Order Rule (see www.ftc.gov) says merchants must have a reasonable basis for implying—in ads, on the Web, or on the telephone—that an order can be shipped within a reasonable amount of time (30 days at most). The rule does not stipulate when a credit card should be charged, but some state laws do. Before you order, check the merchant's site for its policy on payments and charges.



The federal rule does require that merchants tell you before the product's due date if it can't ship your order when promised—and to then let you agree on a new date or cancel your order. But judging from my mail, online retailers do not always adhere to this rule.

"Should online merchants clean up their act? Absolutely," says Edgar Dworsky, the founder of Consumer World (www.consumerworld.org), a public service site that gathers tips, advice, and other help. "I anticipate that as the Net becomes a bigger marketplace it will become a bigger target for law enforcement."

Dworsky thinks that more stringent rules may emerge. After all, 30 days is a long time in the right-now world of the Web, and it's all too easy for an automated Web site to charge your card without first checking to see if you're likely to get the item you're paying for.

What can you do if you get stiffed? Contact the FTC and your state attorney general's office. If they see a pattern of misconduct, they'll investigate.

ILLUSTRATION: JOHN CUNEO

Heads Up...

YOU'VE DISCOVERED by now that **Hayes** has gone belly-up. But if you need repairs on a Hayes modem, try www.modemexpress.com. Modem Express bought Hayes' domain name and repair gear and is offering fixes for a fee... Readers who responded to a **Microworkz** ad for $499 systems in *PC World* let me know they were unhappy with long shipping delays. "We are ramping up production as fast as possible," says Mark Palmer, chief purchasing officer. "There is no issue here, but sometimes we, like everybody, get in back-order situations." Of course, irate customers think excessive delays are an issue. Palmer suggests that those still waiting for PCs call 888/306-2044 for help... I'm told changes are afoot at **Egghead** (www.egghead.com). The company has consolidated operations and hired more phone representatives. As a result, says Norm Hullinger, vice president of sales and operations, calls to customer service now get picked up within 5 seconds, and e-mails get answered in 3 to 10 hours. "The past wasn't perfect," says Hullinger, admitting that customers encountered poor service, "and the present can still be improved upon. But there's now nothing higher on the management priority list than providing a positive customer service experience."

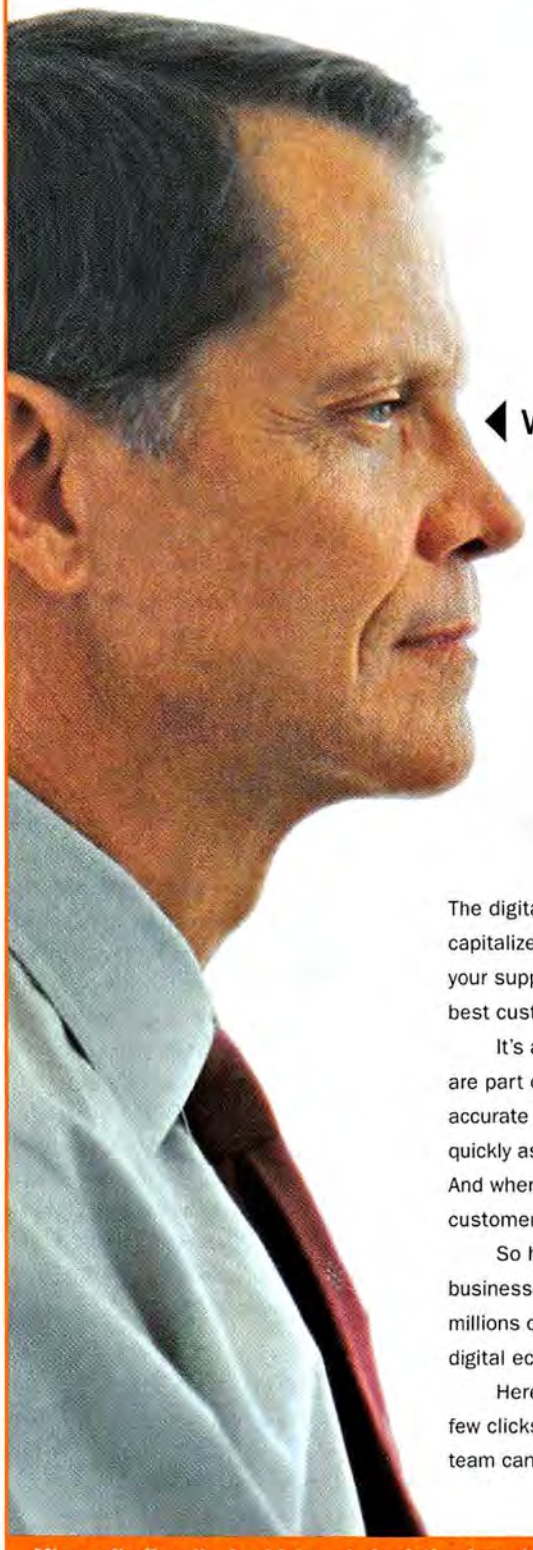
LETTER OF THE MONTH

I ORDERED A sound card from Computer Parts USA (www.computerpartsusa.com). I received a prompt confirmation via e-mail, and my Visa card was charged. Time went by. I sent e-mails. Nothing. Then I noticed that the company had no phone number listed on its site. When I called the Better Business Bureau, a representative told me the BBB had received other complaints about the company. Is my money gone? —*Scott Logan, Stratford, Connecticut*

PC World responds: I e-mailed Computer Parts USA on behalf of Logan. Jeff Wilson, an e-mail support rep, told me he was surprised to learn Logan had not received a refund, and assured me that the company would issue one right away. (Logan has since gotten his refund.) As for the complaints to the BBB, Wilson says, "We have thousands of satisfied customers who never report good things to the BBB. Whenever we have an issue that arises, we do our best to make the customer happy." ■

GOTTEN A RAW DEAL?

Or a great one? E-mail the details to onyourside@pcworld.com. We'll investigate complaints and publish items of the broadest interest. Christina Wood is a contributing editor for PC World.



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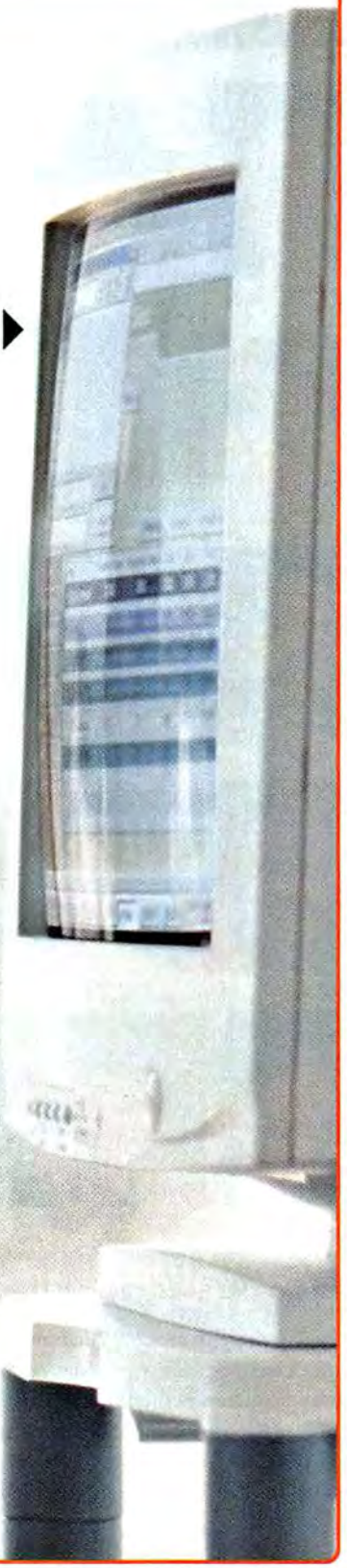

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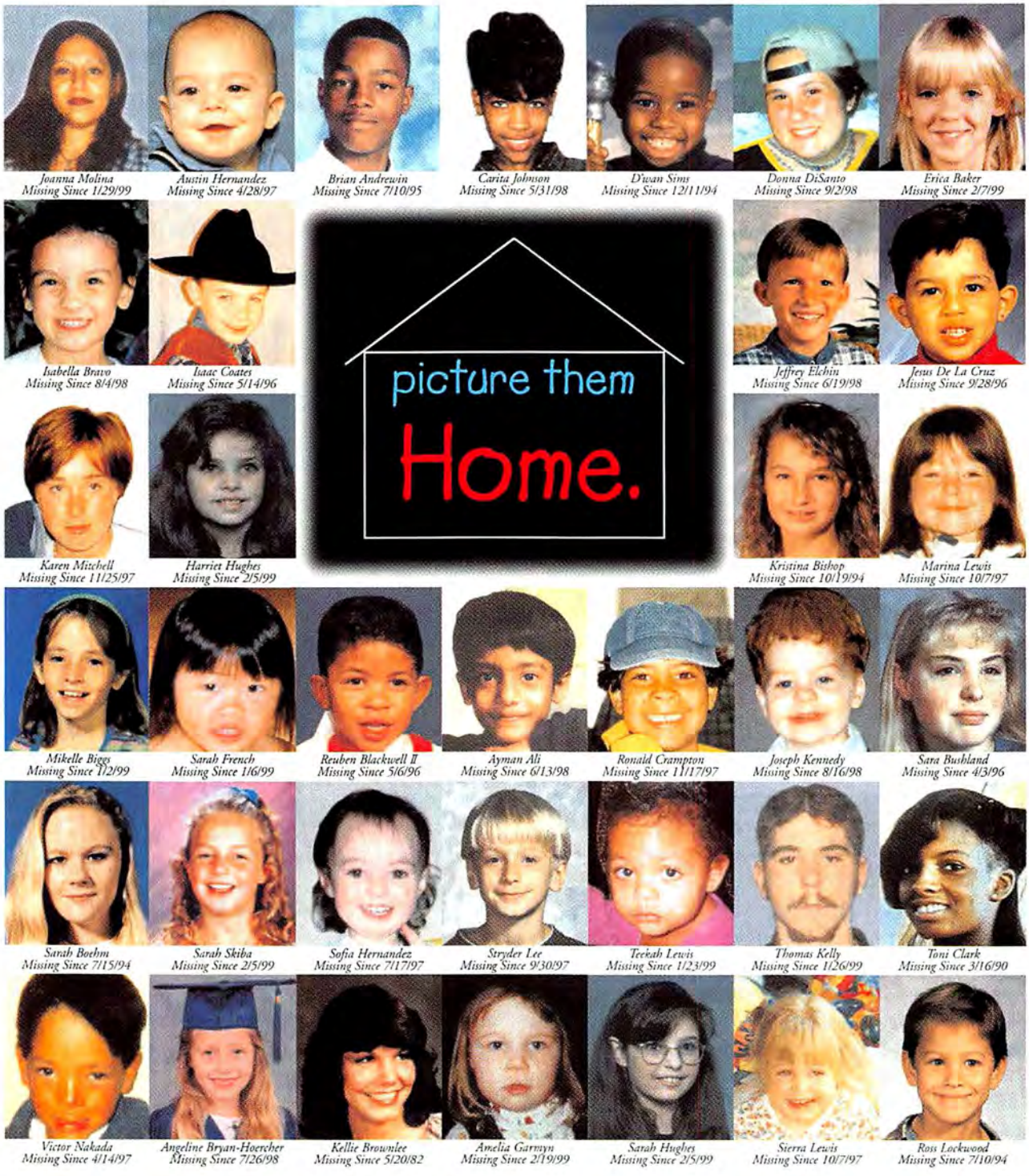

If you've seen any of these children, please call the **NCMEC hotline** at **1-800-THE-LOST.**

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Back to School, Web Style

PROBLEM *You want to take a course or get a degree but can't find time in your schedule.*

SOLUTION *Take classes over the Internet.*

PHOTOGRAPH: SETH RESNICK

CAROL HOPKINS DREAMED OF earning her MBA, so like many people the Ledyard, Connecticut, salesperson struggled to squeeze night classes into an already packed schedule. In 1982, she had to drop out of graduate school. Three years ago she decided to try again. But by then, new obstacles intervened: She had a young child and lived an hour away from the nearest college. "I had more time to study, but I had to be home for my daughter," she recalls.

Unable to attend classes the traditional way, Hopkins enrolled in an online-studies program offered by the University of Phoenix. Last November, after two and a half years of study over the Internet, she received her MBA degree and joined Prudential Securities as a financial advisor in training. "Getting a degree online was a wonderful experience," she says. "It was a rigorous, high-quality program, with very, very sharp instructors."

Even if you study online from the comfort of your home, attaining a degree requires major commitments of time, intellectual energy, and money. Still, whether you want to take a class for your career or for fun, the new world of online learning is worth checking out.

EDUCATION BOOM

THOUSANDS OF ONLINE courses are available to anyone with a PC and Internet access, including classes from such respected institutions as the University of Wisconsin, Stanford University, Penn State, and the University of California at Berkeley. According to International Data Corporation, the number of people taking at least one college course over the Internet will triple by the year 2002 to about 2.2 million. That figure doesn't include students enrolled in online courses offered by computer training companies like Scholars.com, which offers Microsoft and Novell certification courses. Nor does it count people taking online hobbyist classes.

To see what's available, consult a clearinghouse such as TeleCampus (telecampus.edu). This Web site lists over 12,000 classes offered by 700 colleges and other teaching organizations located throughout the world. Also worth a visit is Yahoo's online learning section (www.yahoo.com/education/distance_learning), which provides more than 400 links.

With most online courses, students go to the school's Web site to pick up lessons, assignments, and tests; and they communicate with teachers via e-mail. Group discussions rely on chat rooms and message boards. Some courses even let online learners view streaming video of classroom lectures. Schedules are often accelerated. For example, the New School in New York offers 9-week online courses that would take 15 weeks to complete if taken on campus.

You may not care about frat parties or hanging out at the Student Union anymore, but will you miss the face-to-face interaction with classmates if you attend an online school? You might, but proponents say the benefits outweigh the drawbacks. Because students communicate primarily through e-mail, they can participate at any time and from any place that gives them access to a computer. ▶

Terri Hedegaard-Bishop, vice president of the University of Phoenix's distance learning program, adds that with online studies, "people aren't responding to physical features, gender, charisma, or whatever—they're responding to ideas, and that can be very freeing."

NOT FOR SLACKERS

STILL, ONLINE LEARNING is not for everyone. Though you might expect online classes to be cheaper to conduct than traditional ones, they can cost more, because teachers must put in longer hours. For example, University of Phoenix online graduate courses, most of which cost $1410 each, are 3 to 15 percent more expensive than their campus counterparts.

And Internet courses can be just as demanding as traditional classes, if not more so. That means online students, working in relative isolation, must be especially motivated to hit the books. "Don't think that just because you can study on your laptop that you can travel and earn a degree in your spare time," warns Hopkins. "To finish my 18 back-to-back six-week courses, I had to study several hours a day, including weekends."

Rigorous online classes offered by high-profile schools promise to bring new respectability to correspondence learning. "In general," says Hedegaard-Bishop, "today's employers are accepting of [online study], both because they know the constraints employees face when attempting to go back to school and because companies are usually quick to embrace technology for their own training needs."

But that doesn't mean diploma mills aren't as commonplace on the Web as they are in the analog world. These shady organizations, often graced with names that deceptively mimic those of real universities, may require little academic work or volunteer to sell you a degree outright. Warning signs include absence of a physical address or phone number on the Web site. Don't sign up for a college-level program unless it's approved by a regional accreditation agency. However, if you're taking a course not intended for completing a degree—say, a class on data warehousing from Scholars.com, or one on insects from The School of Flyfishing (www.schoolofflyfishing.com)—a nonaccredited Web school could serve you fine.

Although Carol Hopkins says she was "tethered to the computer" during her online studies, it wasn't all work. "One of my classmates invited several of us for a weekend on Nantucket so we could finally meet and celebrate the completion of our degrees." Which proves that even when you opt for a virtual campus, the friendships you form can be very real.

Carla Thornton is a contributing editor for PC World. *If you're having trouble resolving a PC-related hardware or software problem, we'd like to hear from you. See page 12 for contact information.* ■

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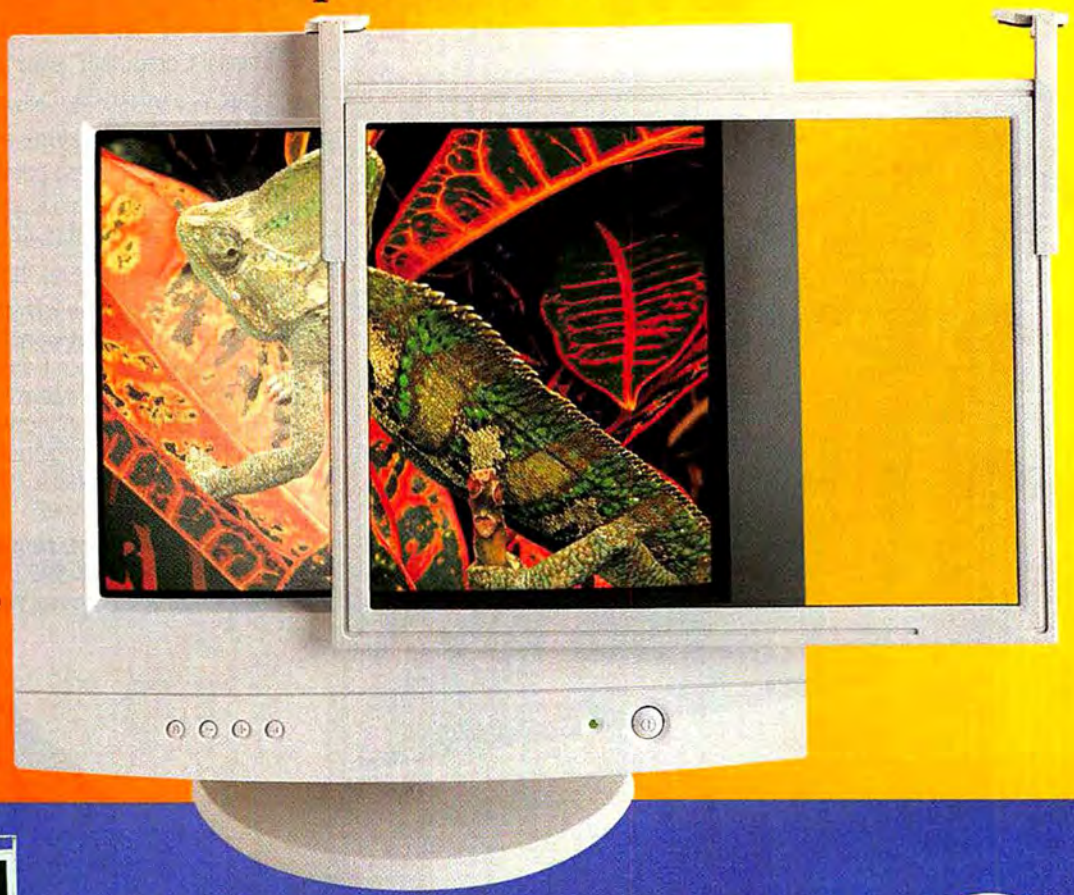

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USB's Fast and Easy—No Bones About It

"I CAN'T DO IT," I said to my editor. "See, an earthquake just hit Pasadena and an 18-wheeler plowed into my office, smashing my computer!" He was badgering me into playing with some Universal Serial Bus devices, something editors do when they're afraid to try newfangled gadgets themselves. Hose your own computer, I thought, mine works just fine. But I relented, motivated by a mild curiosity about USB (not to mention a monthly paycheck).

Here's the end of the story: USB is an utterly amazing way to connect peripherals to a PC. It works so well, in fact, that if I have the choice, I'll never buy another product that uses a parallel or serial port.

USB UNLEASHED

THE USB IS a tiny port, about a half-inch wide, found on newer PCs. It's small enough that you may never have noticed it. I have two USB ports on my PC, both in the back; my wife's Gateway Destination has one in the front, a *much* better spot for making quick connections. It's no contest: Compared to USB, parallel and serial ports look absolutely decrepit.

See, while the computer is running, I can plug a USB device into the port, and the machine recognizes it instantly. I think my PC looks forward to it, like a Labrador with a new tennis ball—oh boy, oh boy, a new toy. For example, I plugged in a Kodak DC265 digital camera and snapped a few pictures of my dog. Then I detached the camera from the USB port and connected an HP DeskJet 895C to my system so I could print the pictures. Folks, this is Plug and Play at its finest.

I think my PC looks forward to USB devices, like a Labrador with a tennis ball—oh boy, oh boy, a new toy.

Next, I borrowed a dozen USB products and connected them all. (No bytes were harmed in this experiment.) I used Entrega's 7-Port USB Hub to attach the HP DeskJet, a Visioneer scanner, a Logitech MouseMan, a Microsoft SideWinder joystick, an Iomega Zip drive, and a 3Com 56K modem. Everything worked! The clincher: No matter how many devices I used, USB needed just one interrupt.

Wait, it gets better. Some USB peripherals let me attach other USB devices to them. Mitsubishi's 19-inch Diamond Pro 900u monitor has a built-in USB hub. Once I connect it to my PC's USB port, I can connect three USB devices to the display.

RATHER SWITCH THAN FIGHT?

IF YOUR PC IS more than 18 months old, you probably don't have a USB port. And even if you do, your PC's BIOS may not have the smarts to handle it. That's because many manufacturers sold USB motherboards before USB specs were finalized—which is why so many people think USB is a scam.

But I think the USB technology is terrific, and I don't want you to miss out on it. So if you have an older PC, I have some solutions. First, grab a copy of USBReady, a free program that will check your system and tell you what you have to get in order to use USB. This great tool is available on PC World Online's FileWorld.

Then visit www.usb.org for details about USB and for useful links to available peripherals. For more technical information—like which version of Windows 9*x* you'll need—read "Get on the Bus" in May's *Hardware Tips* (www.pcworld.com/may99/hardware).

More good news: You can upgrade your older system to USB. Belkin sells an add-in card for about $40. If your PC's BIOS is old and crotchety, you may need to upgrade it first. Check your BIOS manufacturer's Web site for the skinny.

If you decide the USB upgrade isn't worth the hassle—but you're running out of ports—use a cheap data switching box. Belkin sells one that lets you switch between four serial devices with the flick of a dial. I've used one for years.

Uh-oh, I have to go. My editor's calling. He has a Microsoft USB vacuum cleaner he wants me to play with.

Find files mentioned in this article at www.fileworld.com/magazine. Contributing Editor Steve Bass is the president of the Pasadena IBM Users Group. See page 12 for contact information. ■

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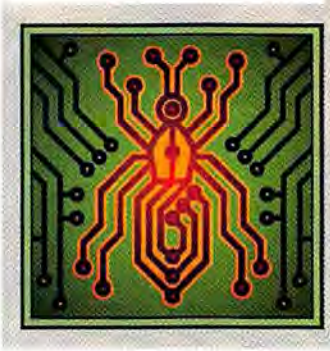
Internet Explorer 5 Survival Guide



MICROSOFT'S LATEST BROWSER has been out for a few months now—long enough for the irritating interface glitches, security flaws, bugs, and incompatibilities with other applications to manifest themselves fully. The good news: IE 5 is more stable than IE 4.0 was at the same stage in its development. The bad news (sorry, Microsoft): IE 5 is buggy. Fortunately, you can fix or work around most of the problems.

An IE 5.0 service pack is undoubtedly in the works, though at the time of this writing, Microsoft had not announced one officially. Meantime, Microsoft has released a confusing dribble of minor updates. Office 2000 shipped with IE 5.0a, a minor upgrade that includes Office 2000 compatibility tweaks, but no bug fixes, according to Microsoft. Concurrently, the company updated the downloadable version, from the original IE 5.0 (shown as version 5.00.2014.0216 in *Help•About Internet Explorer*) to the new IE 5.0a (shown as 5.00.2314.1003). As news of the update leaked out, users anxious for a fix downloaded the update from Microsoft's Web site, but all for naught: Version 5.0a doesn't fix a thing.

Besides releasing its Office 2000–related versions, Microsoft has posted two corrective IE 5 patches to close the security holes mentioned in last month's column (www.pcworld.com/jun99/bugfix). The 1.1MB IE 5 MSHTML patch fixes three security flaws, and the 170KB DHTML "Edit Control" update fixes one. Find both of these patches—and more details—at www.microsoft.com/windows/ie/security/default.asp. Versions of each fix are also available for Internet Explorer 4.0, including version 4.01 with Service Pack 2 (see "In Brief").

Unlike the rather obscure security holes these patches try to plug, some other IE 5.0 bugs may interfere with your productivity, or at least drive you crazy. Here are three of the most commonly encountered bugs, and what you can do about them:

BUG While browsing in IE 5 and clicking links to visit new Web sites, you decide you want to return to a previous page—but the Back button is grayed out. Microsoft promises to include a fix for this snag in a yet-to-be-announced update.

WORK-AROUND For the present, Microsoft suggests, you can get back to the page where you want to be by selecting the appropriate URL from the Address window's drop-down list. Or you can try closing and relaunching IE 5. Unfortunately, however, the drop-down list in question can take a long time to display. Some users have reported that the Back button problem may go away if you perform the following steps: Choose *Tools•Internet Options*, select the *General* tab, click the *Settings* button that's located in the Temporary Internet files area, and set 'Check for newer versions of stored pages' to *Every time you start Internet Explorer*.

BUG The Outlook Express 5.0 mail and news reader lacks a spelling checker, but it can use one that comes with another Microsoft product (like Office). When you spell-check an e-mail note you've written, though, OE may display one of those helpful error messages saying that the program encountered 'an error'.

FIX Open the Registry Editor (*Start•Run•Regedit*). Press **<F3>** to start a search, enter **SharedFilesDir** in the 'Find what' field, check the *Values* option under 'Look at', and then click *Find Next*. When Regedit finally locates the value, double-click it and make sure that the string ends with a backslash. On most systems, the correct string will be C:\Program Files\Common Files\Microsoft Shared\. Click *OK*, and exit the Registry.

BUG Web pages appear blank or only partially rendered, even though IE 5 displays the 'Done' message in the status bar.

FIX Download a 332KB patch from support.microsoft.com/download/support/mslfiles/3725.exe. For more information go to support.microsoft.com/support/kb/articles/q226/5/50.asp.

You can find files mentioned in this article at PC World Online (www.fileworld.com/magazine). Scott Spanbauer is a contributing editor for PC World. ■

IN BRIEF

VirusScan 4.0.2 SP2

TAKING A PAGE from Microsoft, Network Associates now posts VirusScan service packs. Its 817KB Service Pack 2 corrects several bugs discovered since VirusScan version 4.0.2 appeared (see March's *Bugs and Fixes*, www.pcworld.com/mar99/bugfix) and incorporates fixes that appeared in SP1. Get the pack and a description of its contents at ftp.nai.com/pub/antivirus/service_paks/win9x.

Internet Explorer 4.0 SP2

UNWILLING TO take a chance on IE 5? These days IE 4.0 looks pretty stable. The most recent fix, which focuses on solving interface glitches, also includes all previously issued security patches. To upgrade, choose *Help•Product updates*. Find SP2 details at www.microsoft.com/windows/ie/ie40/ie40sp2.asp.

BUGGED?

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TOP OF THE NEWS

Fast and Pricey, PIII Hits 550 MHz

Intel's **knocking** at your door with faster PIIIs. You **may not** want to answer.

◆ **By Laurianne McLaughlin**

YOU HAVE probably seen the big blue door. That's Intel's marketing gimmick, designed to convince PC buyers that its new Pentium III chip powers the most irresistible systems ever built. The door is about to open again. Intel has pushed the PIII to 550 MHz, up from the initial 450- and 500-MHz clock speeds. But don't venture in just yet. The extra speed won't buy much more performance, and it'll cost you hundreds of dollars extra.

Moreover, Intel exaggerates when it claims that the new instructions that distinguish the Pentium III from earlier chips will propel you to a dramatically improved world of browsing. To date, about 16 Web browser plug-ins and a scant 30 sites have been enhanced for the PIII. Some of these sites do sparkle on a PIII, but others look just fine on cheaper PII systems.

We tested three preproduction PIII-550 systems: Compaq's $2799 Prosignia 330, for small businesses; Dell's $2600 Dimension XPS T550, for home use; and Hewlett-Packard's $2564 Vectra VLi8 MT, for corporate customers. They're all solid systems. But they run our application tests a lot like their next-door neighbors, the PIII-500 family. And that should come as no surprise. PIII-450 and PIII-500 PCs already run blazingly fast, and few apps today cry out for more speed. But PIII-550s will cost $200 to $300 more than a similarly equipped PIII-500 PC and up to $400 more than a comparable PIII-450.

Of course, there's more to a PC than its processor, and all three PIII-550 machines deliver some compelling new features. For example, the Compaq has a 250MB Zip drive, and the Compaq and Dell systems both use an impressive 32MB graphics card based on the high-performance NVidia RIVA TNT2 chip.

OVERKILL?

DO YOU NEED a PC that runs faster than 500 MHz? Some people do. Database designers and multimedia content creators, for instance, push their PCs to the limit. But those of us who use ordinary productivity applications can hardly be blamed for getting a little blasé about speed. Even relatively inexpensive desktops are fine for routine office work.

A close look at the numbers confirms that the three PIII-550 machines we tested, each equipped with a hefty 128MB of RAM, ripped through our business application tests. ▶

COMPAQ'S Prosignia 330 (top), HP's Vectra VLi8 (middle), and Dell's Dimension XPS T550.

PHOTOGRAPH: MARC SIMON PHOTO-ILLUSTRATION: JEFF BERLIN

Tough Times for Cheap Chip Makers

CYRIX, WHOSE CHIPS power many of today's sub-$500 PCs, has been put up for sale by parent company National Semiconductor. For now, Cyrix continues to ship its M II processors; you'll see the CPUs in systems from Compaq, Emachines, Microworkz, and Packard Bell. Meanwhile, the only other companies competing in the sub-$500 PC market—IDT and Rise Technology—are making little progress. IDT, maker of the WinChip line of processors, is seeking new financial backing. Rise, which makes the MP6 chip, has yet to announce agreements with U.S. computer vendors.

New High in Hard Drives

A NEW TECHNOLOGY developed by IBM could allow desktop hard drives to hold 100GB of data, and notebook drives to store 36GB, says Jim Porter, president of the market research company Disk/Trend. According to Porter, the drives, which are expected to be available in 2001, will probably cost about what high-end drives do today. The highest-capacity desktop drives currently available hold 25GB and cost about $425 in an upgrade kit, Porter says. The largest notebook drives today store 12GB and sell for about $500 when purchased with the system. ▶

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The Compaq Prosignia earned a PC WorldBench 98 score of 246, the best performance for a Windows 98 machine to date. The HP Vectra scored 244, and the Dell Dimension posted 241—a virtual tie. But these machines run business applications only about 5 to 7 percent faster (10 percent is noticeable) than the average PIII-500 with 128MB of RAM.

PIII APPS CHECK IN

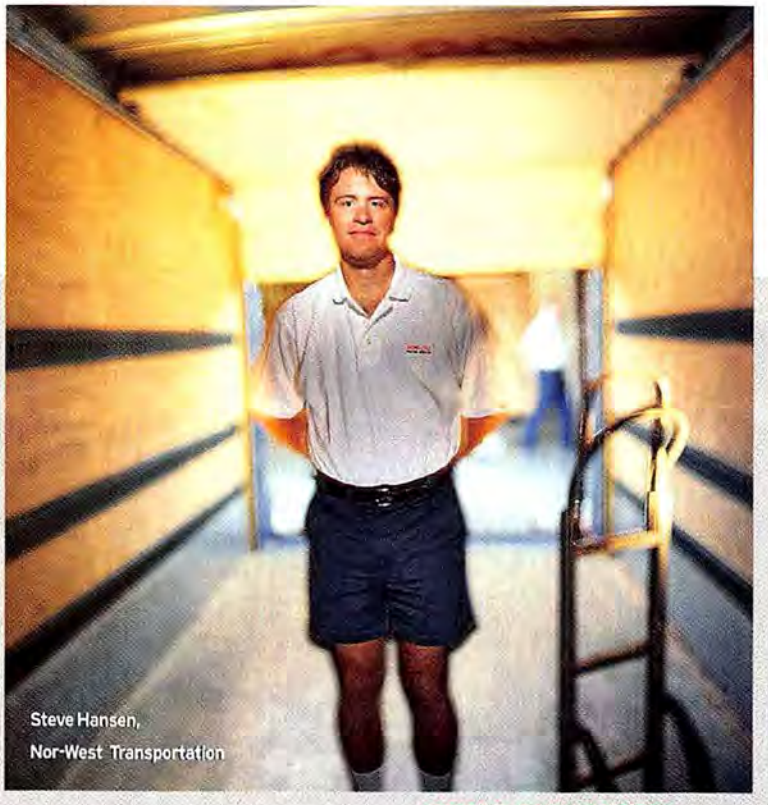
POWER IS IMPORTANT, but if you're considering a PIII PC, you should also ask some questions about PIII-enhanced software: How much is available, and what's in it for you?

The PIII's 70 Streaming SIMD extensions (like the 57 MMX instructions) speed up applications or browser plug-ins designed specifically to take advantage of them. Programs that have been optimized for Microsoft's DirectX 6.1 API can also benefit. Intel estimates that about 100 Pentium III–enhanced applications will ship by June 1.

The improved plug-ins do speed up some tasks, such as streaming animation. One site that Intel touts as being optimized for Pentium III users (www.exciteextreme.com) features a PIII-enhanced plug-in that helps you search the Web. Instead of clicking through a list of search categories, you can click on and rotate a series of 3D objects that represent topics. The PIII instructions improve the smoothness and frame rate of the 3D graphics. But on the whole, Pentium III–enhanced content won't radically improve your everyday browsing.

For business users, PIII-enhanced voice recognition and image editing apps show the greatest promise. Dragon's NaturallySpeaking is shipping already. Lotus's forthcoming SmartSuite Millennium edition, due in June, will also use PIII instructions to speed up voice recognition processing. Philips plans to ship a PIII-enhanced version of its FreeSpeech this summer, and both IBM and Lernout & Hauspie have made fall product plans.

Microsoft Office 2000, due



Steve Hansen, Nor-West Transportation

The PC Challenge: Can You Pick the PIII-550?

IN A TASTE TEST, most of you could tell Coke from Pepsi. But in a PC taste test, could you tell a PIII-550 from a slower, less expensive system? And what do PIII machines add when you're viewing PIII-enhanced Web sites? To find out, we asked two PC users to perform a suite of tasks using four unlabeled desktops: a PIII-550, a PIII-450, a PII-450, and a Celeron-400.

Our testers: Steve Hansen, owner of a moving company in San Lorenzo, California, and Jon Pevna, a vice president of service procurement for Bank of America in San Francisco. Their verdict: A PIII-550 with a top-flight graphics card galvanizes 3D games. But in other apps, differences were harder to detect.

SITE-SEEING

FIRST, WE WANTED to see whether Hansen and Pevna would notice the impact of the PIII's streaming SIMD extensions on Web sites that had been optimized for them. Each tester used two machines: a PIII-450 system and a PII-450.

Both men visited two PIII-enhanced pages—www.sharperimage.com and www.styleclick.com—shopping sites sporting 3D representations of products. They rotated and examined a clock radio/CD player on the Sharper Image site and footgear on Styleclick.com. Both Hansen and Pevna said rotating the objects was a tad easier with the PIII machine. "The lag is subtle," Hansen remarked of the PII-450. He said the Web sites looked great on both machines.

> He was able to **spot the PIII-550** but found all four machines **acceptably peppy.**

Overall, Hansen liked the 3D online shopping, but Pevna waxed a little less enthusiastic. "I don't know if you want to see [the clock radio/CD player] from 14 different angles," he said. "It's sort of a gimmick." Neither man thought that the PIII system improved the shopping experience significantly.

BREAD AND BUTTER

NEXT, OUR TESTERS used Microsoft's Picture-It on all four machines to edit an image for use on a Web page. After using each machine to rotate and flip an image, apply a background, and touch up the image, Hansen quickly pronounced the PIII-550 PC the fastest. He was an apt judge, since he edits images frequently for personal Web pages. Hansen pegged the PIII-450 as the second fastest and the Celeron-400 as the slowest, though he said the Celeron's perfor-

PHOTOGRAPHS: ROBERT CARDIN

to ship in June, has two PIII-enhancements, Microsoft says. PIII instructions should speed encoding of presentations for Web broadcasts and accelerate performance with PhotoDraw, the business graphics application included in Office 2000 Premium Edition.

GOOD CONFIGS

BEYOND THE PIII processor, you'll find the PIII-550 machines' configurations generous. The corporate PIII-550 system we tested, HP's Vectra VLi8 MT, costs the least, at $2564, and comes with a 17-inch monitor. Our model included a 16X–32X CD-ROM drive, a 13.5GB hard drive, and a 3Com 10/100 network interface card. The design of the Vectra's case is also top-notch: Pull a small lever, and the left side of the case comes off. Another lever removes the motherboard, and drives slide out without tools.

For graphics performance, the Vectra uses a Matrox G200 chip with 8MB of memory integrated on the motherboard. This subsystem works fine for business graphics, though you can't upgrade it. HP's PIII-550 machine held its own during tasks such as playing a presentation in PowerPoint 97 or running a clip using Macromedia Director. We excluded the HP from the 3D game tests because we didn't want to dismiss this corporate PC on the basis of game frame rates.

For home PC enthusiasts, Dell's Dimension XPS T550 packs the goods you'd expect in a $2600 PC, along with a 19-inch monitor. Our model had a 20GB hard drive, a 6X DVD-ROM drive, and a standard 100MB Zip drive. But if you're a 3D-game fan, the machine's Diamond Viper V7770 graphics card will probably be the major attraction: It turned in extremely fast, smooth performance in our game tests.

Compaq's $2799 Prosignia 330, the most expensive of the three machines that we evaluated, had the biggest hard ▶

mance was very acceptable. Pevna did not notice a difference among the PIII-550, PIII-450, and PII-450 machines on this test, though he too rated the Celeron-400 PC as slowest.

The testers next constructed a newsletter in Word. Hansen detected little difference between the Pentium III-550 and the Celeron-400. Pevna thought the Celeron-400 felt a bit faster. Both reported relatively minor differences between the machines. In our Excel test, which involved copying and pasting large columns, Hansen couldn't distinguish between the four computers. Pevna identified the PIII-550 and PIII-450 as the fastest PCs but saw no difference between those two.

PLAYING GAMES

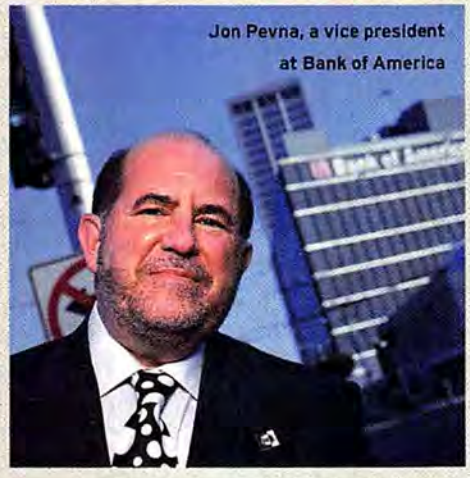
IN OUR FINAL TEST, with Rage Software's PIII-enhanced game Expendable, both Pevna and Hansen felt that the PIII-550 distinguished itself. It's worth noting that the PIII-550 used a very fast NVidia RIVA TNT2-based graphics card, while the other three machines employed a Matrox G200 card. The combination of the graphics card and the PIII-550 CPU made game play feel extremely responsive.

Interestingly, both Pevna and Hansen slightly preferred the game's appearance on the PIII-450 to the way it looked on the PII-450. Given the machines' identical graphics cards, this indicates the PIII extensions are contributing small but perceptible improvements to this game.

Hansen stated he was pleased overall with the Celeron-400 PC (despite the lag on the Picture-It task). He pegged it as the second fastest, behind the PIII-550, although he found all four PCs peppy. Pevna picked the PIII-550 as the fastest PC, followed by the PIII-450, the PII-450, and the Celeron-400.

Our testers concluded that a PIII-550 PC provides significant speed-up for games. But they were also impressed by the PIII-450 and Celeron-400 systems. Take into account that you pay less than $1800 for a PIII-450 and less than $1400 for a Celeron-400, and their reactions are food for thought.

3D shopping sites are "sort of a gimmick."



Jon Pevna, a vice president at Bank of America

Help With Bulk Mailing

SMALL BUSINESSES with bulk mailing needs that are too small to justify the expense of traditional mailing services often lack the staff needed to print, stamp, and stuff hundreds of envelopes. For these companies, Eletter (www.eletter.com) offers a moderately priced, laborsaving, Web-based alternative. Working from mailing lists and files that you upload to the service with a browser, Eletter produces and mails postcards, letters, and brochures in black-and-white or color. Producing and sending first-class mail costs as little as 53 cents per letter for quantities under 200; per-letter rates decrease for larger runs sent by Class A bulk mail. A minimum $10 charge applies.

Tidbytes

CHILD-FRIENDLY SURFING: A coalition of 15 tech companies plans to offer Net safety tips, a guide to browser filters, information on how to report troublesome online activity, and pointers to child-friendly content. In July the information will appear on many popular Web sites. For more info, see www.neted.org.

NOVELL'S SMALL-BUSINESS BUNDLE: This summer, Novell plans to ship Small Business Suite 5, which includes the new NetWare 5; Groupwise version 5.5 (e-mail/groupware tool); and Netscape Enterprise Server (Web server). The suite includes wizards for easier setup. A five-user license is expected to sell for about $1300.

drive—22GB—and a 250MB Zip drive, one of the first we've seen bundled in a system. Our model also carried a 52X CD-ROM drive, a 19-inch monitor, and the same Diamond graphics card as in the Dell machine. In our graphics tests we did detect a few differences. For example, the Compaq machine took 15 seconds longer than the Dell PC to complete the PowerPoint test. But don't read too much into that. The graphics cards and the graphics card drivers were in beta form. We expect to see more-uniform graphics quality in the shipping versions.

PEEK IN THE KEYHOLE

ONE FINAL consideration: If you're inclined to buy the fastest PC on the market in hopes of postponing obsolescence, hold your horses. The next wave of PIII machines, expected in early fall, will add more than just clock speed. They will integrate a new system chip set code-named Camino, which supports a 133-MHz system bus (up from today's 100-MHz bus on PIII computers and 66-MHz bus on Celeron systems). The chip set enables AGP 4X graphics and support for direct RDRAM, a fast new type of main memory.

Meanwhile, Intel's archrival AMD has big plans of its own. The first systems based on AMD's new K7 processor are expected to make their appearance later this summer. The K7, which will launch in 500-, 550-, and 600-MHz versions, supports a 200-MHz system bus and looks to be a robust Pentium III competitor.

BEHIND THE BLUE DOOR

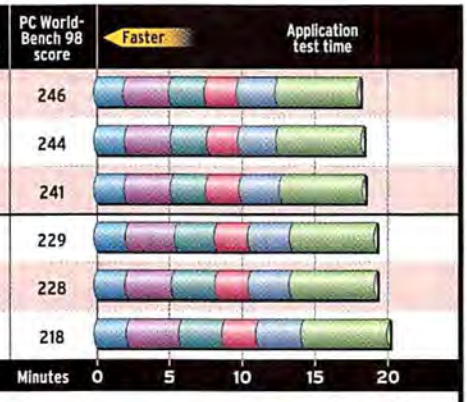
MAKE NO mistake, the PIII-550 systems we tested are fast, solid, well-designed machines. But the PIII-500 and PIII-450 models offer a sweeter combination of price and performance for many people. For example, you could buy the Dell Dimension XPS with a PIII-500 processor for $2340. Workhorse PIII-450 desktops now go for less than $1800. And if all the hoopla over PIII-enhanced applications and browser plug-ins just doesn't intrigue you, by all means consider buying a Celeron-466 PC for $1499. Systems based on that processor race through apps like Word and e-mail much as a PIII-450 PC does.

Finally, if you've been saving for a dream game machine, consider waiting for PCs with the Camino chip set and AGP 4X graphics, due out this fall. Opening the big blue door may be more exciting then.

DESKTOP PCs — TEST REPORT

Pentium III-550s Edge Out the Competition...

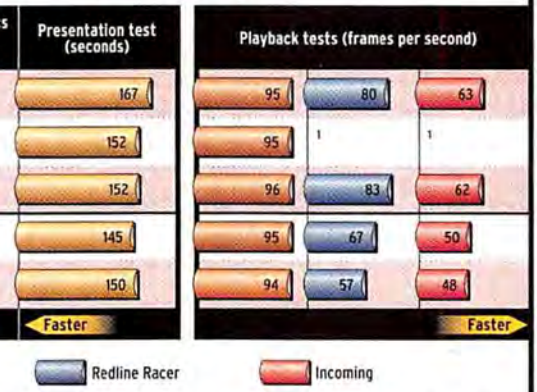
SYSTEM	CPU	RAM (MB)	Level 2 cache (KB)	PC WorldBench 98 score
Compaq Prosignia 330	Pentium III-550	128	512	246
HP Vectra VLi8 MT	Pentium III-550	128	512	244
Dell Dimension XPS T550	Pentium III-550	128	512	241
Average of 27 desktops	Pentium III-500	128	512	229
Average of 2 desktops	K6-III-450	128	256[1]	228
Average of 5 desktops	Pentium III-450	128	512	218



TEST PC WORLD CENTER **HOW WE TEST** All systems are tested with PC WorldBench 98, *PC World*'s application-based benchmark. A higher PC WorldBench 98 score is better. For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing). Data based on testing conducted by the PC World Test Center. All rights reserved. [1]Both machines also have 1024KB of level 3 cache.

...and Look Strong on Graphics

SYSTEM	CPU	Graphics RAM (MB)	Presentation test (seconds)	Playback tests (frames per second)		
Compaq Prosignia 330	Pentium III-550	32	167	95	80	63
HP Vectra VLi8 MT	Pentium III-550	8	152	95	1	1
Dell Dimension XPS T550	Pentium III-550	32	152	96	83	62
Average of three systems	Pentium III-500	16	145	95	67	50
Average of two systems	Pentium III-450	16	150	94	57	48



TEST PC WORLD CENTER **HOW WE TEST** In Microsoft PowerPoint 97, we time a script that builds a 50-slide presentation; faster times are better. Using Microsoft Active Movie, we play back a looping AVI clip while running an animation created with Macromedia Director 6 in the foreground. We also execute self-running demos in Criterion Redline Racer and Rage Incoming. For all three playback tests, higher frame rates are better. All systems tested with 128MB of system RAM and 512KB of level 2 cache. Data based on testing conducted by the PC World Test Center. All rights reserved. [1]3D game tests omitted for this model, which is aimed at corporated users.

Dimension XPS T550
Street price $2600; Dell; 800/388-8542; www.dell.com
PRODUCT INFO NO. 611

Prosignia 330
Street price $2799; Compaq; 800/345-1518; www.compaq.com
PRODUCT INFO NO. 612

Vectra VLi8 MT
Street price $2564; Hewlett-Packard; 800/322-4772; www.hp.com/desktops
PRODUCT INFO NO. 613

Office 2000: What Microsoft's Hiding Inside the Box

THE MOTHER of all office suites has landed. Microsoft's long-awaited Office 2000 delivers a boatload of small improvements. But many users will want to steer clear of one of its most highly touted features.

As part of the company's effort to make all of its products Web-centric, every application in the suite can save documents as Web pages, with formatting, formulas, and macros intact. Thereafter, anybody who has a Web browser should be able to view Office 2000 documents in all their glory. But there's a significant problem. If you save particularly long or complex Office files as Web pages, many non-Microsoft applications—including Netscape Navigator and Composer—will not be able to read them.

USE INTERNET EXPLORER to view a presentation created in PowerPoint 2000 (top), and it looks great. View that same presentation in Netscape Navigator (bottom), and you get junk.

THE GOOD NEWS

USERS WILL find many intriguing new features in Office's latest version. Among the highlights:

- File Open and File Save dialog boxes have added a browser-style history list of recently used files and folders.
- The suite now has its own clipboard, which can hold as many as 12 items at a time.
- Office 2000 can repair itself, automatically replacing crucial program files that are missing or damaged.
- The Single Document Interface places an individual button for each open file on the Windows taskbar.
- Menus can adapt to your work patterns, putting items you use frequently on the top level, and those you rarely open on submenus below.
- You can choose high, medium, or low security settings, and ward off Visual Basic macros (such as the Melissa virus) by having Office 2000 check their digital signatures.

One of the nicest of the new features: In most cases, Office 2000's native-format files are compatible with—and more compact than—Office 97's. This convenience enables your coworkers to open Office 2000 native-format files even if they haven't upgraded to the new suite. And if your hard disk labors under a load of large PowerPoint presentations or Access databases, upgrading to Office 2000 and opening and saving those files in the native format could free up megabytes of disk space.

Note to users of WordPerfect and Word Pro: Though you might be able to work with Word 97 files, our tests indicate you will have difficulties opening documents that were created in Word 2000. And some spreadsheeters are out of luck as well: Quattro Pro is able to handle the new Excel 2000 format with some success, but 1-2-3 is not.

Finally, despite all its new bells and whistles, Office 2000 runs no slower than Office 97. Most tasks—including launching applications, opening and saving files, inserting graphics, and moving columns—take approximately the same amount of time in the new suite as they did in the old one.

POLYGLOT NOT

THIS ROSY picture turns dark and gloomy when you attempt to save Office documents as Web pages.

To test Office 2000 file compatibility, we created HTML documents in three applications—Word 2000, Excel 2000, and PowerPoint 2000. Then we tried to open those files in Office 97, in competing office suites, and in various browsers and HTML editors.

If you save large or complex Office 2000 documents (in other words, files with macros, graphics, or any kind of complex formatting) as .htm files and then open them in a ▶

Office 2000: Five Flavors

1 Office 2000 Standard
Excel 2000, Outlook 2000, PowerPoint 2000, Word 2000
$499, upgrade $209 (for current Office users) or $249 (for users of competing software)

2 Office 2000 Small Business
Excel 2000, Outlook 2000, Publisher 2000, Word 2000, and assorted small-business tools
$499, upgrade $209 or $249

3 Office 2000 Professional
Access 2000, Excel 2000, Outlook 2000, PowerPoint 2000, Publisher 2000, Word 2000, and assorted small-business tools
$599, upgrade $309 or $349

4 Office 2000 Premium
Access 2000, Excel 2000, FrontPage 2000, Outlook 2000, PhotoDraw 2000, PowerPoint 2000, Publisher 2000, Word 2000, and assorted small-business tools
$799, upgrade $399 or $499

5 Office 2000 Developer
Access 2000, Excel 2000, FrontPage 2000, Outlook 2000, PhotoDraw 2000, PowerPoint 2000, Publisher 2000, Word 2000, and assorted small-business and programming tools
$999, upgrade $609 or $649
Microsoft, 800/426-9400
www.microsoft.com/office
PRODUCT INFO NO. 614

non-Microsoft browser, in an HTML editor, in a competing office suite, or even in Office 97, you will often lose that formatting. Sometimes you will get nothing but gobbledygook (for details, see "Office 2000 Files Don't Always Work With Other Apps").

For example, when we saved one .htm file from Word 2000 and then tried to open it in Netscape Navigator 4.51, we found headlines broken up one word to a line and images that ran over the text. When we tried to open the same file in SoftQuad's HotMetal Pro HTML editor, the program warned us of "problems" in the HTML; its HTML wizard then reported that the document was full of "unrecognized" HTML code. When we tried to open an HTML PowerPoint presentation, Navigator could display only digital junk.

Microsoft has created a hybrid file format that only Office 2000 users can share fully.

NOT JUST HTML

WHY DID THIS happen? The current Hypertext Markup Language 4.0 spec, to which most current browsers and HTML editors adhere, isn't equipped to preserve complex Office documents with perfect fidelity. Consequently, when it saves documents as Web pages, Office supplements standard HTML with some nonstandard technologies: XML (Extended Markup Language) handles macros and other interactive elements, while VML (Vector Markup Language) preserves some graphics. Because many editors and browsers don't yet support either XML or VML, they aren't fully compatible with Office's .htm files.

Office 2000's nonstandard implementation of HTML could also make collaboration more difficult. Microsoft has created a hybrid form of HTML that only Office 2000 users can share fully—and even then, they could run into trouble.

Here's why: Suppose you create an .htm document in Microsoft Word. Office 2000 embeds a special tag in the file's source code, identifying the file to Office and to Windows Explorer as a Word document. But should one of your collaborators subsequently open and save that same file in FrontPage, it becomes a plain Web page—losing all of its Wordiness in the process, including the special tag that identifies the document's original application. After that point, if a third user comes along and wants to open the file, he or she will have no clue about which application to use, potentially leading to all sorts of confusion.

FAT AND SLOW

THIS HYBRID form of HTML can also be sluggish. Excel 2000 slows down substantially when working with HTML. Saving a 5MB spreadsheet in the program's native .xls format took a little under 4 seconds. But saving that very same spreadsheet as HTML caused the file to balloon to a whopping 20MB, and the process took almost 40 seconds. Other Office 2000 applications are better behaved: Word 2000 files we saved as Web pages turned out smaller than the native .doc files, and PowerPoint presentations enlarged only slightly when saved in .htm format.

The bottom line: Although Office 2000 has a number of nifty new features to recommend it, the implementation of .htm as a common file format is not one of them. Of course, the new suite's nonstandard HTML will not be a problem if you avoid it, sticking instead with each application's native document formats (if your collaborators have the new suite) or a standard document format like .rtf (if they don't). Nor will it be a problem if you are posting files to an intranet and you're sure that absolutely everyone in the office is using Internet Explorer 5.

But if you want to create Web pages for all the world to read, or if you want to collaborate with a variety of users using .htm as a common file format, Office 2000 is not the right tool for the job.

—Scott Spanbauer and Dan Miller ▶

OFFICE 2000 FILE COMPATIBILITY

Office 2000 Files Don't Always Work With Other Apps

FILE TYPE	Can open file with full fidelity to original	Can open file, but display varies noticeably from original	Can't open file, or displays garbled data or source code
Word 2000 (.doc)	Word 97	Word Pro 9	WordPerfect 9
Word 2000 (.htm)	FrontPage 2000, Internet Explorer 4.01 and 5, Netscape Navigator 4.51	Netscape Composer 4.51, WordPerfect 9	HotMetal Pro 5, Word 97, Word Pro 9
Excel 2000 (.xls)	Excel 97	Quattro Pro 9	1-2-3 9
Excel 2000 (.htm)		FrontPage 2000, Internet Explorer 4.01 and 5, Netscape Navigator 4.51	1-2-3 9, Excel 97, HotMetal Pro 5, Netscape Composer 4.51, Quattro Pro 9
PowerPoint 2000 (.ppt)	PowerPoint 97		
PowerPoint 2000 (.htm)	Internet Explorer 4.01 and 5	FrontPage 2000	HotMetal Pro 5, Netscape Composer 4.51, Netscape Navigator 4.51, PowerPoint 97

TEST PC WORLD CENTER **HOW WE TEST** We tried to open Office 2000 native and .htm files of various sizes and complexity (that is, with and without graphics, revision marks, macros, and frames) with popular suite, HTML editor, and browser applications. Data based on tests designed by the PC World Test Center. All rights reserved.

ThinkPad® 570

the new thinkpad 570.(dramatization)

transformer	This is how it works. Slip the ultralight, superthin ThinkPad 570 into an UltraBase and it transforms into an all-in-one desktop ready for the office or the road. ibm.com/thinkpad 800 426 7255, ext. 1203	
ultrabase	holds floppy drive or extra battery and options like CD, DVD, Zip, extra hard drive[2] or SuperDisk LS-120	
notebook	1" thin[2] / 4.0 lbs[2] / 12.1" or 13.3" active matrix display 4.0gb or 6.4gb hard drive / 64–192mb sdram mobile Pentium® II processor 300PE / 333 / 366 mhz	
price	from $2,699[1]	

e-business tools

intel inside
pentium® II

Estimated reseller price for model 570/2AU. Price excludes UltraBase and other options. FDD/battery included. Actual prices may vary. [1]Actual weight/thinness may vary due to vendor components, manufacturing process and options. Weight includes battery; excludes FDD and other options. [2]Adapter required. mhz denotes microprocessor internal clock speed only; other factors may also affect application performance. gb=1 billion bytes for HDD capacity. PCs referred to in this ad include an operating system. IBM product names are trademarks of International Business Machines Corporation. The Intel Inside logo and Pentium are registered trademarks of Intel Corporation. © 1999 IBM Corp. All rights reserved.

Dell and Gateway Enter Online Store Wars

DELL AND GATEWAY want you, and not just when you're buying a computer. The two direct-sales giants recently launched online superstores—Dell's Gigabuys site (www.gigabuys.com) and Gateway's SpotShop.com (www.spotshop.com)—each selling thousands of PC peripherals, accessories, and software titles.

Like other online computer shops, Gigabuys and SpotShop.com beat brick-and-mortar stores on price and selection. They also offer existing Dell and Gateway customers nifty personalized buying advice. But you can find better bargains and a greater range of merchandise at other Web superstores.

OPENING SHOP

DELL'S GIGABUYS launched last March. SpotShop.com opened in April, just two months after Gateway bought a 19.9 percent interest in NECX, one of the top-rated sites in our October survey of superstores (see "Where the Buys Are," www.pcworld.com/oct98/mailorder). In fact, SpotShop.com is NECX in a new Gateway guise. Once you get past the first page, the two sites are almost identical except for the different logos at the top and the absence of PCs on SpotShop.com (for these, you must go to Gateway.com).

Both Gigabuys and SpotShop.com shine in design and content. Product information is plentiful and generally easy to find. Selection at both is good, too. Dell says Gigabuys has an inventory of 26,000 items, with 40,000 expected by midsummer. SpotShop.com boasts more than 30,000 products. In contrast, a typical CompUSA store has 5000 to 6000 items. But you can find larger selections elsewhere on the Web: CDW claims to stock 45,000 items.

We shopped for seven popular products—two monitors and two printers from recent *PC World* Top 100 roundups; a Palm IIIx personal digital assistant; Symantec's Norton SystemWorks 2.0; and Adobe Photoshop 5.0—at seven different stores: Gigabuys, SpotShop.com, Shopping.com, Buy.com, CDW, CompUSANet.com, and a CompUSA store in San Bruno, California. We found all seven products at each of the Web sites. The CompUSA store in San Bruno, however, did not carry either of the two monitors or the HP DeskJet 880C.

Gigabuys and SpotShop.com both go beyond raw inventory numbers by offering personalized shopping services. Gigabuys' home page invites Dell owners to identify their systems and then proposes compatible upgrades; it can, for example, automatically determine the right kind of RAM for your PC. SpotShop.com doesn't offer the same degree of personalization, but Gateway customers can check the compatibility of upgrade items using NECX's existing software.

BETTER PRICES ELSEWHERE

OVERALL, Gigabuys and SpotShop.com offered better deals than CDW, CompUSANet.com, and the brick-and- ▶

ONLINE STORES PRICE COMPARISON

Where to Find Deals and Steals Online

SITE	3Com Palm IIIx	Adobe Photoshop 5.0	HP DeskJet 880C	Lexmark 5700 Color Jetprinter	Norton SystemWorks 2.0	Princeton E0500	ViewSonic PT775
Buy.com	$294[1]	$529	$250	$199	$57	$159	$388
CDW	$348	$609	$297	$229	$69	$195	$480
CompUSANet.com	$350[1]	$600	$290	$230	$55	$205	$510
Gigabuys (Dell)	$320	$644	$275	$226	$62	$196	$459
Shopping.com	$320[1]	$580	$275	$215	$63	$185	$440
SpotShop (Gateway)	$320[1]	$586	$280	$222	$63	$191	$455
CompUSA[2]	*$370*	*$600*	*n/a*	*$230*	*$70*	*n/a*	*n/a*

Lowest price for each product shown in red. n/a = not available [1] Out of stock on date checked (4/16/99). [2] San Bruno, California, retail store included for comparison.

ILLUSTRATION: JEFF BERLIN

*Estimated reseller price for models 600/35U-6AU. Actual prices may vary. Actual weight/thickness may vary due to vendor components, manufacturing process and options. Includes battery (and travel cover on ThinkPad 600 models) and excludes external diskette, cd/dvd drives, if applicable. mhz denotes microprocessor internal clock speed only; other factors may also affect application performance. gb=1 billion bytes for HDD capacity. PCs referred to in this ad include an operating system. IBM product names are trademarks of International Business Machines Corporation. Intel Inside and Pentium are registered trademarks of Intel Corporation. © 1999 IBM Corp. All rights reserved.

intel inside
pentium® II

thinkpad.power suit

IBM

ThinkPad® 600

price	power	bytes	media	design
$2,299 to $4,299*	mobile Pentium® II processor 266 to 366 mhz	3.2 or 6.4gb hard drive 32 or 64mb memory	12.1" or 13.3" TFT display cd or dvd, SRS 3-D sound option: port replicator	ThinkPad 600. Light weight and high performance, in a 4.9 lb design statement a mere 1.4" thin.† www.ibm.com/thinkpad or call 800 426 7255, ext. 5038

e-business tools

mortar CompUSA store, but both were consistently undersold by Shopping.com and Buy.com (see "Where to Find Deals and Steals Online," page 56). For example, the Lexmark 5700 Color Jetprinter cost $226 at the Gigabuys site, $4 less at SpotShop.com, $11 less at Shopping.com, and $27 less at Buy.com. On the other hand, CDW wanted $229 for the same printer, while CompUSANet.com and the CompUSA store both charged $230. Those prices didn't include tax or shipping, which for ground delivery ranged from $8 (at CompUSANet.com) to $15 at Shopping.com. Currently, Gigabuys informs you by e-mail of the shipping costs *after* you make the purchase; it promises that it will fix this arrangement by July.

Dell and Gateway are not the only PC vendors expanding their "e-tail" activities. But Compaq, which owns Shopping.com through its AltaVista subsidiary, seems content to keep its store and its PC business separate. Don't expect other computer giants to open their own online superstores anytime soon. "Compaq has been dipping its toe in this, and Acer tried something like it," says Eric Brown, an analyst for Forrester Research. "But I don't think anybody else is going to get into this."

SPOTSHOP.COM is really just NECX in a new Gateway guise.

For the two mail-order stalwarts, their new online stores mean new revenue streams at a time when PC margins are shrinking. And both companies have a large following of consumers who are willing to buy online and are probably in the market for PC-related products.

Nonetheless, both Dell and Gateway have their work cut out for them. Dell's store does simplify the upgrade process for owners of its systems, and both stores offer a respectable selection of products at competitive (if not rock-bottom) pricing. Like the song says, you better shop around.

—Yardena Arar

Snoopware: For Bosses Who Like to Watch

IT'S BAD ENOUGH that your bosses can read your e-mail. (You knew they could, right?) Now a new generation of software lets them keep a running record of virtually everything you do on your PC.

WinWhatWhere Investigator (www.winwhatwhere.com) and BlueWolf Network's Prudence (www.bluewolfnet.com) are just the latest incarnations of snoopware, a rapidly growing genre of software that ostensibly was designed to combat corporate espionage and employee malfeasance. But while these programs may in fact serve a legitimate business purpose, they may also be illegal.

ELECTRONIC STAKEOUTS

THE LATEST programs do more than keep track of your typing (so-called keystroke loggers have been around since the early eighties). Once installed on your system, Investigator and Prudence keep a running record of the files and applications you open, the menu items you click, and your browser's history and bookmarks, as well as logging your keystrokes; then they send all this info to your network administrator.

Why would companies impose this kind of surveillance on employees? According to security expert Winn Schwartau, insiders commit 60 percent of corporate computer crime. Snoopware can sniff out such miscreants. Or let's say an outsider forges an e-mail threat to the company president in your name (it's easy to do). If your company is using snoopware, it'll know you're innocent.

But these utilities could run afoul of a section of the U.S. Code that prohibits the "interception of wire, oral, or electronic communications." If employers use snoopware without notifying employees, they may be violating this law. While both Investigator and Prudence can be configured to warn PC users, neither does so by default. One way to find out if you're being watched: Hit **<Ctrl>-<Alt>-<Del>** to call up the list of currently active applications. If snoopware has been installed on your PC, you'll catch it red-handed.

—Andrew Brandt ▶

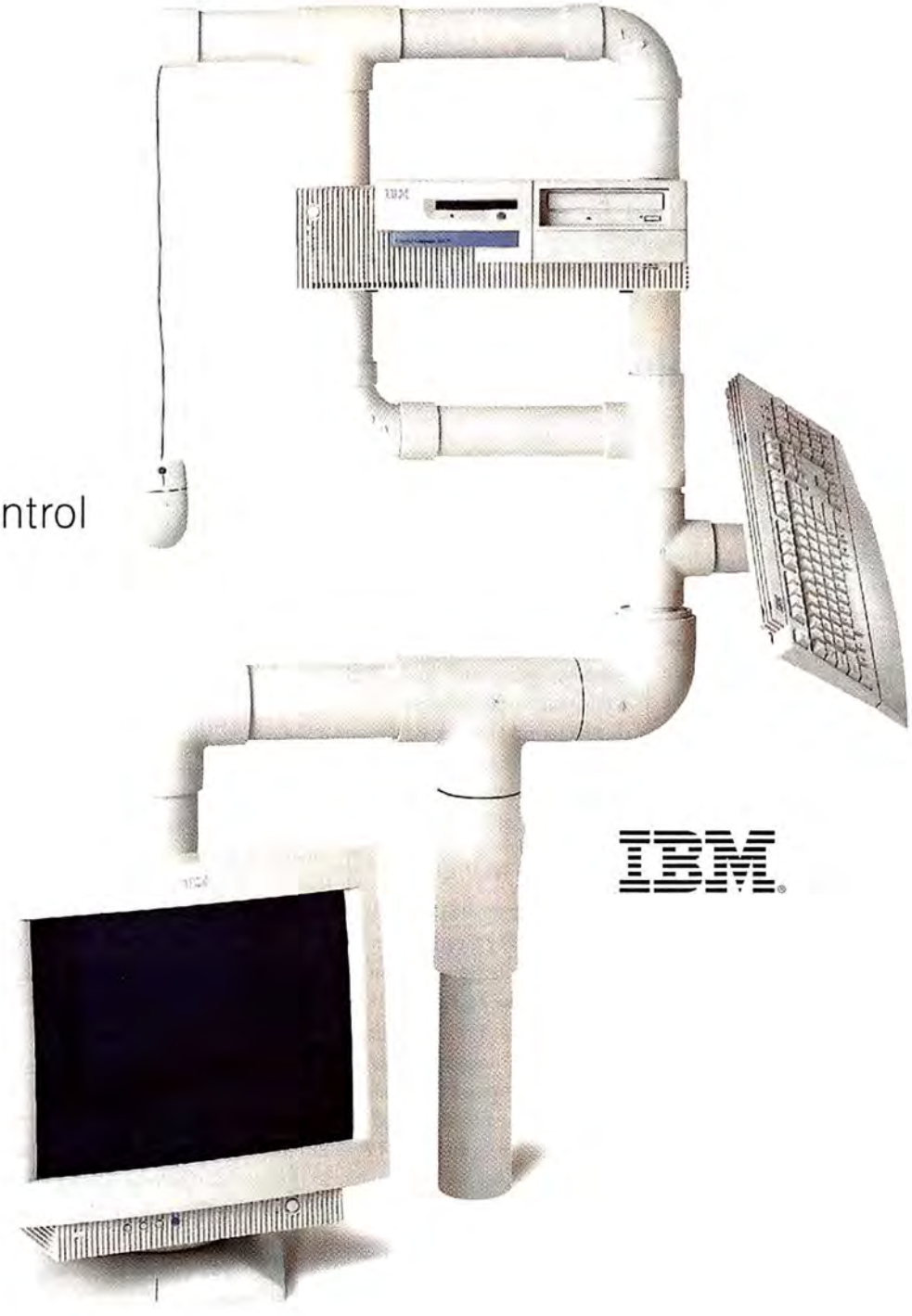
ILLUSTRATION: JEFF BERLIN

PC 300PL

price	specs	options	control
from $1,358*	Pentium® III processor (up to 550mhz) 3D AGP graphics (up to 8mb) up to 768mb memory / 20.4gb hdd integrated ethernet & audio	zip drive / cd rom 19" G96 monitor (17.9" viewable)	Imagine PCs you control from virtually anywhere – over the network or the Web. PCs that integrate easily into your enterprise management software. PCs with time-saving features like LANClient Control Manager. It's the IBM 300PL. It's the ultimate in remote control. www.ibm.com/ibmpc 1 800 426 7255, ext. 4130

e-business tools

remote control



IBM

intel inside

pentium® III

*Estimated reseller price for model 6862-29U (CPU) and 654102N (monitor). Actual prices may vary. MHz denotes microprocessor internal clock speed; other factors may affect application performance. GB = 1 billion bytes for hard drive capacity. All PCs in this ad ship with an operating system. IBM product names are registered trademarks of International Business Machines Corporation. Intel, the Intel Inside logo and Pentium are registered trademarks of Intel Corporation. © 1999 IBM Corp. All rights reserved.

THE GOBI Computers System (right) and InterSquid's Basic Model.

Warning: Free PCs Not as Cheap as You Think

A FREE LUNCH? Well, maybe. What about a free PC? That offer has surfaced in recent months. In fact, at least five companies plan to offer what appear to be sub-$30 PCs. *PC World* took a hard look at some of these offers, and guess what? There's still no such thing as a free PC—but there are some deals to consider.

Almost every company "giving away" a PC requires you to buy Internet access from it for three or four years—often at a slightly inflated price. In most cases, you shell out about $900 to $1000 over three years or so and get both the computer and Internet service. One company—Free-PC—plans to offer free PCs with no service-contract strings attached, but your screen will be cluttered with annoying advertising.

FREE FOR A FEE

YOU HAVE to do some math to figure what you'd ultimately pay for an Internet-supported PC. Take the monthly fee, subtract what you'd expect to pay for an ISP—say, $20 a month—and multiply the remainder by the number of months you must subscribe. Then add any fees and shipping costs.

You may incur another cost by committing to an ISP for several years. If an ISP grows too fast or loses key personnel, its service can suffer. Moreover, you could be locked into 56-kbps modem service while your neighbors enjoy much faster cable access.

MIXED REVIEWS

WE TESTED TWO ISP-provided PCs—Gobi Computers' System and InterSquid's Basic Model—and we saw a demonstration of the Free-PC, the only advertisement-supported model announced at press time. Because all three products are either brand-new or not yet shipping, we couldn't test the vendors' service and support or the quality of their Internet access. Our conclusion: These PCs have attendant risks, but if you're short of cash, you can get a worthwhile bargain in a low-end home machine.

Gobi charges $75 for start-up and shipping fees, plus $26 a month for Internet access, and requires a three-year commitment. That adds up to $1011. But if you figure you'd probably spend $20 a month for access in any case, the real hardware cost is more like $291 over three years.

> Though adequate for some homes, these systems make no sense for offices.

And the Gobi handled itself surprisingly well. Its PC WorldBench 98 score of 154, though nothing to e-mail home about, is more than acceptable for a Celeron-300 system. In fact, the Gobi came in just ahead of Emachines' Etower 366i, a $738 Celeron-366 system (for details, see "How Low Can They Go? The Best PCs for Under $1000," page 114).

The Gobi you get is likely to have a faster processor than ours. After we'd tested the machine, the company announced that it was switching over to Celeron-333s. Gobi adds its own active desktop-based interface over Windows. Boot up, and you'll get wallpaper with links to popular sites; a help button; and a HotBot-based search field—nice for novices but annoying for experienced users who already know where they want to go. This desktop has one major problem: The optional wallpaper is designed for screen resolution of 1024 by 768 (Gobi's default), but viewed on the Gobi's 15-inch screen, that setup can be hard on the eyes.

The InterSquid Basic Model costs $30 a month for 30 months of access. Add shipping and handling charges, and you wind up paying $400 just for hardware. And judging from the review unit we tested, the system isn't worth it. We found the machine to be badly designed, flimsy, and rather slow. This Celeron-333 system scored 144 on PC Worldbench 98, not keeping pace with the Gobi despite its faster processor. Inter- ▶

PHOTOGRAPH: MARC SIMON

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A key to the success of LG Electronics is the company's ability to leverage its huge research and development capabilities in one area to produce quality products in another. This research is carried out daily at 25 R&D facilities around the world, where engineers and scientists crank out a string of advances in liquid crystal displays, audio and video systems, multimedia products, and a host of other areas.

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Microworkz Computer has plans to offer a low-priced Webzster Jr. system (which was not available for testing). When fully configured it will run you about $300, after you deduct the cost of a year of included Internet access. (For more about Microworkz, see *On Your Side*, page 35.)

GOOD DEALS AND BAD

OTHER COMPANIES with free offerings didn't have systems ready for us to sample. Both Simple Solutions and DirectWeb keep their monthly price at $20 (at least for their low-end systems) and hope to make a substantial portion of their income from electronic commerce and advertising.

If you want the whole Simple Solutions Enchilada, you have to pay for the company's Internet service for four years. DirectWeb doesn't ask you to subscribe for a set period of time, but if you hold on to the system for 36 months, you get to keep it. You can cancel your subscription whenever you want by returning the computer. And at the end of three years, you can buy the computer by forfeiting the otherwise-refundable $150 deposit.

ADVERTISING OVERLOAD

WHILE SOME free PCs subject you to advertising, only the Free-PC beats you over the head with it. Granted, you don't pay a dime for your Free-PC—it even comes with 30 months of free Internet access. The company hopes to make a profit by selling ads. In addition, you must provide personal information to the vendor in order to qualify for its largesse.

The PCs are given away through a lottery, so you may or may not get one. If you do win a Free-PC, you'll find nearly a third of the screen occupied by thick bands filled with blinking, ever-changing ads. Even when you're offline, working in your word processor, the busy screen looks like a garishly overdone Web site.

Like the Gobi, the Free-PC defaults to 1024 by 768 resolution. As a result, it renders text and images too small for you to view comfortably on the provided 15-inch monitor. But unlike the Gobi, the Free-PC doesn't let you change this setting. In fact, you're not permitted to do a lot of things on the Free-PC. You can violate the customer agreement by reinstalling your operating system, by partitioning your hard drive, or by using your computer for less than 10 hours a month.

Free-PC received over 1 million applicants for the first 10,000 systems, which are slated to ship in early June to winners of its lottery. The company expects to offer more PCs later this year, increasing your odds of getting one.

Free-PC is one of the few companies with free offerings that provides a name-brand machine. At press time, the company planned to give away Compaq systems based on Cyrix's 333-MHz M II chip.

GIFT HORSE?

IF YOU NEED a second PC in the house, primarily for Internet access and word processing, a solid ISP-supported system such as the Gobi is worth considering. These PCs generally have basic support policies and full warranties similar to those of systems acquired in more traditional ways. The vendors also act as your ISP and handle support issues.

These systems make no sense for an office, where you probably already have Internet access—maybe with something faster than a modem—and don't need to pay a separate monthly fee to connect one system over the phone lines. And with a few higher-priced exceptions, such systems are too slow to make good gaming machines.

Offers of "free" PCs are alluring, and in some cases, the temptation is worth acting on. But be sure to check the fine print, and do the math.

—Lincoln Spector ■

FREE PCs TEST REPORT

Stuck in the Slow Lane

	SYSTEM [1]	CPU	RAM (MB)	PC WorldBench 98 score
Free	Gobi Computers System	Celeron-300	32	154
Free	InterSquid Basic Model	Celeron-333	32	144
Inexpensive	Acma A333 ($798)[2]	Celeron-333	64	172
Inexpensive	Emachines Etower 366i ($738)[2]	Celeron-366	32	153
	Average of 3 desktops	Celeron-333	32	162

TEST PC WORLD CENTER **HOW WE TEST** All systems are tested with PC WorldBench 98, *PC World*'s application-based benchmark. A higher PC WorldBench 98 score is better. For details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing). Data based on testing conducted by the PC World Test Center. All rights reserved. [1]All systems include 128KB of L2 cache. [2]One of the two lowest-cost systems reviewed in "How Low Can They Go? The Best PCs for Under $1000," page 114.

What You Get for Nothing

SYSTEM [1]	Start-up/ monthly cost	Length of agreement (months)	Total cost	Computer cost [2]	CPU/RAM (MB)	Hard drive (GB)	CD-ROM drive speed
DirectWeb Basic [3] www.directweb.com	$215/$20 [4]	36	$935	$215	Celeron-333/64	6.4	32X
Free-PC www.free-pc.com	$0/$0	30	$0/$0	$0/$0	Cyrix M II-333/32	4 [5]	32X
Gobi Computers System 888/937-4624 www.gobi.com	$75/$26	36	$1011	$291	Celeron-333/32	3.2	40X
InterSquid Basic Model 877/724-3733 www.intersquid.com	$100/$30 [4]	30	$1000	$400	Celeron-333/32	4.3	40X
Simple Solutions Enchilada www.enchilada.com	$99/$20 [4]	48	$1059	$99	AMD K6-2-300/32	3.2	24X

[1] All systems include a 15-inch monitor.
[2] After subtracting cost of typical Internet service ($20 a month).
[3] Specifications still in flux at press time.
[4] Higher-end configurations available at higher monthly fees.
[5] Only 2GB available to user.

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- GCS-200 Speakers by Cambridge SoundWorks
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The Network Hits Home

Until recently, "networking" was a word heard more often in high-rise data centers than ground-floor family rooms. It implied the necessity to master a complex, often confusing mix of hardware and software. But that's changing. Small-business owners are discovering, to their great satisfaction, that networking can help them transform their home office into a high-efficiency enterprise.

Today, of the 42 million homes that have PCs, nearly 18 million own two or more, twice as many as only two years ago. By the year 2003, analysts predict that number will rise to 28 million.

"Home networks make sense," says Jim Balderstom, an industry analyst at Zona Research in Redwood City, Calif. "As more homes start to add second and third PCs, and prices decline to $100 or so per networked PC, the technology's success is guaranteed."

CONSUMERS AND AT-HOME WORKERS ARE QUICKLY DISCOVERING THE BENEFITS OF NETWORKS THAT TRANSFORM THE HOME INTO THE ELECTRONIC COTTAGE OF THE FUTURE

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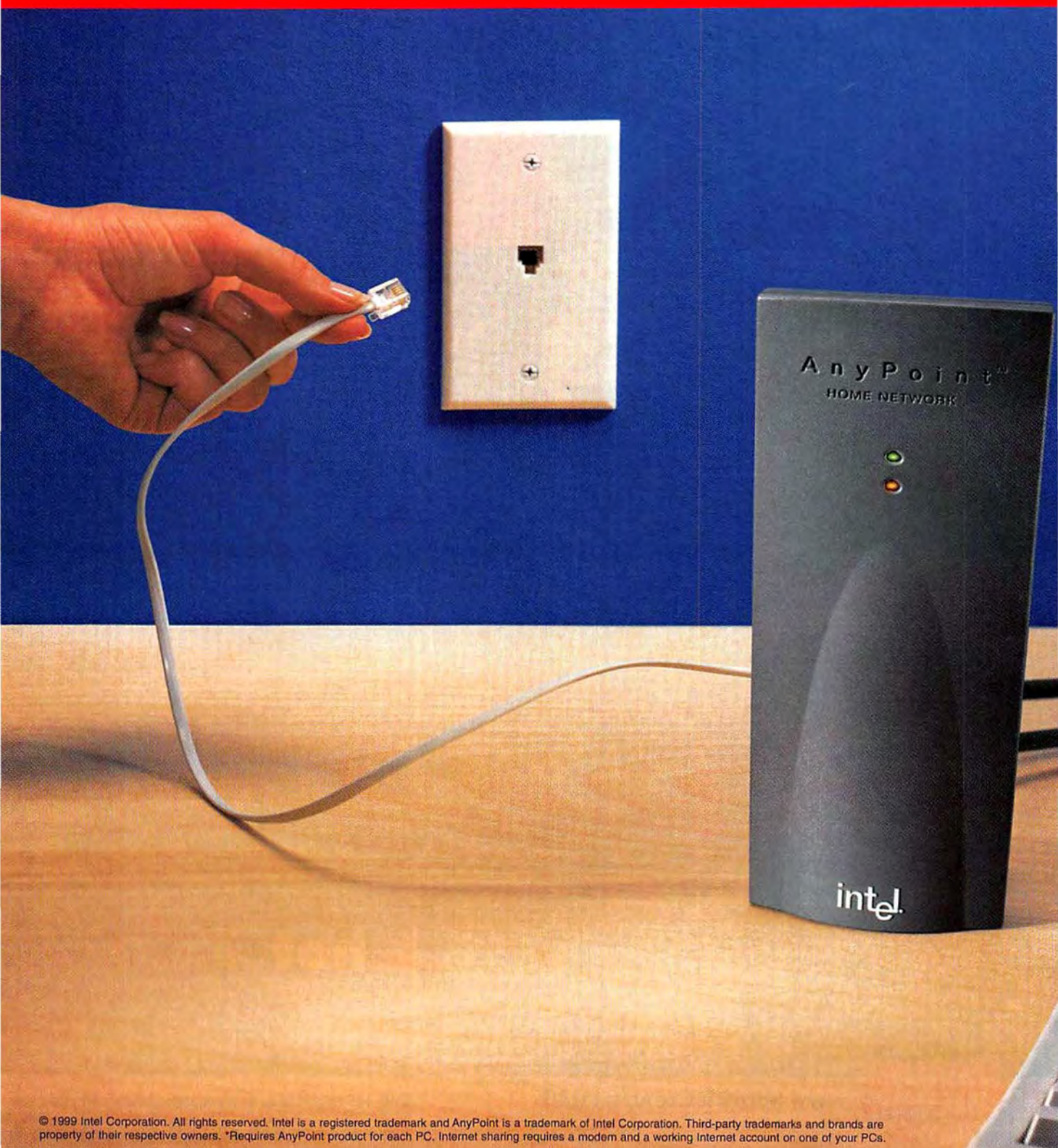

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The Network Hits Home

"Home networks make sense."

—Jim Balderstom, Zona Research

Today's techno-savvy home has plenty of computer equipment to network. Printers, files, back-up storage, drives, scanners, and Internet Service Providers can all be shared using one of the latest networking technologies geared toward the home user.

For example, Intel Corp.'s $189 AnyPoint Home Network starter kit provides two parallel-port adapters that do not require you to open the PC's case. Another version connects multiple machines using internal PCI cards. Both AnyPoint versions use your home's existing phone lines, eliminating the need to drill holes and run cables.

"We have a vision of a billion connected computers in the next decade," says Mark Christensen, vice president and general manager of Intel's Network Communication Group.

While Intel's system builds on your existing equipment, Compaq Computer Corp. literally delivers a total solution. Its home network in a box consists of two ready-to-network Presario desktops ready to plug into your existing phone lines. Compaq uses Tut Systems Inc.'s phone-based technology, which, like Intel's technology, adheres to a "no new wires" standard.

Intel's research reveals that 86% of U.S. households with multiple PCs also have Internet access. What's more, someone in the household is online an average of 14 hours each week, most often between the hours of 6 p.m. and 10 p.m. Those kinds of peak-use periods drive the rising interest in innovative and practical home networks.

"Consumer are hungry for home network product information," says Mike Komar, vice president of operations at IPX Motherboards and Upgrades of Mesa, Ariz., and former product tester for *InfoWorld*. "The more information that becomes available about home networking, the more they want."

And for good reason. When you own more than one PC, a network gives you the same benefits, convenience, and efficiency that you have at the office. "People have really bought into home computing," Komar states. "The next logical step is making all the home's devices talk to each other. Networks really are the next Big Thing. It's all about connectivity."

HOME ALONE

Like a commercial network, a home network connects computers and peripherals so all devices can communicate with each other. Unlike commercial networks, however, home networks can also link your PC to your security system, climate control, and entertainment systems. As with all innovations, the technology must deliver sustainable and clear benefits.

Mining on MindSpring

WHEN RESEARCHING ANY NEW TECHNOLOGY, you need quality information to make an informed purchasing decision. With three classes of home network systems to choose from—phone line, power line, and wireless—how can you select the one that's right for you?

Some of the best information on home networks is available on the Web. We began our product search on MindSpring (www.mindspring.com), a leading Internet service provider (ISP) and portal. MindSpring's search engine led us to HotBot (www.hotbot.com) and the Mining Company (miningco.com) and ultimately provided links to informative articles in several computer magazines.

If you decide that you want a telephone wire-based system, visit the site maintained by the Home Phoneline Networking Alliance (www.homepna.org), an association of companies working to develop a standard phone line networking standard.

One of the more innovative uses for home networks comes from an alliance of British computer maker ICL and Electrolux. Their technical alliance has resulted in a smart refrigerator that will know when you have run out of ice cream, skim milk, tofu, or any other refrigerated food.

An ICL company spokesman says the refrigerator will call, via a dial-up ISP, a local supermarket who will offer to restock the refrigerator.

Some of those benefits include:

Your work notebook or laptop can double as a second workstation, synchronizing files with your primary desktop machine. A home network is the fastest way to transfer files from your desktop PC to the notebook before you leave or when you return from a trip.

Your Mac and Windows PC can finally make peace. One of the great things about networks is that they can transmit just the data and eliminate the need to worry about disk formats.

You can resurrect that dinosaur of a PC you've been using as a doorstop. With a network, an older 486 or even (gasp) a 386 can share the resources of a newer computer. Once networked, you are no longer limited by the old PC's small, antiquated hard disk. You can save your files directly to the new machine. You can also use the CD-ROM drive on the new PC to install software on the old PC.

Children of any age can play popular head-to-head multiplayer games like Quake and Rainbow6. "I didn't network to play games," admits C.G. Willis, vice president of Walker Mortgage. "But now that we can, it's plenty of fun." Willis' primary use for his home network is to link his desktop and laptop computers. "I can work at home without having to carry a bunch of floppies around in my pocket. It's a huge timesaver," he says.

It's easy. There's no need to run category 5 cables throughout the building as required for commercial networks. New technologies simplify the process of wiring a network by either using the home's existing phone wiring or radio frequency-based wireless products. Working within the familiar Windows interface, the best home network options are simple and straightforward to set up, automatically configuring printers and drives after asking you a few simple questions.

You never again need to worry about someone else in your home logging in before you do. Home networks can share Internet access through a single dedicated phone or ISDN line. Higher-speed in-home networks can support applications such as multiple broadband Internet connections, software and computer peripheral sharing, IP telephony, and high-quality digital audio/video streaming throughout the home.

HOME CONNECTIONS

With the next generation of home networks, every digital/electric device in your house can be connected. Komar's own home network currently links his home-office PC, laptop, telephone, and cable TV. Through a service offered by his local cable company, Komar's home phone and Internet connection are piggybacked onto his existing cable line. Soon, he hopes to add his security system, stereo, lighting, and appliances.

Balderstom sees a time when home networks will use the Internet to exchange a variety of data from medical-monitoring devices, appliances, air conditioners, smart appliances, and many more. "Before that happens, we need to reach a critical mass in persistent, high-speed access into the home, as cable modems and ADSL provide."

Komar agrees. "One major benefit of home networks is how just one wire allows multiple users to share multiple devices," he says. "It delivers speed and convenience at a low cost. It is a new essential for the home office. Period." ■

Howard Millman (hmillman@ibm.net) maintains, networks, and designs computer systems that help clients achieve the maximum return on their automation investment.

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Digital Creativity Imaging Center[3]	Home Phoneline Networking PC Card[5]
10 Mbps Ethernet Port, Cable Modem Ready[6]	Read/Write CD-ROM (4X/2X/24X)[4]
Read/Write CD-ROM (4X/2X/24X)[4]	Microsoft Featured Home Collection + MS® Word
Microsoft® Office 2000 Small Business Edition*	Microsoft Windows98
Microsoft Windows®98	Compaq CV715 17" Monitor (15.9" VIA)
Compaq V910 19" Monitor (18.0" VIA)	
$2999‡ As low as $102 per month†	**$2499**‡ As low as $85 per month†
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256 MB SyncDRAM: Add $300	Altec Lansing ADA 310 Speakers: Add $119
Hughes Full DirecDuo Satellite: Add $549	Hughes DirecPC Satellite: Add $349
Diamond Monster Sound MX300 PCI Audio Card & JBL Pro Premium Speakers w/Subwoofer: Add $89	Tripp Lite Internet Office 700 UPS: Add $179[9]

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intel inside
pentium® III

The Compaq Presario 5700T Internet PC with Home Phoneline Networking.

Now everyone in your family can surf the Net from their PCs at the same time, without additional phone lines — and without fighting over who gets to go first. All you need is one of these PCs with Home Phoneline Networking[5]. This exclusive innovation works with your home's existing phone wiring to connect the PCs in your house, so you can share Internet access, printers, even games. Of course, these PCs are also built for speed. And with our 6.0Mb and 1.5Mb Max Digital Modems[5], which work with your 56K dial-up access sources, you can switch to DSL service for lightning-fast surfing as soon as the service becomes available in your area. Plus, these modems together with DSL service will let you talk on the phone while you're online. Add all that to 50 free hours on the Net[4] and you've got the ultimate Internet PC. So call now. And make the living room a safer place to surf.

PRESARIO 5700T-500/3 INTERNET PC	**PRESARIO 5700T-500/3 INTERNET PC**	**PRESARIO 5700T-450/3 INTERNET PC**	**PRESARIO 5700T-450/3 INTERNET PC**
Intel Pentium III Processor, 500 MHz	Intel Pentium III Processor, 500 MHz	Intel Pentium III Processor, 450 MHz	Intel Pentium III Processor, 450 MHz
128 MB SyncDRAM expandable to 384 MB	128 MB SyncDRAM expandable to 384 MB	128 MB SyncDRAM expandable to 384 MB	64 MB SyncDRAM expandable to 384 MB
17.0 GB UltraDMA Hard Drive[1]	17.0 GB UltraDMA Hard Drive[1]	17.0 GB UltraDMA Hard Drive[1]	13.2 GB UltraDMA Hard Drive[1]
6X DVD-ROM Drive[4]	6X DVD-ROM Drive[4]	6X DVD-ROM Drive[4]	6X DVD-ROM Drive[4]
2X AGP Graphics w/8 MB SDRAM	2X AGP Graphics w/8 MB SDRAM	2X AGP Graphics w/8 MB SDRAM	2X AGP Graphics w/8 MB SDRAM
Diamond Monster Sound MX300 PCI Audio Card	Diamond Monster Sound MX300 PCI Audio Card	Creative Labs Sound Blaster™ 1373	Creative Labs Sound Blaster 1373
1.5Mb Max Digital Modem[5]	1.5Mb Max Digital Modem[5]	56K ITU V.90 Modem[2]	56K ITU V.90 Modem[2]
JBL Pro Studio Speakers w/Dual Subwoofers	JBL Pro Studio Speakers w/Subwoofer	JBL Pro Amplified Speakers	JBL Pro Amplified Speakers
Digital Creativity Imaging Center[3]	Digital Creativity Imaging Center[3]	Digital Creativity Imaging Center[3]	Microsoft Featured Home Collection + MS Word
Microsoft Office 2000 Small Business Edition	Microsoft Featured Home Collection + MS Word	Microsoft Featured Home Collection + MS Word	Microsoft Windows98
Microsoft Windows98	Microsoft Windows98	Microsoft Windows98	Compaq CV715 17" Monitor (15.9" VIA)
Compaq CV715 17" Monitor (15.9" VIA)	Compaq CV715 17" Monitor (15.9" VIA)	Compaq CV715 17" Monitor (15.9" VIA)	
$2199‡ As low as $75 per month[†]	**$1999‡** As low as $68 per month[†]	**$1649‡** As low as $56 per month[†]	**$1449‡** As low as $50 per month[†]
Read/Write CD-ROM (4X/2X/24X):[3] Add $199	Read/Write CD-ROM (4X/2X/24X):[3] Add $199	Iomega Zip Built-In™ Drive with 1 Disk: Add $79	128 MB SyncDRAM: Add $120
Compaq V910 19" Monitor (18.0" VIA): Add $200	Compaq V910 19" Monitor (18.0" VIA): Add $200	Home Phoneline Networking:[5] Add $49	17.0 GB UltraDMA Hard Drive:[1] Add $50
Hughes DirecPC Satellite: Add $349	6.0Mb Max Digital Modem:[5] Add $50	Tripp Lite Internet Office 280 UPS : Add $79[6]	Iomega Zip Built-In™ Drive with 1 Disk: Add $79

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NEW PRODUCTS

Lights! Action! PC! Sony's VAIO Digital Studio

DESKTOP PC

YOU'RE POOLSIDE at the Beverly Hills Hotel, thumbing through *Variety* for news about your impending three-picture deal. Your cell phone rings. It's Spielberg. "Babe," he says, "heard you might sign with Miramax. Let's talk."

Okay, so you've never been to Beverly Hills, and Spielberg doesn't know you from Adam Sandler. But that's the kind of Tinseltown fantasy Sony's new VAIO Digital Studio PCV-R526DS ($2199, excluding monitor) is likely to inspire.

Like two other new (but less fancily appointed) Digital Studio midsize towers, the PCV-R526DS brings full-motion digital video editing capabilities to consumers in a stylish, intelligently designed system. We looked at a preproduction unit of the PCV-R526DS.

Processor speed is vital to a multimedia system, and this Digital Studio runs on a powerful Pentium III-500 chip. The CPU, along with 128MB of PC100SDRAM and a 512KB level 2 cache, helped the system rack up a solid PC WorldBench 98 score of 219 (a bit below the PIII-500 average, but still quite fast).

The system's audio and video—bolstered by ATI Rage 128GL 3D video acceleration, 16MB of video SDRAM, Aureal Dynamic 3D surround sound, and a 4X Hitachi DVD-ROM drive—serve up all the crisp, rich, fluid video a movie buff or game fanatic could possibly want.

One quibble: The included Sony SRS-Z050V speakers were too wimpy to provide the kind of rock-your-world surround sound you'd expect to obtain from an entertainment mogul's desktop system.

The PCV-R526DS is among the few PCs we've examined that packs both a DVD-ROM drive and a CD-Rewritable drive. Using the preinstalled Adaptec DirectCD software, you can copy up to 60 minutes of MPEG compressed video—or back up data from the 13GB hard drive—to a CD-RW. It's also possible to duplicate personal copies of audio CDs, but to do so you'll need a utility (not bundled with the unit) such as Adaptec's $99 Easy CD Creator.

The Digital Studio's biggest attraction is that it enables mere mortals to shape raw video footage into their own cinema verité. Sony has done a good job of making digital video editing accessible. For instance, the front bezel of the handsome gray-lavender Digital Studio case conveniently features a four-pin IEEE 1394 port that Sony calls an I.Link. The I.Link supports superfast transfer speeds of up to 400 megabits per second, which means you can quickly copy video direct from any digital camcorder that supports IEEE 1394 to the Digital Studio with virtually no perceptible image degradation.

Once you've transferred the scenes you want from your camcorder to the PC, you can use the straightforward, pre-

VAIO Digital Studio PCV-R526DS

PRO: Jam-packed with digital video editing tools, includes both DVD-ROM and CD-RW drives.

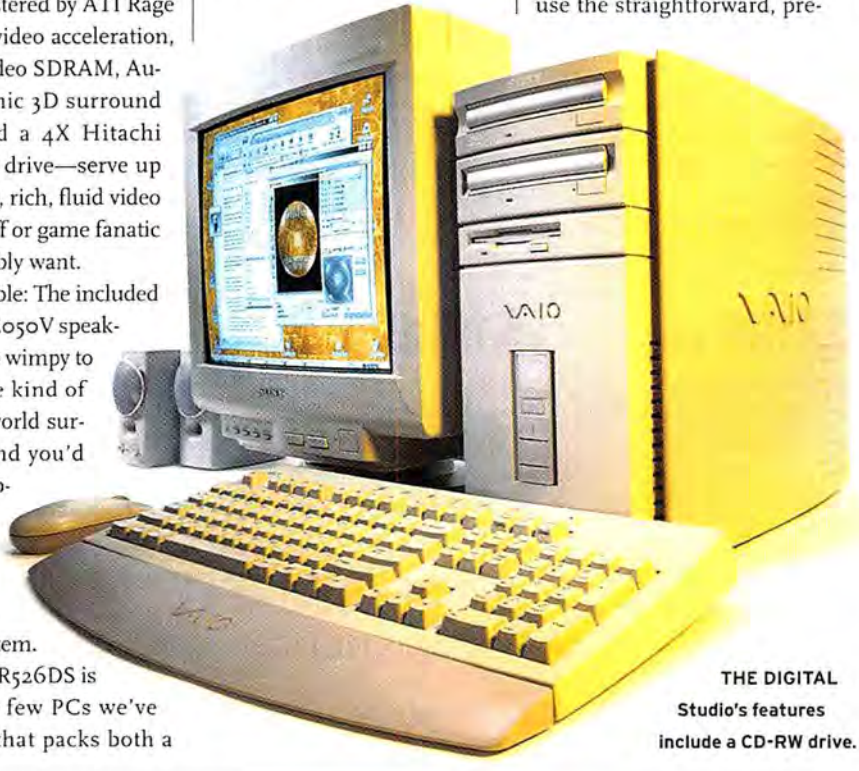
CON: Below-average speed for its CPU class, limited expansion, disappointing speakers.

VALUE: Above average if you're a multimedia or video maven.

List price: $2199, excluding monitor.

Sony Electronics
800/476-6972
www.sony.com/pc

PRODUCT INFO NO. 779



THE DIGITAL Studio's features include a CD-RW drive.

PHOTOGRAPHS: MARC SIMON

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installed Sony applications to edit and compress video and to capture still images.

Sony bundles a limited edition of Adobe Premiere 4.2 with the PCV-R526DS so you can add sound, transitions, and other effects. You also get Sony's Smart Capture software, which enables you to create and send video e-mails, and Smart Connect, for networking two VAIO systems via I.Link ports.

The new VAIO monitors Sony plans to offer for the Digital Studio line weren't available for our review. Instead, the company sent us a Sony Multiscan 200 ES 17-inch display (with 0.25 dot pitch). According to a company spokesperson, this model is identical in quality to the new $349 VAIO CPD-200ES/L monitor (shown in the photograph at left). The Multiscan renders bright, sharp text and graphics and delivers excellent contrast.

Sony earned high reliability scores in our May survey—but its service was rated only fair. Another drawback: While the Digital Studio comes fully loaded, it's not terribly expandable—only two PCI card slots are available. Then again, what does that matter? Once your movie debuts at Sundance, sweetheart, you can buy all the computers you want.

—*James A. Martin*

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Compaq A900
Hewlett-Packard OfficeJet R40
Xerox WorkCentre 480cx

Loaded Multimedia PC at a Budget Price

DESKTOP PC

WHAT'S IN A number? In the case of the CyberMax Enthusiast K2-475, which is built around AMD's K6-2-475 processor, not a heck of a lot.

The preproduction unit we tested—equipped with 128MB of RAM and a 512KB level 2 cache—earned a PC WorldBench score of 176. That's not bad for a budget multimedia system like this—but neither is it any faster than the three systems we've tested that use AMD's K6-2-400 and have similar memory and cache.

But even if the PC's performance doesn't live up to the CPU's clock-speed number (this machine is slower than the average Celeron-400 PC), CyberMax makes up for it by packing lots of powerhouse multimedia hardware into the Enthusiast K2-475. Your $1349 gets you theater-quality video playback and cage-rattling surround-sound audio: The K2-475 has a 4.8X Toshiba DVD-ROM drive, a set of awesome Altec Lansing ADA-305 speakers and subwoofer, Voodoo2 Graphics 3D video acceleration, and Aureal Vortex 2 PCI audio.

If that's not enough hardware for you, you'll find it easy to expand the K2-475, thanks to the roomy, clutter-free interior, and removing the casing is just a matter of unwinding thumbscrews. The Enthusiast also comes with top-notch documentation and a compelling package of CD-ROM reference works and games.

We do have a couple of peeves: The keyboard and mouse are as basic as you can get, and the CyberMax CX750N 17-inch monitor rendered dark, lackluster colors. Overall, if you're looking for a reasonably priced multimedia system and don't have too demanding a standard of performance, the Enthusiast K2-475 might be just right for you.

—*James A. Martin* ▶

ENTHUSIASM: This CyberMax packs hot multimedia hardware.

FOR MORE PRODUCT news and the latest announcements, check out the PC World Daily News Service at www.pcworld.com/news.

CyberMax Enthusiast K2-475

PRO: Inexpensive, well-equipped multimedia system.

CON: K6-2-475 PC is no faster than a K6-2-400; subpar monitor.

VALUE: A good deal, even after you invest a little more to get a more serviceable monitor.

List price: $1349

CyberMax Computer

800/345-8939

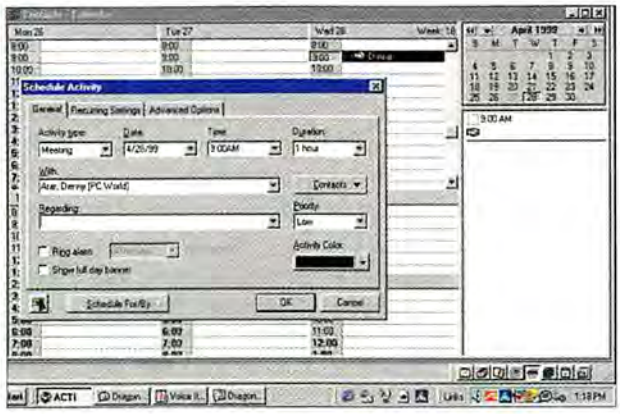
www.cybermaxpc.com

PRODUCT INFO NO. 780

You Can Tell NaturallyOrganized What to Do

SPEECH RECOGNITION

I WISH I HAD my own personal Jeeves to organize my working life—someone who could schedule meetings, write e-mails, and create to-do lists whenever I say so. Along comes Dragon's NaturallyOrganized, a pocket voice recorder and voice recognition software bundle that goes way beyond plain-old dictation and actually helps perform those utterly mundane daily tasks.



AFTER NATURALLYORGANIZED transcribes your recordings of action items, it can actually execute each item in the appropriate application.

Here's how it works: Wherever you are, you dictate action items—"send e-mail to Dan regarding department meeting," "schedule meeting with Susan next Friday at 4 p.m.," "here's a new contact"—as well as regular text documents into the recorder. Back at your desk, you connect the recorder to your PC via Dragon's serial link cable. The bundled Voice It Link software then transcribes and sorts your recordings directly into a set of editable action items. The catch: Voice It Link works only with Symantec's Act personal information manager (not included)—not with any other PIM. After you preview, correct, and approve the list, the tasks are automatically sent to Act's calendar, contacts database, to-do list, or e-mail program.

NaturallyOrganized requires a Pentium-200 or faster PC, 64MB of RAM (or 96MB if you're running Windows NT 4.0), and 250MB of hard drive space. The $299 package also includes Dragon's NaturallyMobile recorder, along with the NaturallyOrganized and NaturallySpeaking software.

I dictated into the recorder at the office, outside, in a cab, and on an airplane. At first, accuracy was a little spotty, regardless of the environment. But with continued use, NaturallyOrganized became more and more adept at recognizing the kind of item I was dictating, be it e-mail, a calendar entry, or a note.

Dragon promises a version, probably available by the time you read this, that works with Lotus Notes, Outlook, and other PIMs and e-mail programs. Meanwhile, I'm still waiting for a better Jeeves—one who's a quicker learner.

—Aoife McEvoy

Dragon NaturallyOrganized

PRO: Turns dictation into executable tasks, good accuracy.

CON: Works only with Act 4.0 PIM, accuracy is slow to develop.

VALUE: Voice-activated assistant helps you with daily tasks when you're working remotely.

Street price: $299

Dragon Systems

800/437-2466

www.dragonsys.com

PRODUCT INFO NO. 781

ViaVoice Takes the Typing out of Online Chat

SPEECH RECOGNITION

IF YOU'RE A chat room fanatic who's tired of typing furiously to keep up with the flow, IBM's ViaVoice Online Companion might be worth a try. For $20, you can give your weary hands a break from the keyboard and literally talk with other chatters.

As the name suggests, the Online Companion works with Big Blue's ViaVoice family of voice recognition products—the ViaVoice 98 Home ($89), Office ($129), and Executive ($149) editions. If you already have one of these packages installed and trained properly, you don't need to do any additional preparation.

After some initial installation problems, I got my headset and the mike connected. Then Online Companion let me yammer away in Yahoo Chat and on America Online with ease. Once I was in the chat area's message field, I simply said "dictate directly" and then started "talking" to my newfound online pals.

Voice-to-text accuracy was pretty good, especially with brief messages. As with the regular edition of ViaVoice 98, I could correct misrecognized words on the fly by saying "Show correction window" and then dictating or typing the correct spelling. After finishing my dictation, I clicked Send—or in the case of AOL, I simply said "send"—and my message appeared immediately in the chat room. To other chat room participants, my messages looked as if I'd entered them on a keyboard.

Online Companion is optimized to let you dictate e-mail using Netscape Navigator, Microsoft Internet Explorer Outlook Express 98, and AOL—another plus. At $20, it's a good deal for online chatters.

—Aoife McEvoy ▶

ViaVoice Online Companion

PRO: Cheap add-on program can speech-enable your chat room conversations and enhance your e-mail dictation capabilities.

CON: Works only with ViaVoice.

VALUE: Speech-recognition and chat-room enthusiasts will love the voice bonus.

Street price: $20

IBM

800/825-5263

www.software.ibm.com/speech

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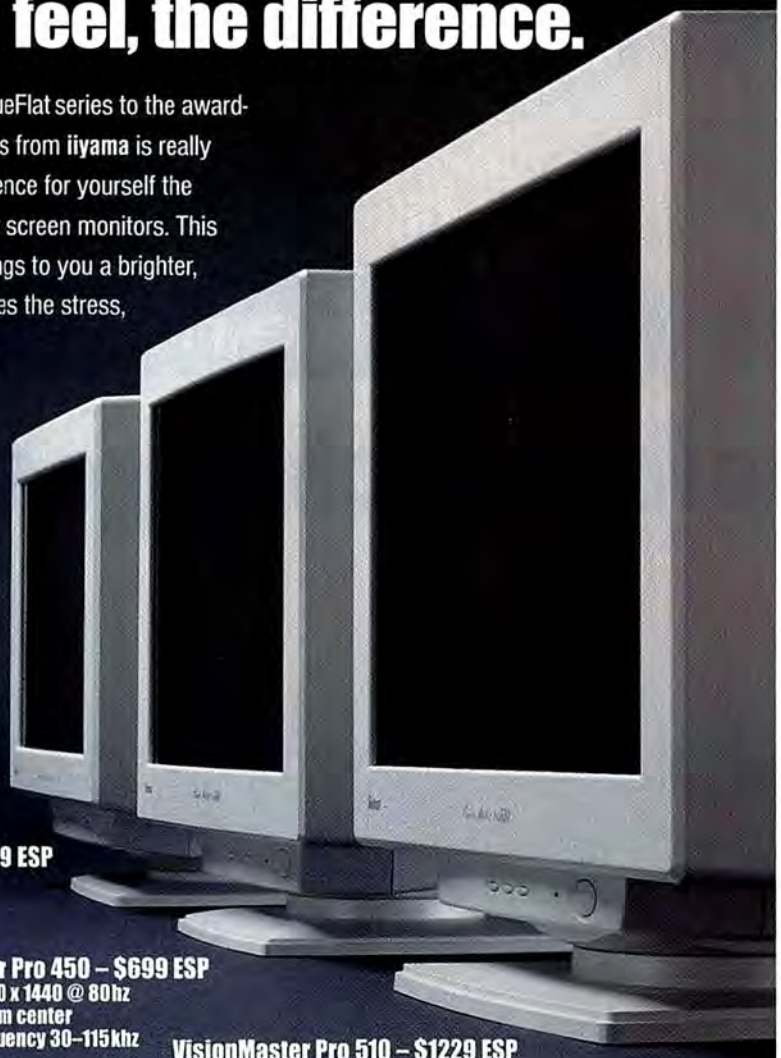
The addition of the TrueFlat series to the award-winning family of monitors from **iiyama** is really something to see. Experience for yourself the benefits of these new, flat screen monitors. This advanced technology brings to you a brighter, sharper image that reduces the stress, and strain, on your eyes. With amazing refresh rates, the resolution will provide you with unparalleled viewing performance. Add to this the TCO '99 certification and you'll know why the TrueFlat series of monitors from **iiyama** can make the difference.



VisionMaster Pro 410 – $469 ESP
Resolution 1600 x 1200 @ 75hz
AG pitch 0.25mm center
Horizontal frequency 27–96khz

VisionMaster Pro 450 – $699 ESP
Resolution 1800 x 1440 @ 80hz
AG pitch 0.25mm center
Horizontal frequency 30–115khz

VisionMaster Pro 510 – $1229 ESP
Resolution 2048 x 1536 @ 80hz
AG pitch 0.25mm center
Horizontal frequency 30–130khz

	CRT Monitor Model/ Viewable Area	TCO	Dot Pitch/ CRT Type	Max. Horizontal Scan Rate	Max. Resolution	Est. Street Price
22"	**VisionMaster Pro 510** (20.0" VIS)	TCO '99	0.25mm/AG	130khz	2048 x 1536@80hz	$1229
21"	**VisionMaster Pro 502** (19.5" VIS)	TCO '95	0.28mm/AG	110khz	1800 x 1440@75hz	$999
	VisionMaster Pro 501 (19.5" VIS)	TCO '95	0.28mm/AG	96khz	1600 x 1200@75hz	$939
	VisionMaster 502 (19.5" VIS)	TCO '95	0.22mm/H	110khz	1800 x 1440@75hz	$999
19"	**VisionMaster Pro 450** (18.0" VIS)	TCO '99	0.25mm/AG	115khz	1800 x 1440@80hz	$699
	VisionMaster 450 (18.0" VIS)	TCO '95	0.22mm/H	102khz	1600 x 1200@80hz	$559
17"	**VisionMaster Pro 410** (16.0" VIS)	TCO '99	0.25mm/AG	96khz	1600 x 1200@75hz	$469
	VisionMaster Pro 400 (16.0" VIS)	TCO '95	0.25mm/AG	96khz	1600 x 1200@75hz	$399
	VisionMaster 400 (16.0" VIS)	TCO '95	0.26mm/dp	96khz	1600 x 1200@75hz	$379
	S702GT (16.0" VIS)	TCO '95	0.28mm/dp	96khz	1280 x 1024@85hz	$299
15"	**VisionMaster 350** (13.7" VIS)	MPR-II	0.28mm/dp	69khz	1280 x 1024@65hz	$219

	TFT/LCD Monitor Model	TCO	Pixel Pitch	Max. Horizontal Scan Rate	Max. Resolution	Est. Street Price
14.1"	**Pro Lite 36a** (with OSD)	TCO '95	0.297mm	62.5khz	1024 x 768@75hz	$839
15.0"	**Pro Lite 38a** (with OSD)	TCO '95	0.297mm	62.5khz	1024 x 768@75hz	$1079
	Pro Lite 38b (with OSD, USB & Speaker)	TCO '95	0.297mm	62.5khz	1024 x 768@75hz	$1129
15.4"	**Pro Lite 39a** (with OSD, USB & Speaker)	TCO '99	0.2385mm	80khz	1280 x 1024@75hz	$1999
18.1"	**Pro Lite 46a** (with OSD, USB & Speaker)	TCO '99	0.2805mm	80khz	1280 x 1024@75hz	$3329

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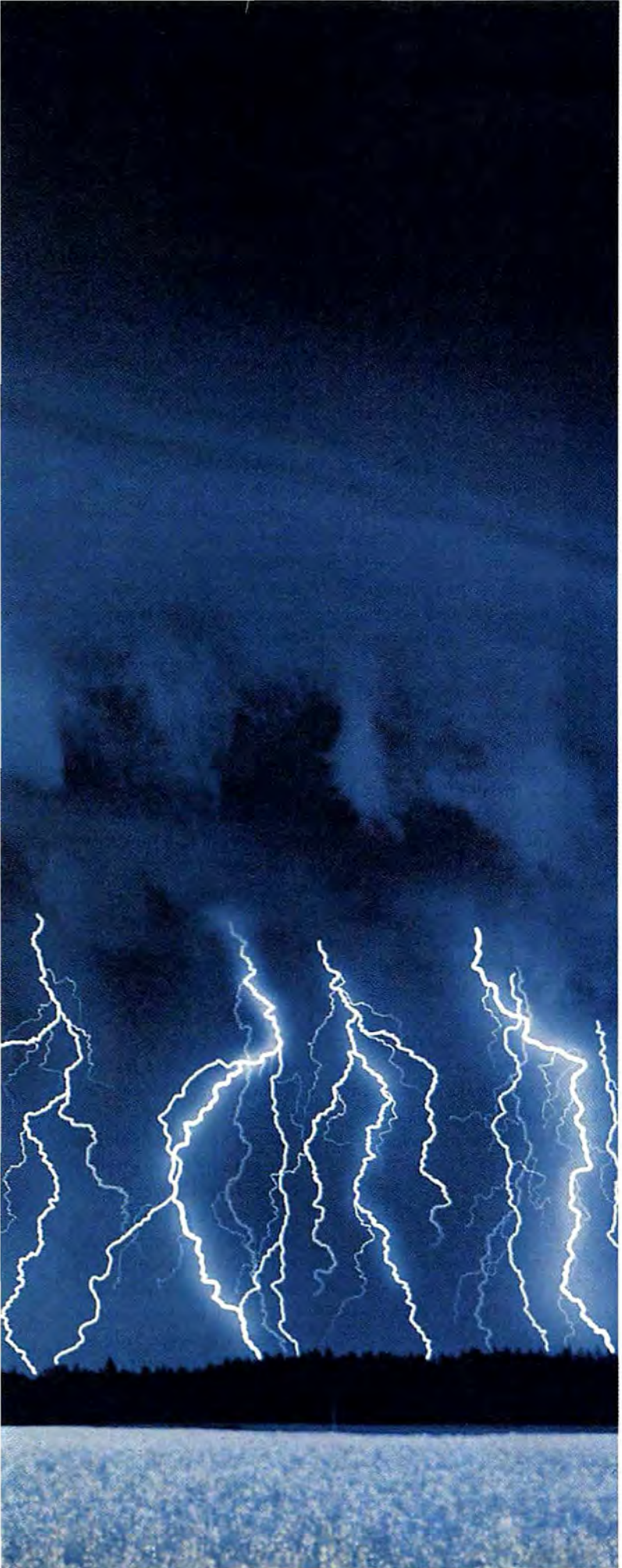

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Kingston and PowerLeap Boost PC Power

CPU UPGRADES

REPLACING THE processor has long been one of the best ways to give tired, two- to three-year-old PCs a power boost. New Plug and Play CPU upgrades from Kingston Technology and PowerLeap may make the process more viable than ever for some users.

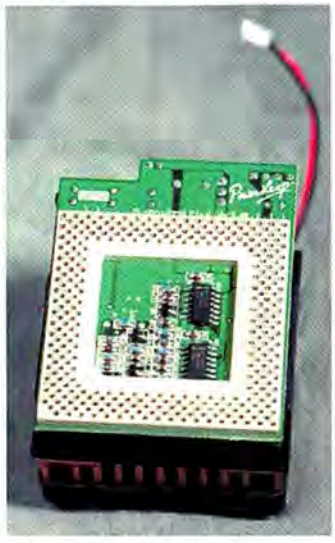
I tested a shipping version of Kingston's $249 **TurboChip 366** and a prototype of the $349 **PowerLeap K6-III**. Both use AMD processors—the Kingston a 366-MHz K6-2, the PowerLeap a 400-MHz K6-III. The price gap is due not to the small clock-speed difference but to the fact that the K6-III has a 256KB internal cache that runs at the same 400 MHz as the CPU.

Each of the two modules is slightly thicker than the original processor. Each adds circuitry to the CPU that eliminates the need to change motherboard jumpers for voltage and clock multipliers. Both also have built-in fans to cool the chips.

The upgrades are designed for PCs running Pentium, AMD, or Cyrix processors with clock speeds of at least 166 MHz. They work only with processors that fit into standard Socket 6 or Socket 7 motherboards, which means you can't upgrade a Pentium II–based system.

I started out with a two-year-old, home-built PC based on a Pentium-166. I've upgraded it occasionally, boosting the RAM to 64MB, adding a new SCSI hard drive, and upgrading the graphics card. Before trying the CPU upgrades, I ran PC WorldBench, which yielded a modest score of 79.

The Kingston TurboChip 366 was a breeze to install. I removed the existing Pentium-166, plugged in the TurboChip, and hooked up power to the fan. When I booted the PC, everything worked normally. I ran PC WorldBench again, and the score rose to 122—a 38 percent improvement, but still a lot lower than the average of 169 recorded by AMD K6-2-350 systems we've tested. (PCs based on the AMD K6-2-366 weren't available for testing.)



THE POWERLEAP K6-III CPU upgrade boosts PC performance.

I then removed the TurboChip and plugged in the PowerLeap. When I turned on the PC, I was greeted by the unmistakable stench of overheated electronics. The PowerLeap had burned out. The company said the prototype I tested did not have finished power-regulation circuitry, and sent me a second one. It worked, but I had to upgrade my BIOS first. I also had to install a utility to switch on the K6-III's performance-boosting write-enable feature (a step the Kingston doesn't require).

After rebooting, I ran PC WorldBench and got a score of 159—nearly double that of the original Pentium-166, and 24 percent better than the TurboChip 366. By comparison, seven off-the-shelf K6-III–based PCs averaged 187.

Should you consider upgrading with one of these chip modules? It depends on your PC. Although each module should work with most systems, it's wise to check Kingston's and PowerLeap's Web sites to see if your PC and motherboard are compatible with the upgrade chips. In most cases, the vendor will recommend that you upgrade your BIOS (which could also help with Y2K compatibility)—usually a simple matter of downloading and running an installation file from your PC maker's Web site.

If you've never upgraded your old PC's RAM, graphics card, or hard drive, the upgrade chips could be hobbled by your old, slow components. But if you've kept your PC up-to-date with new parts and pieces, the upgrades can be worthwhile—especially the K6-III–based PowerLeap. If your budget's tight, the TurboChip 366 can also give your old system a boost.

—Stan Miastkowski ▶

PowerLeap K6-III

PRO: Provides an impressive performance boost.

CON: More finicky about BIOS compatibility than the TurboChip.

VALUE: Good performance makes high price fair.

Street price: $349

PowerLeap

877/278-5327

www.powerleap.com

PRODUCT INFO NO. 705

TurboChip 366

PRO: Works on practically any Pentium-166 or later PC.

CON: K6-2–based upgrade is slower than K6-III–based PowerLeap.

VALUE: Lower-price choice for boosting an old PC's power.

Street price: $249

Kingston Technology

800/435-2620

www.kingston.com

PRODUCT INFO NO. 706

QUICK TAKES

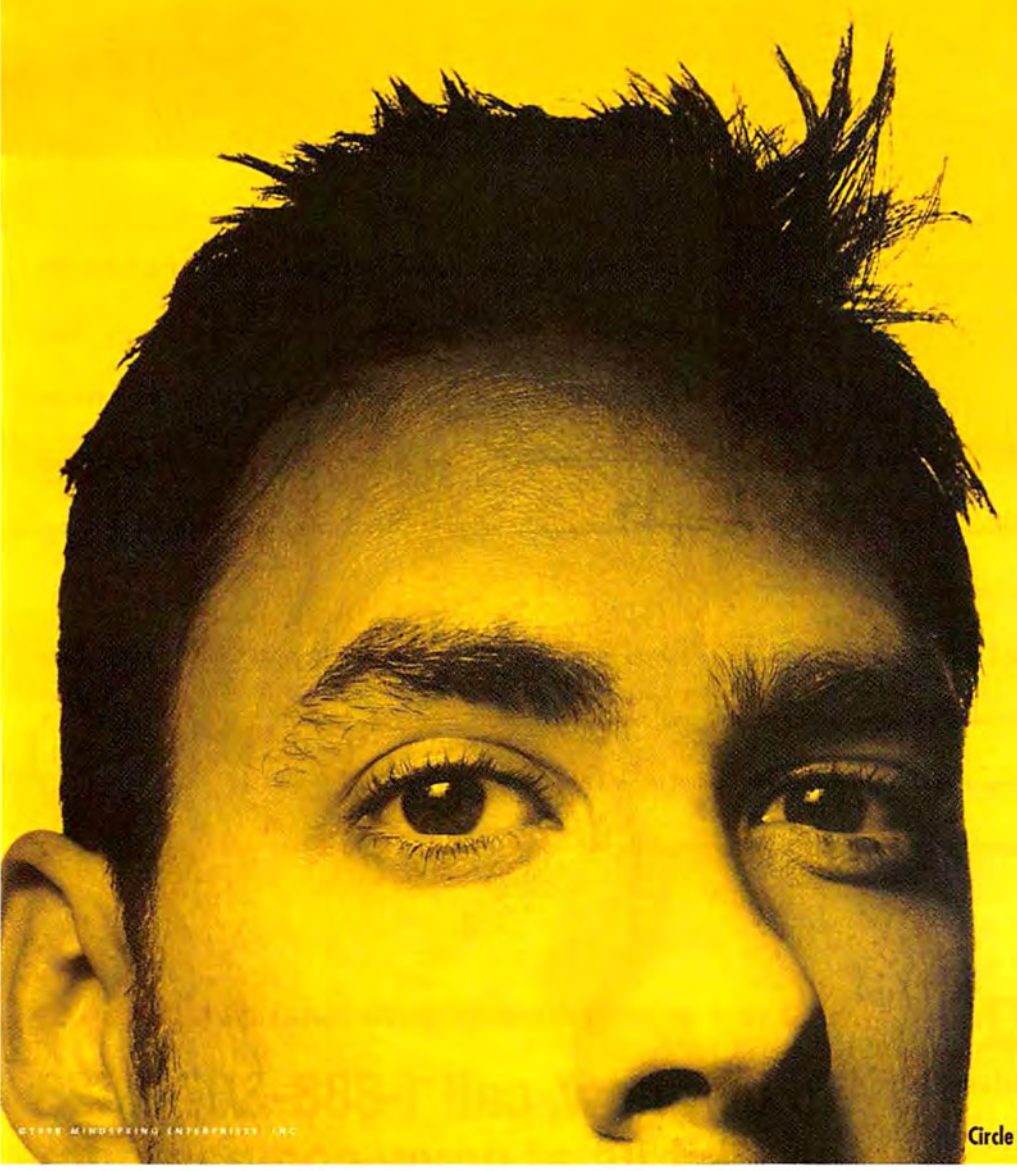
Connect a Modem Anywhere With LineStein

DIGITAL PHONE lines are quickly replacing the analog lines we've used for years. But while digital lines provide a wide array of convenient new features, they can fry devices that depend on analog service—such as modems and numerous teleconference phones. Hello Direct's **LineStein Digital Adapter** solves this problem by transforming any digital line into an analog-friendly one. This portable $120 lifesaver prevents potential modem damage wherever you travel. Installation takes seconds, and the device's Learn button takes the guesswork out of making the right connections. One caveat: LineStein requires an AC adapter (included), which can be a drag if the outlet and phone jack aren't near each other. And, yes, it is pricey—but so is replacing a modem or conference phone. Hello Direct; 800/444-3556; www.hello-direct.com.

PRODUCT INFO NO. 783

—Michael S. Lasky

The Internet is made up of zeros and ones. Which does your provider make you feel like?



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- 24X Max CD-ROM Drive[4]
- Compaq V.90 Data/Fax Modem[5]
- Compaq PremierSound™
- Integrated AC Adapter; 1 Li-Ion Battery
- Microsoft® Windows® 98
- Microsoft Office 97 Small Business Edition®
- Free[6] Trial of Compaq Online Services
- 3-year Worldwide Limited Warranty[7]

$2699 Purchase price*

PROSIGNIA NOTEBOOK 161

- Mobile Intel Pentium II Processor 333 MHz
- 4.0 GB SMART Hard Drive[3]
- 64 MB SDRAM (expandable to 192 MB)
- 14.1" CTFT (1024 x 768) Display
- 24X Max CD-ROM Drive[4]
- Compaq V.90 Data/Fax Modem[5]
- Compaq PremierSound
- Integrated AC Adapter; 1 Li-Ion Battery
- Microsoft Windows 98
- Microsoft Office 97 Small Business Edition
- Free[6] Trial of Compaq Online Services
- 3-year Worldwide Limited Warranty[7]

$2499 Purchase price*

PROSIGNIA NOTEBOOK 124

- Mobile Intel Pentium II Processor 300 MHz
- 4.0 GB SMART Hard Drive[3]
- 64 MB SDRAM (expandable to 192 MB)
- 12.1" CTFT (800 x 600) Display
- 24X Max CD-ROM Drive[4]
- Compaq V.90 Data/Fax Modem[5]
- Compaq PremierSound
- Integrated AC Adapter; 1 Li-Ion Battery
- Microsoft Windows 98
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$1999 Purchase price*

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Prosignia Desktop 330

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June 1999
PC World Magazine
Top 20 Power Desktops
Prosignia Desktop 330

PROSIGNIA DESKTOP 330

- Intel Pentium III Processor 500/100 MHz
- 13.5 GB Ultra ATA Hard Drive[3]
- 128 MB SDRAM (expandable to 384 MB)
- Compaq S700 17" Monitor (16" viewable)
- 40X Max CD-ROM Drive[4]
- Compaq 56K V.90 PCI Modem[5]
- Altec Lansing ACS44 Speakers w/Subwoofer
- STB/nVIDIA TNTv, 3D AGP 16 MB
- Microsoft Windows 98
- Microsoft Office 97 Small Business Edition
- Free[6] Trial of Compaq Online Services
- 3-year Limited Warranty[7]

$1949 Purchase price*
$67 Monthly lease price[9]

Customize with these options:

- Upgrade to S900 19" Monitor (20" viewable): $200
- Upgrade to Microsoft Office Professional: $199
- Upgrade to Windows NT®: $99

PROSIGNIA DESKTOP 330

- Intel Pentium III Processor 450/100 MHz
- 9.1 GB Ultra ATA Hard Drive[3]
- 96 MB SDRAM (expandable to 384 MB)
- Compaq S700 17" Monitor (15.7" viewable)
- 32X Max CD-ROM Drive[2]
- Compaq 10/100 Network Controller
- Creative Labs 2-Piece Speakers
- STB/nVIDIA TNTv, 3D AGP 16 MB
- Microsoft Windows 98
- Microsoft Office 97 Small Business Edition
- Free[6] Trial of Compaq Online Services
- 3-year Limited Warranty[7]

$1749 Purchase price*
$60 Monthly lease price[9]

Customize with these options:

- Upgrade to S900 19" Monitor (18" viewable): $200
- Upgrade to Microsoft Office Professional: $199
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- Intel Celeron™ Processor 400/66 MHz
- 9.1 GB Ultra ATA Hard Drive
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- Microsoft Office 97 Small Business Edition
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- 3-year Limited Warranty[7]

$1299 Purchase price*
$45 Monthly lease price[9]

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- Dual Processor Capable
- 128 MB SDRAM (expandable to 1 GB)
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- Max Internal Storage of 54.6 GB[3]
- 8 Bays: 4 Removable, 4 Hard Drive
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- 10/100 TX UTP NIC
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- 3-year Limited Warranty[7]

$3129 Purchase price*
$107 Monthly lease price[9]

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Micron's TransPort NX: A 'Desktop' Notebook

NOTEBOOK

THIN AND LIGHT notebooks may be catching on with the jet set, but if you plan to use a notebook as your primary PC, you probably want more than the svelte models offer. Fortunately, many 8- to 10-pound behemoths pack fast processors, giant screens and hard drives, wider keyboards, and in many cases enough video RAM and multimedia connections to set up a mini audio-video editing studio. If all this sounds appealing, you could do worse than Micron's new 9.4-pound **TransPort NX**—especially if you don't intend to lug it around much.

The TransPort NX may not give you the best audio, the slickest case design, or the longest battery life. But the $3299 Pentium II-366 version of the NX (a PII-333 model is also available) does deliver good performance: Armed with 64MB of RAM, our shipping unit earned a PC WorldBench score of 190, less than 1 percent behind that of Dell's Inspiron 7000 A366LT, the fastest notebook we've tested.

The TransPort NX also has a lovely 15-inch screen, touchpad *and* eraserhead pointing devices, and lots of multimedia and expansion options. The TransPort's two modular bays make it the first Micron notebook to accommodate as many different internal devices as competing notebooks do. In place of the floppy drive, you can insert a second 14GB hard drive ($999 extra), for a total capacity of 28GB. Instead of the LS-120 drive, you can pop in a second lithium-ion battery ($99) or a Zip drive ($199).

Ports to connect multiple devices, including a TV or camcorder, let you record and play audio and video. Suprisingly, audio output is weak, and no modem is included.

The TransPort NX offers more for the money than almost identical notebooks by Enpower and AMS Tech, including better-quality DVD and superior tech support. This is a workhorse PC that can go the distance—as long as you don't have to carry it.

—Carla Thornton

TransPort NX

PRO: Fast, fully loaded; excellent technical support.

CON: Heavy, no modem, mediocre audio, battery lasts only 90 minutes.

VALUE: A well-priced desktop replacement, especially suitable for those who work with multimedia or graphics applications.

Street price: $3299

Micron

888/208-1937

www.micronpc.com

PRODUCT INFO NO. 708

Fix-It Has All the Utilities—But Do They Fix It?

UTILITY SOFTWARE

SEEMINGLY TAKING the evolution of utility programs to its logical conclusion, **Fix-It Utilities 99** from Mijenix integrates all the utilities you're likely to need into a single scan-and-fix wizard, so you can find and repair the full range of PC problems with just a few clicks.

We tested a shipping version of the $35 program, which includes the following types of utilities: system diagnostics, antivirus, backup of Windows and disk configuration data, enhanced disk tools (for scanning, defragging, and undeleting), system crash protection, Windows customization (for user-controlled interface and system settings), and a Y2K system check. You also get a a ready-to-use emergency boot disk and a copy of PowerDesk Utilities 98, the Best Buy file manager from *PC World*'s June 1998 utility roundup. The only major omission is an enhanced uninstaller.

Fix-It integrates all these utilities seamlessly, but some don't work as well as they should. I got a chance to test Fix-It's CrashProof feature almost immediately in Windows 98, when the master FixWizard program crashed while running the registry scanner. CrashProof ultimately worked around the problem. And after installing Fix-It in my normally rock-solid NT system, I started getting regular blue-screen crashes, which went away after I uninstalled Fix-It.

Mijenix has already fixed many of the bugs we encountered (the fixes are available as free downloads from its Web site), so the program may eventually live up to all its promises. A 60-day money-back guarantee means you can check the software out with no risk to your pocketbook. But if you do, back up first.

—Robert Lauriston ▶

FIX-IT DOES MORE than its name promises—the package includes handy customization tools Microsoft left out of Windows.

Fix-It Utilities 99

PRO: Comprehensive utilities integrated into a handy wizard.

CON: No enhanced uninstaller, buggy, no toll-free support.

VALUE: Even without an uninstaller, this is a useful resource.

Street price: $35

Mijenix

800/645-3649

www.mijenix.com

PRODUCT INFO NO. 709

Now the award-winning WinBook XL is the first notebook to bring you 400 MHz performance. And don't let the low price fool you, this model has what it takes to put that speed to work — 128 MB SDRAM, SVGA TFT screen, 3 GB of ultra DMA storage and a v.90, 56k capable modem.

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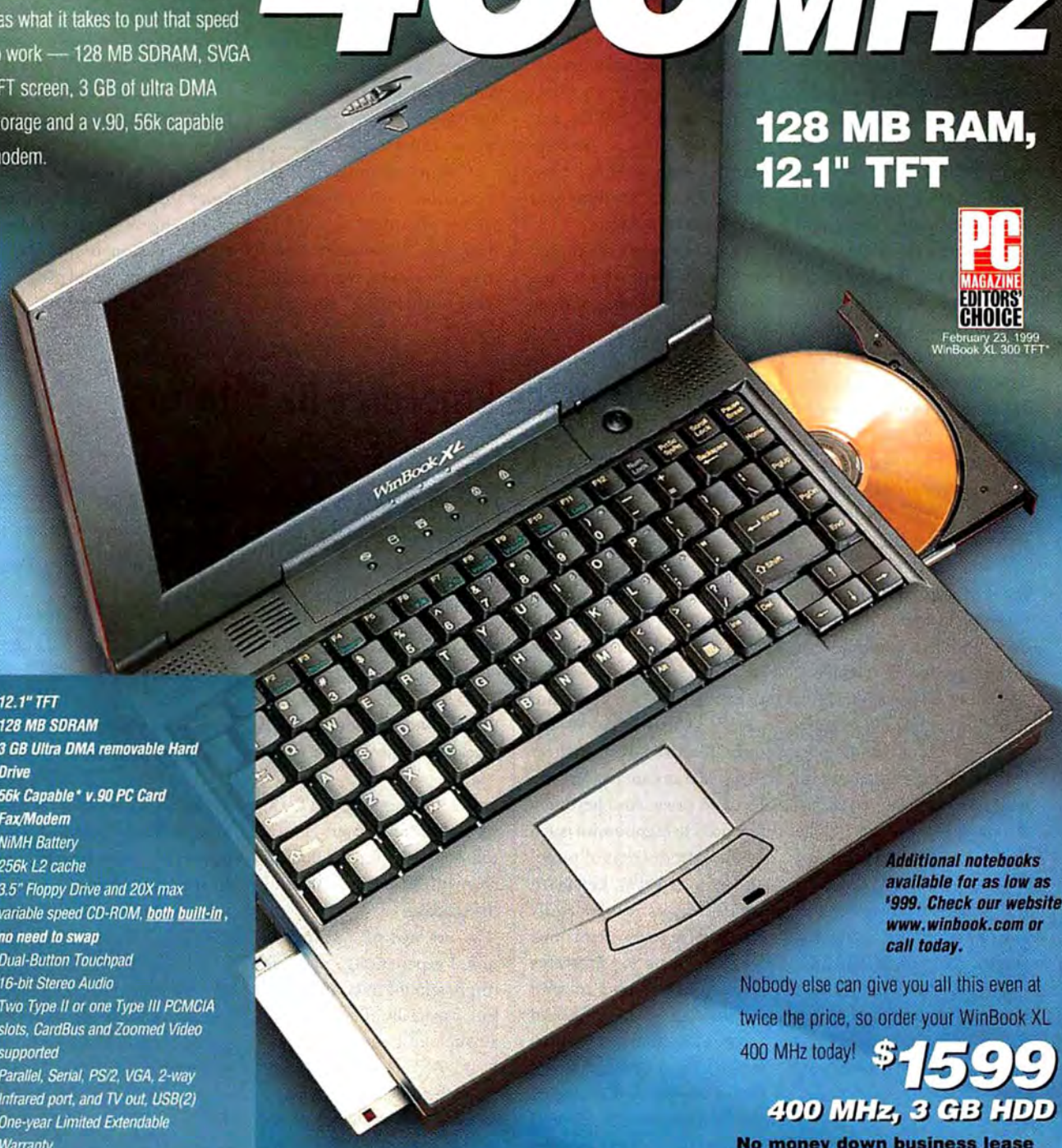
PC MAGAZINE EDITORS' CHOICE
February 23, 1999
WinBook XL 300 TFT*



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Acer's Slide Scanner: Power and Convenience

SCANNER

WITH SO MANY budget scanners available, a new model needs to have added features in order to stand out. Acer's $149 **Prisa 620PT** separates itself from the pack with its advanced slide, film, and transparency capabilities.

Not only can this 36-bit flatbed scan six slides simultaneously (thanks to its built-in, exceptionally capacious transparency adapter), it can also handle each of those slides as a separate job, with different color and resolution settings. This feature eliminates the need to shuffle individual slides in and out of the scanner. If you don't need to change settings for each slide, you can scan several slides at once, and then cut and paste each image into its own file.

In other respects, the Prisa 620PT is comparable to many other 36-bit parallel port flatbeds on the market. Image quality is acceptable, if not outstanding. The software bundle includes Ulead Photo Express 2.0 (a solid but not particularly user-friendly image editor) and Kai's Photo Soap for graphics; a utility that enables you to use the scanner as a photocopier; and TextBridge Classic 2.0, a limited version of ScanSoft's optical character recognition program (for a review of the full-fledged TextBridge Pro 9.0, see page 90). The Prisa does not, however, come with any document management software.

Helpful, clearly illustrated installation instructions on a large poster should get most novices up and running easily. Note that the Prisa 620PT requires an extra power outlet, since the transparency adapter has its own AC adapter.

My shipping unit came with a parallel port hookup. If you're planning on a lot of high-resolution slide scanning, however, you might want to spend an additional $20 for the Prisa 620ST, whose SCSI interface is speedier—but note that you'll have to open your computer's case to install the 620ST's included SCSI board, unless you already have one installed. There are plenty of affordable scanners to choose from today, but if your scanning routine involves lots of slides, either version of the Acer Prisa is worth considering.

—Yardena Arar

Prisa 620PT

PRO: Ability to scan multiple slides in batches.

CON: No document management.

VALUE: Particularly good for high-volume slide scanning.

Street price: $149

Acer Peripherals

www.acerperipherals.com

800/379-2237

PRODUCT INFO NO. 713

May the ErgoForce Be With You

KEYBOARD

OVER THE YEARS, PC keyboard manufacturers have tried to perk up sales of keyboards by adding speakers, scanners, and Internet navigation buttons to the boards. With the release of Windows 95, the basic 101-key device expanded to 104 keys. But despite all these changes, the only features that matter much to users are typing comfort and price. And beyond a few nods to ergonomics (such as the introduction of raised and angled keys), keyboard comfort levels haven't really changed for years. Until now.

Key Tronic's $25 **ErgoForce** revolutionizes typing comfort by varying the force required to press each key. On most keyboards, it takes about 55 grams of force to activate any key. But common sense tells us that the thumb can exert more pressure on the spacebar than the weaker pinky can when it reaches for the P or Q keys. Accordingly, the 104-key ErgoForce requires just 35 grams for outlying letter keys, 45 grams for inside keys, 55 grams for the function keys, 65 grams for <Enter>, and a full 80 grams for the bottom row with <Ctrl>, <Alt>, and the spacebar.

KEY TRONIC'S ERGOFORCE keyboard varies the amount of pressure required for different keys, making typing more comfortable.

In my test of a shipping unit, I experienced a palpable improvement in typing comfort, especially after spending a couple of hours at the keyboard. Because I tend to inadvertently press the spacebar on conventional keyboards, I particularly appreciated that the ErgoForce's bottom row required more pressure.

For hunt-and-peck typists, the varied key pressures won't make much of a difference—the ErgoForce keyboard was clearly designed with touch typists in mind. And its reasonable $25 price tag should make it easier for them to handle the "pressure."

—Michael S. Lasky ▶

ErgoForce

PRO: Varying the amount of pressure needed to strike each key makes touch typing considerably more comfortable over the long run.

CON: Will benefit only touch typists.

VALUE: A well-priced replacement keyboard that represents a significant advance over previous keyboard technology.

List price: $25

Key Tronic

800/262-6006

www.keytronic.com

PRODUCT INFO NO. 711

Starting at $99, it's the least expensive disaster prevention you'll ever buy

APC Back-UPS Pro® 500:
"APC's latest plugs into a USB port, making it completely painless to protect your PC from power snafus and electrical spikes."
- PC Computing 4/99

A A-LIST PCComputing

Why 8 million PC users can't be wrong about APC power protection.

Power problems are the largest cause of data loss and occur 15 times more frequently than computer viruses. Besides an outright power outage, keyboard lock-ups, system crashes, corrupted data and lost Internet connections are also symptoms of power irregularities. These events cause interruptions and interfere with your ability to get the job done.

An APC Uninterruptible Power Supply (UPS) gives you two layers of protection in one unit. Memory cards and hard disks are shielded from damaging surges while back up battery power enables you to shut down during an emergency without losing any data. APC units are the only UPSs on the market backed by a $25,000 equipment protection guarantee. Try one today!

An APC UPS gives you:

- Enough outlets to protect your computer plus displays, printers, scanners and more
- Emergency battery power for continuous uptime through brief power outages to help save your data.
- Telephone/network surge suppression to maintain your online connection.
- Auto-shutdown software which saves your files and data, even when you're away from your computer.

APC Safety and Reliability Benefits:

- User-replaceable batteries reduce service costs
- Easy Overload Recovery
- Site Wiring Fault Indicator
- Audible and Visible Alarms alert you to power events as they occur
- $25,000 equipment protection guarantee (U.S. and Canada only, see policy)
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See ScanSoft Spell: TextBridge Pro 9

OCR SOFTWARE

IF YOU'RE SERIOUS about turning paper documents into editable text, you'll want more than you get from the limited optical character recognition software that comes with most scanners. ScanSoft's **TextBridge Pro 9** reaches out to beginning and intermediate OCR users with its simplest interface ever, improved accuracy, support for color documents, and the ability to output formatted Web pages. The new version places TextBridge Pro closer than ever to its arch-rival, Caere's OmniPage Pro.

In fact, I found a preproduction copy of TextBridge Pro 9 easier to use than OmniPage Pro 9.0, mainly because OmniPage's zoning tools—which divide complex documents into different areas for formatting purposes—are more difficult to master. ScanSoft also offers more prescanning options for different document types (newspaper clipping, magazine page, fax, letter, and so on). And like OmniPage, ScanSoft offers easy proofing and correction.

I tested TextBridge Pro 9 with a dozen or so letters, faxes, and spreadsheets, and a few pages from *PC World* magazine. On clearly printed letters, The program achieved impressive accuracy in both character recognition—99 percent or better—and format retention. But with more complex content, results varied wildly. For example, TextBridge Pro did a fine job recognizing the text from a *Wall Street Journal* clipping, but inexplicably changed typefaces in midstream and put a caption for a line drawing in the middle of text. The program was more adept at maintaining the format of a black-and-white warranty card, and recreating simple formats in HTML.

TextBridge Pro couldn't render a complex *PC World* page that had different font sizes and styles: It performed two scans of the color pages (one for the color elements, another for black and white) but then had difficulty recombining them properly.

TextBridge Pro's new user interface and simple zoning tools make it especially well-suited for OCR beginners, who need all the hand-holding they can get. For everybody else, it should make text conversion a breeze.

—Yardena Arar ▶

TextBridge Pro 9

PRO: Improved user interface and accuracy, good Web formatting.
CON: Has trouble re-creating complex documents with color.
VALUE: Solid product easily accessible to beginners.
Street price: $99 ($49 to upgrade from TextBridge 98 or Classic).
ScanSoft
888/663-0658
www.scansoft.com
PRODUCT INFO NO. 712

HP's Palmtop: The Handheld PC Done Right

P D A

'HANDHELD' PCS? Most of the latest Windows CE devices so marketed are more like a handful-and-a-half. Sharp's Mobilon Pro and its rivals approach the size and weight of subnotebooks. One handheld PC that lives up to the name is Hewlett-Packard's **Jornada 680**. Though a tight squeeze for most pockets at 7.4 by 3.7 by 1.3 inches, the 1.1-pound Jornada is compact enough to carry almost anywhere in a briefcase or shoulder bag. With a usable if not quite ergonomic keyboard, the Jornada is a legitimate alternative to pen-only devices like 3Com's Palm organizers.

THE JORNADA 680 offers a crisp color display and an improved keyboard.

The $899 price is a bit steep, but it gets you a zippy 133-MHz processor, a generous 16MB of RAM, a reasonably crisp 256-color screen, and a built-in 56-kbps modem. HP supplements Windows CE's standard applications (slimmed-down versions of Word, Excel, Outlook, Internet Explorer, and other programs) with useful extras such as Pocket Quicken, a backup utility, and a file viewer.

Most importantly, the Jornada 680 makes real strides toward overcoming two of palmtop computing's most annoying weak spots: keyboard quality and battery life. Its notebook-like keys are a bit too small for touch typing, but they're a vast improvement on most PDAs' calculator-type buttons. I was able to take care of basic data entry without too many typos. In my informal tests of a shipping model, the rechargeable battery provided more than 6 hours of power.

Judging from the success of 3Com's Palm devices, most palmtop buyers are perfectly happy without a keyboard, color screen, built-in modem, or Windows-style user interface. But if you crave those features, and you still want to go small and light, you won't do better than the Jornada 680.

—Harry McCracken

Jornada 680

PRO: Improved keyboard and color screen, long battery life.
CON: Not really pocketable, keyboard too tiny for touch typing.
VALUE: Best color Windows CE palmtop we've seen.
Street price: $899
Hewlett-Packard
800/443-1254
www.hp.com/jornada
PRODUCT INFO NO. 710

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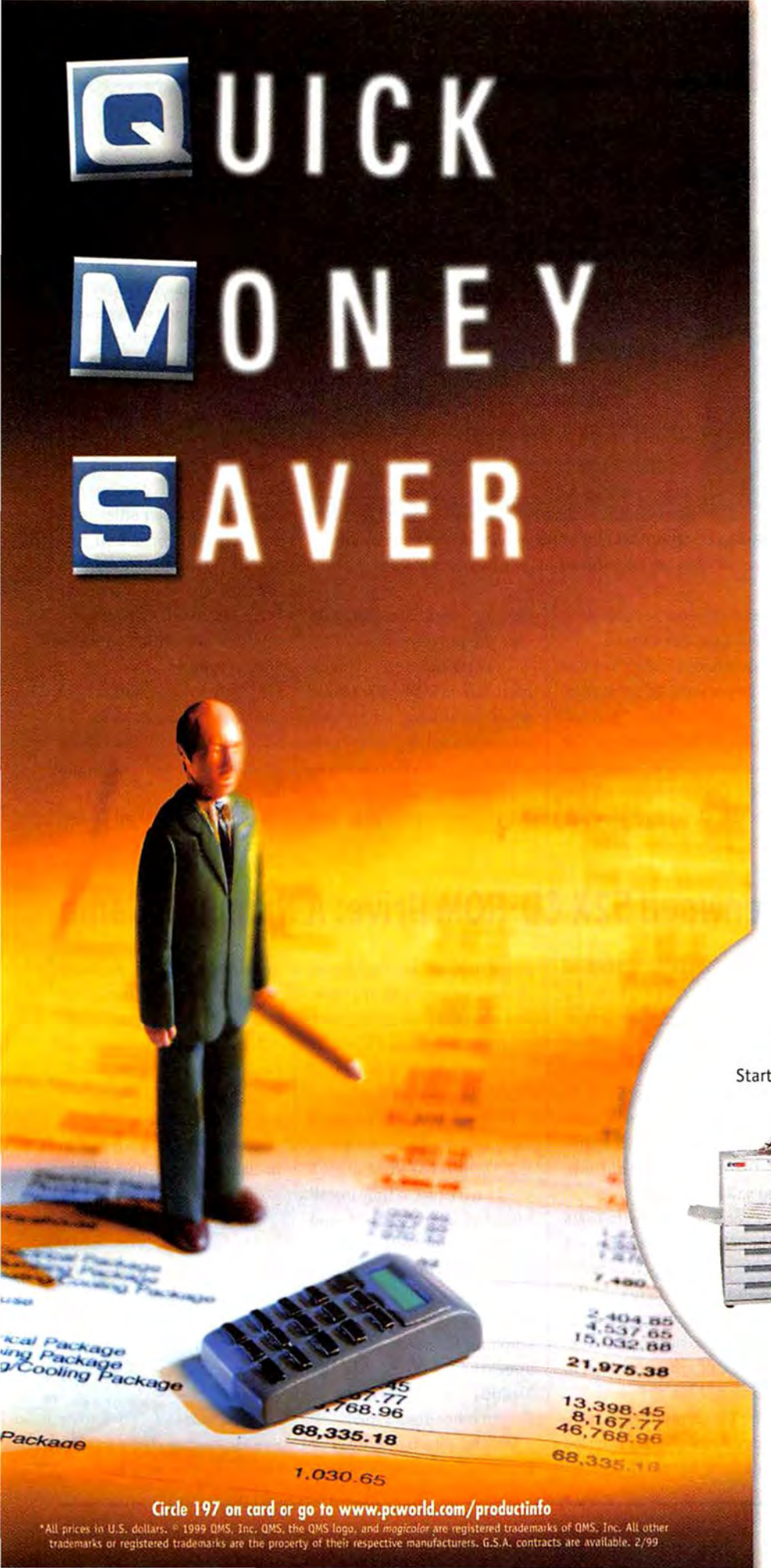

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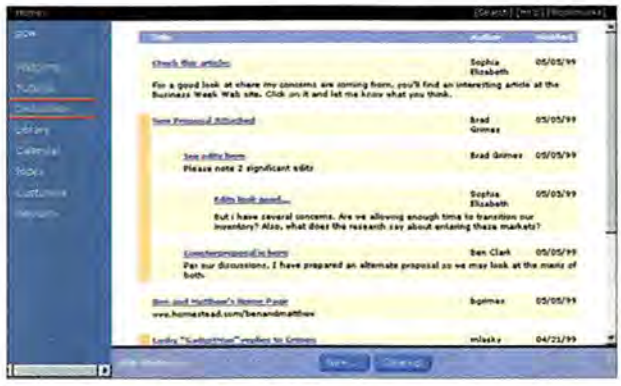
Hold Your Group Meetings on the Web

GROUPWARE

GIVEN ALL ITS success with Notes, you might expect Lotus to make a compelling Web-based workgroup application. Not exactly. Judging from our experience with a prerelease version, the company's new **QuickPlace** workgroup program—though miles ahead of its predecessor, Lotus Instant Teamroom—still lags several steps behind the competition.

Web-based workgroup applications are meant to be simple. Once you've loaded the program on a company server—or rented it from an ISP—users participate in group discussions and collaborations using nothing more than their Web browsers. QuickPlace, which will be available as a $995 standalone server application, bundled with Domino R5, and rentable through America Online and others, is certainly easier to use than Instant Teamroom. You can post messages with multiple fonts, colors, and formats, and include files, animations, or HTML pages. There's also a shared calendar for planning meetings and deadlines.



WEB-BASED GROUP DISCUSSIONS and collaborations, along with a shared calendar, are the core benefits of Lotus QuickPlace.

But intuitive it isn't. Instead of simply posting messages, you must create "pages." Granted, these can be far more sophisticated than your typical discussion thread, but with the all the typefaces and graphics froufrou, they also slow the program down.

The original Instant Teamroom lacked a way of notifying team members when you posted something new. Lotus added this crucial feature to QuickPlace, but buried it: When you create a page, you need to hit the Publish As... button to notify group members. A simple Notify button would have sufficed. QuickPlace also lacks a Log Out button, which should concern security-conscious workgroups.

Compare QuickPlace with ERoom from Instinctive Technology, and you'll see what Lotus missed. ERoom has a chat feature for instant meetings and a search function for messages and documents, notifies you when other team members are logged on, and tracks document revisions. ERoom 4.0 also integrates with Microsoft Office 2000 and new workgroup administration features.

If QuickPlace had any of these features, it would be more alluring. As it is, however, a better name for it might be QuickSand.

—Brad Grimes

QuickPlace

PRO: Better than its predecessor, handles elaborate messages.

CON: Not as good as competitors, lacks several useful features.

VALUE: If you use Notes, it's a simple way to set up Web-based workgroups, but it's not the best.

List price: $995 for stand-alone server (Windows NT only), $40 per client; rental rates to be determined

Lotus

800/353-5414

www.lotus.com/quickplace

PRODUCT INFO NO. 716

Kenwood 52X CD-ROM Drive: A Numbers Game

CD-ROM DRIVE

I NEARLY DESTROYED the shipping carton in my eagerness to open Kenwood's $130 **52X TrueX** CD-ROM drive. I couldn't wait to check out its new TrueX multibeam technology, 2MB onboard buffer (to further rev data output), and 52X speed.

Several passes with Testa Labs' CD Tach benchmark software, using Windows' "Quad speed or higher" buffer settings, did nothing to dampen my enthusiasm: The Kenwood's 47X test rating was, in a word, smokin'.

The TrueX multibeam technology Kenwood has licensed from Zen Research is supposed to speed throughput by reading seven tracks at a time. But what works in benchmark testing often doesn't translate to improvements in real-world CD-ROM drive performance.

That was borne out when I compared the Kenwood with a 32X Toshiba CD-ROM drive. I used each drive to fully install Microsoft Office 97 and found no appreciable difference in their performance reading and loading data on the Microsoft installation disc. The shipping Kenwood drive also appeared no faster than the Toshiba when reading any of the ten other discs I tried.

On the positive side, the Kenwood 52X TrueX is ruggedly built and will probably hold up far beyond its one-year warranty.

There may be practical business uses where TrueX technology produces better results. Until I find them, I remain unconvinced that it can sustain its claims in the real world.

—Jon L. Jacobi

Kenwood 52X TrueX

PRO: Solidly constructed.

CON: Doesn't live up to its speed rating for real-world uses.

VALUE: Okay but not a standout.

List price: $130

Kenwood

888/730-4206

www.kenwoodtech.com

PRODUCT INFO NO. 714

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Kodak's Digicam: Lots to Like, a Few Gotchas

DIGITAL CAMERA

WHEN WE tested ten megapixel digital cameras in January (see www.pcworld.com/jan99/cameras), Kodak's DC220 emerged as a Best Buy. The company's new $699 **DC240** improves on its predecessor in several respects, but image-quality problems and a couple of missing features keep it from earning an unqualified rave. (The DC220 remains on the market for the time being; it also is priced at $699.)

THE TRIMMER, EASIER-to-hold Kodak DC240 improves on its predecessor, the DC220.

On the plus side, the Kodak DC240 is trimmer and easier to hold than the chunky DC220, and it delivers higher resolution—1280 by 960 pixels—a boon if you're trying to print color photos that match the quality of 35mm prints. Like the DC220, it offers some of the friendliest, most versatile on-camera controls and bundled PC software around. And the two models also provide both a serial and a USB connection, which can reduce the time it takes to download a high-res image to your USB-equipped computer from minutes to seconds.

Most of the pictures I took with a shipping version of the DC240 displayed vivid colors and sharp details, but some snapshots taken in bright sunlight without flash came out fuzzy and unappealing.

I also missed two of the DC220's niftiest features: The DC240 doesn't let you record audio clips to annotate pictures, and when you turn the camera on its side for a portrait-format shot, it doesn't rotate the image accordingly—as with most models, you've got to do so yourself on your PC.

Nevertheless, this camera is worth considering if you are in the market for a general-purpose digital camera. But compare it with competitors such as Agfa's EPhoto CL50 and Nikon's Coolpix 700 before you make a final decision.

—Harry McCracken

Kodak DC240

PRO: Easy to use, speedy USB port, bountiful software bundle.

CON: Disappointing image quality with some outdoor shots, missing some features of the DC220.

VALUE: Worth considering, but not a runaway winner.

List price: $699

Kodak

800/235-6325

www.kodak.com

PRODUCT INFO NO. 717

USB CD-RW Drive: Instant Plug-In Convenience

STORAGE

FOR MANY users, the appeal of creating CD-ROMs and audio CDs with a CD-Rewritable drive has been offset by assumed installation hassles. But installing LaCie's **CDRW 226** drive—one of the first USB CD-RW drives—is as easy as plugging the drive into a standard USB port. The $379 drive works with any Windows 98 PC that has a USB port—and with Apple's iMac and G3 computers. Installing a shipping version of the drive (on a Pentium MMX-200 system with 32MB of SDRAM) was like plugging in a toaster. It was ready to use without a single reboot.

MAKE CDs quickly with LaCie's CDRW 226.

Alas, its performance was unremarkable. Testa Lab's CD Tach benchmark rated the LaCie's data-reading capabilities at just slightly faster than 3X—considerably slower than the drive's 6X rating. To its credit, the drive read a variety of CD-R and CD-RW disks and played audio CDs without hiccuping once.

Of course, the main reason to install a CD-RW drive is to write discs, and the LaCie does that with aplomb. I wrote two CD-Recordables at the drive's 2X speed with nary a glitch. CD-RW writing was also trouble-free (but slow—writing 100MB of files to disc took about 8 minutes).

The exceptionally quiet drive is mounted inside a wide-profile case that appears sturdy enough to withstand the knocks and dings of moving it from PC to PC. Bundled software includes Easy CD Creator 3.5 plus DirectCD 2.5 for the PC, and Toast 3.5.6 with DirectCD for the Mac.

If you need a cost-effective, hassle-free way to share your CD-RW resources—especially in a mixed PC/Mac environment—the LaCie is well worth the cost.

—Jon L. Jacobi ▶

LaCie CDRW 226

PRO: Portable, easy to install, compatible across platforms, solid CD writer.

CON: Slow reading performance.

VALUE: A bargain for anyone who needs to share a CD-RW drive among different computers.

List price: $379

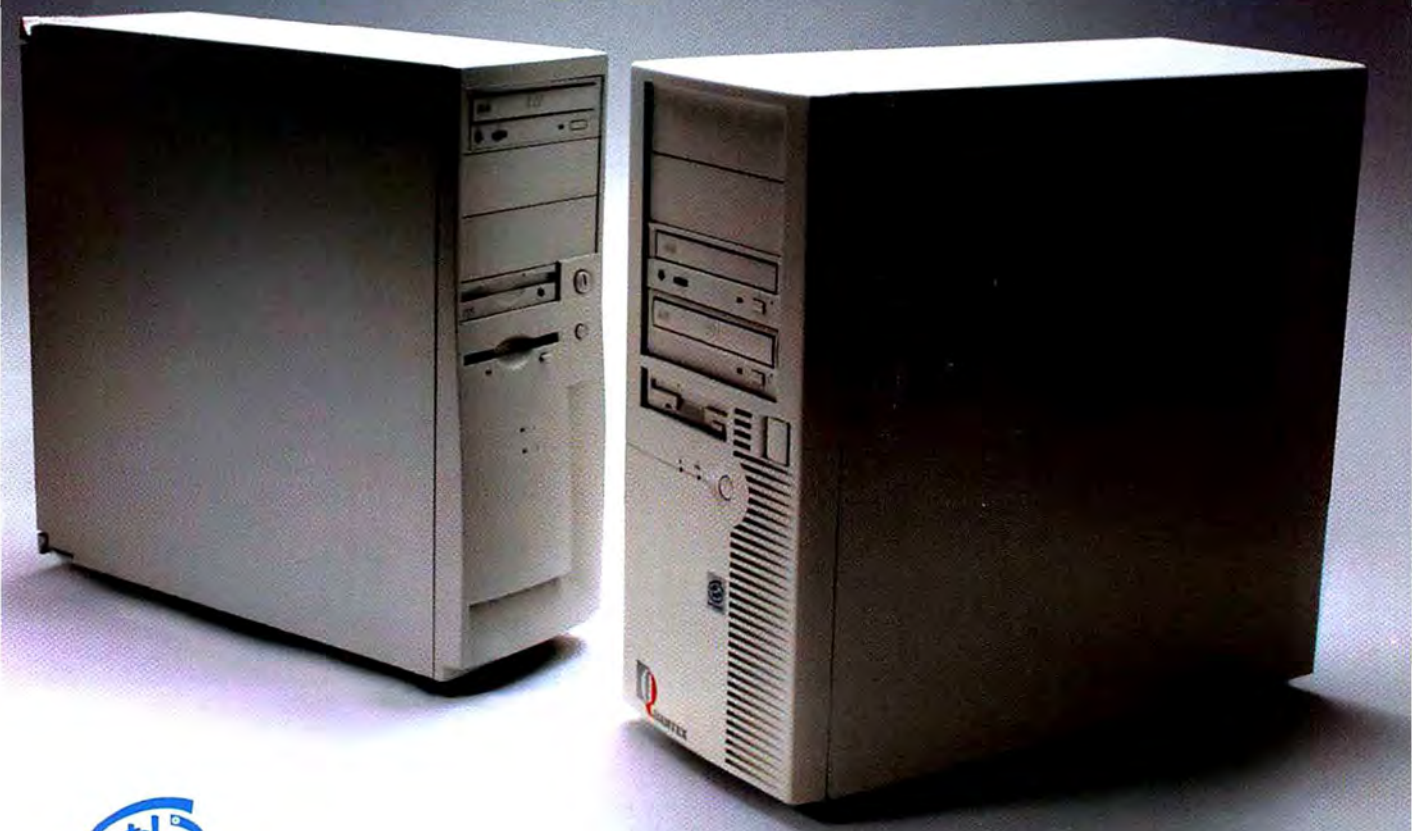
LaCie

503/844-4500

www.lacie.com

PRODUCT INFO NO. 715

IT'S HARD TO TELL THE DIFFERENCE BETWEEN QUANTEX AND THE COMPETITION...



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System Order Code: pcw07s05

QP6/500 Best Buy $1699

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System Order Code: pcw07m09

QP6/466 M-2c $1149

Business lease:$57/Mo., 24 Mos. *$0 Money Down*
System Order Code: pcw07m13

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- ■ Dynamic Wavetable Stereo Sound & Speakers
- ■ Quantex highly-expandable ATX Mid Tower Case
- ■ 104-Key Keyboard; MS Mouse
- ■ MS Windows 98; Value Multimedia Software Bundle
- ■ Corel WordPerfect Office Suite 8
- ■ 3-year Limited Warranty, 24/7 Toll-Free Technical Support

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intel inside
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BEST BUY AWARD—APRIL 1999

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- ■ ESS 3D Wavetable Surround Sound and Speakers
- ■ Long-Lasting 12-Cell Smart Lithium Ion Battery
- ■ USB and Fast IR Ports, Integrated Personal Touchpad
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System Order Code: pcw07i04

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- ■ 6GB Ultra ATA HD
- ■ 56K V.90 Fax/Modem*
- ▲ *New* Modular 4x Max Variable DVD-ROM & 3.5" Floppy Combo Drive
- ▲ ATI Rage Lt Pro 3D AGP Video w/8MB
- ■ ESS 3D Wavetable Surround Sound and Speakers
- ■ Long-Lasting 12-Cell Smart Lithium Ion Battery
- ■ USB and Fast IR Ports, Integrated Personal Touchpad
- ■ MS Windows 98
- ■ Corel WordPerfect Office Suite 8
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- ■ USB and Fast IR Ports, Integrated Personal Touchpad
- ■ MS Windows 98, Corel WordPerfect Office Suite 8
- ■ Quantex Carrying Case - *Upgrade to Deluxe Carrying Case for $89*
- ■ 3-year limited warranty on CPU and Main Memory
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Quantex T-1400 w/Pentium II processor 366MHz.....$2199
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Business lease: $68/Mo., 36 Mos. *$0 Money Down*
System Order Code: pcw07t01

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- ■ 32MB SDRAM
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- ■ 56K V.90 Fax/Modem*
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- ■ NeoMagic NM25 128-bit AGP Video
- ■ Integrated 16-bit Stereo Sound and Speakers
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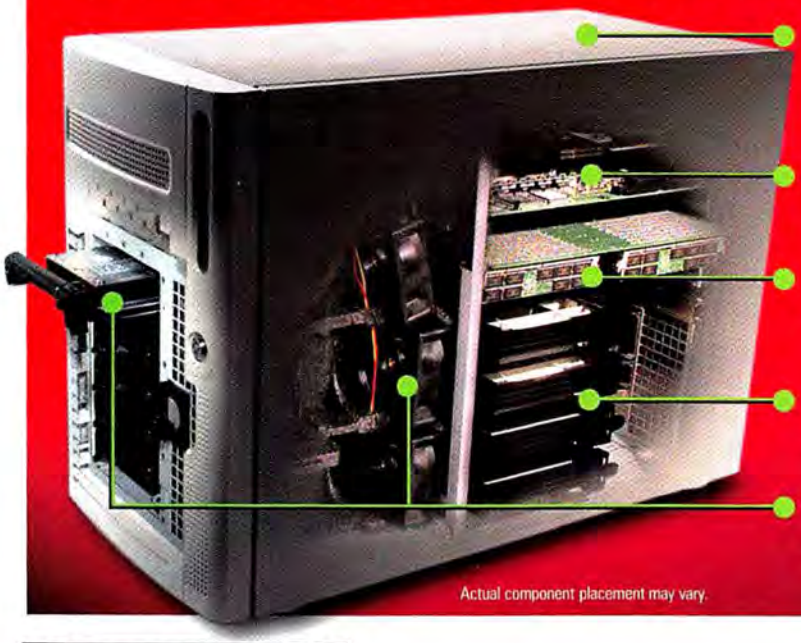

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- 40x Max Variable Speed SCSI CD-ROM Drive
- Quantex QX6400 Server Case; 2+1 400w Redundant Power Supplies; 6 Hot-Swap Drive Bays; up to 11 fans
- Emergency Management Port; ISC Management Console
- Chassis-intrusion switch; Drive bay lock
- 104-Key Keyboard; MS Mouse
- 3-Year Limited Warranty
- 24/7 Toll-Free Dedicated Server Hardware Support

Quantex QX6200 $4299

Business lease:$147/Mo., 36 Mos. *$0 Money Down*
System Order Code: pcw07q25

- *New* Intel® Pentium® III Xeon™ Processor 550MHz (Dual Processor Upgradeable)
- 128MB PC100 ECC SDRAM (2GB Max)
- 512KB Full Speed ECC Secondary Cache
- 9GB Ultra2/LVD SCSI Hot Swap Hard Drive
- Intel EtherExpress Pro 100 Fast Ethernet w/RJ-45
- Dual Channel SCSI Controller; Ultra2 (LVD) SCSI /Ultra Wide SCSI
- Dual Peer PCI Buses; 6 PCI Slots, 1 ISA Slot
- 40x Max Variable Speed SCSI CD-ROM Drive
- Quantex QX6200 Server Case; 2+1 400w Redundant Power Supplies; 6 Hot-Swappable Drive Bays; 6 fans
- Emergency Management Port; ISC Management Console
- Chassis-intrusion switch; Drive bay lock
- 104-Key Keyboard; MS Mouse
- 3-Year Limited Warranty
- 24/7 Toll-Free Dedicated Server Hardware Support
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Quantex QX5000 $2499

Business lease:$90/Mo., 36 Mos. *$0 Money Down*
System Order Code: pcw07q11

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- 512KB ECC Secondary Cache
- 9GB Ultra2/LVD SCSI Hot Swap Hard Drive
- Intel EtherExpress Pro 100B Fast Ethernet w/RJ-45
- Dual Channel SCSI Controller; Ultra2 (LVD) SCSI /Ultra Wide SCSI
- Dual Peer PCI Buses; 6 PCI Slots, 1 ISA Slot
- 40x Max Variable Speed SCSI CD-ROM Drive
- Quantex QX5000 Server Case 5 Hot-Swappable Drive Bays; 4 fans
- Emergency Management Port; ISC Management Console
- Chassis-intrusion switch; Drive bay lock
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- 3-Year Limited Warranty
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- *Add Windows NT Server 4.0 w/10 CAL for $799*
- *Add Adaptec SCSI RAID Controller for $399*

Quantex QX3000 $1499

Business lease:$54/Mo., 36 Mos. *$0 Money Down*
System Order Code: pcw07q02

- *New* Intel® Pentium® III Processor 450MHz
- 64MB PC100 ECC SDRAM
- 512KB ECC Secondary Cache
- 4.5GB Ultra-Wide SCSI Hard Drive
- Intel EtherExpress Pro 100B Fast Ethernet w/RJ-45
- Single Channel Ultra-Wide SCSI Controller
- 3 PCI Slots, 1 ISA Slot, 1 Shared PCI/ISA Slot
- 40x Max Variable Speed CD-ROM Drive
- Quantex QX3000 Mid Tower Server Case 4 Internal 3.5" Bays, 4 External 5.25" Bays
- Emergency Management Port; ISC Management Console
- 104-Key Keyboard; MS Mouse
- 3-Year Limited Warranty
- 24/7 Toll-Free Dedicated Server Hardware Support
- *Add APC Smart-UPS 700VA for $349*

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MULTIFUNCTION

IF YOU'RE LIKE most small-office users, you have a space problem: You've collected a zillion complicated, desktop-hogging pieces of equipment. But if you're starting from scratch, you can free up space and save money by choosing a multifunction device. MFDs combine a printer, a copier, and a scanner—and often a fax—inside a single case.

We tested four MFDs, each designed to handle color ink jet printing and color scanning. We looked at Brother's $499 **MFC-7150C**, Compaq's $399 **A900**, Hewlett-Packard's $599 **OfficeJet R40** (which has no fax capability), and Xerox's $499 **WorkCentre 480cx.**

In exchange for the space savings, each of these MFDs forces you to accept trade-offs. None, for example, makes faxing as straightforward as a stand-alone fax machine does. All four MFDs are confusing to use in some way, usually because of complex software. The HP OfficeJet R40 comes closest to being a good overall package, but it can't fax. The Brother MFC-7150C, meanwhile, has a simple control panel, but its print quality is only middling. Making copies is no fun with the Compaq, and takes too long with the Xerox. So when you consider buying an MFD, try to anticipate what you'll use it for most and make sure your choice is strong in that area.

HP'S OFFICEJET R40 (top) and Compaq's A900.

SOFTWARE: THE MULTIFUNCTION GLUE

FOR MOST USERS, the most compelling benefits of MFDs are that they free up desktop space and simplify connections. These models aren't much bigger than ink jet printers, and they require only one power outlet and one parallel port connection to your PC. And unless you'd choose the cheapest stand-alone products on the market, an MFD costs you less than three or four separate devices.

But a bunch of hardware in one box does not an integrated system make. To tie it all together, you need software, and these MFDs make you switch between third-party programs to perform ordinary tasks. For example, the Xerox includes the Pagis Pro document manager and scanning software as well as LaserFax Lite.

THE HUMAN FACTOR

ANOTHER ADVANTAGE of MFDs over stand-alone devices: You can operate an MFD from its hardware control panel without booting your PC. Of the fax-capable devices we tested, Brother's MFC-7150C gets the nod in this area; its control panel groups clearly labeled buttons for each function. In addition, the Brother's software can import phone numbers from databases such as Symantec's Act and add them to memory. By contrast, the Xerox 480cx's confusing control panel and menus require you to enter phone numbers by hand to store them in memory.

You can run Compaq's A900 from its control panel, but for color copying or complicated jobs, it's easier to use the control form. Once you've printed this form, marked your function choice (fax, copy, or scan), specified the number of pages involved, and fed the form in ahead of your document, the machine performs the desired function. You can also download names from an address book onto the form.

A PRINTER BY ANY OTHER NAME

THERE ARE no mysteries to printing with any of the MFDs we tested. They operate like stand-alone printers. They also vary in terms of print quality.

All four of these models print fairly well on plain paper. The Compaq and Xerox units print clean black text. The HP produces strong, solid black type, but letters look a bit jagged. The Brother MFC-7150C's text is probably the weakest—somewhat gray and streaky—and its graphics seem washed out and gritty, but it should nevertheless be good enough for most uses. The Compaq and Xerox print attractive graphics. If you use ink jet paper, the HP's graphics also shine, and the Brother's improve substantially.

Our informal testing indicates that these MFDs run at about the speed of most ink jet printers. The Compaq and Xerox seem slow, while the HP runs about as fast as the company's zippy DeskJet 882 ink jet printer. One quirk: The Brother MFC-7150C wiggles so much as it prints that it might need its own stand. ▶

SPOTLIGHT

MULTIFUNCTION devices combine three or four products in one. We looked at four models and found the following:

- **Prices under $600**
- **Many functions, small size**
- **Unintegrated software**
- **Broad usability range, from simple to baffling**
- **Good printers, mixed fax machines, slow copiers**

PHOTOGRAPH: KEVIN CANDLAND

PAPER CLONES

SOME MFDS make copying easy; others make it tough. The speed at which a model copies in color is the true test. Ideally, you just drop a document in the feeder and then push the "black copy" or "color copy" button. That's how HP's OfficeJet R40 and Brother's MFC-7150C work—and both can make a color copy in less than a minute. The HP scans on a glass flatbed like a photocopier's, so you can duplicate pages from thick originals such as books.

The Compaq A900 makes black-and-white copies at the push of a button, but color copies are harder to obtain: Your PC must be running, and you have to navigate the A900's control panel menus (or use the control form). The scan goes to your PC and then back to the printer automatically; I waited 8 minutes for one page to print (yikes!). But copying with the Xerox WorkCentre 480cx was trickiest of all: You have to run Pagis Pro on your computer, initiate and save a scan, and then print. Time: about 11 minutes (double yikes!). By contrast, a typical stand-alone color copier can spit out a page in under 40 seconds.

BROTHER'S MFC-7150C (left) and Xerox's WorkCentre 480cx.

HARD FACTS ABOUT FAXES

RUNNING FAX software on a PC opens up intriguing possibilities. For example, by using LaserFax with the Xerox, you can embed commands in documents to automatically fill out cover sheets for broadcast faxes or send different documents to each recipient.

But some MFDs we tested—especially the Brother MFC-7150C—perform plenty of fax tricks without a PC. For example, the Brother can poll (that is, call another fax machine and request faxes from it) and be polled. The Brother also enables you to call in from a remote fax machine and retrieve documents from memory, and it supplies built-in cover pages for outgoing faxes. In comparison, the Compaq's fax functions are particularly limited. The Compaq has no polling or remote capabilities, and provides no way to talk with the recipient before faxing. The Xerox's fax capabilities are modest but adequate. The HP OfficeJet R40 has no fax (a fax-capable version, the R80, costs $799).

THE MFD DECISION

ULTIMATELY, deciding which MFD is right for you comes down to what you want to do with it. If you plan on running a business with your multifunction device, you'll need one that can fax. But if all you're looking for is a printer with some extra features, your best bet is the HP OfficeJet R40, which combines high-quality printing, easy-to-use design, and fast performance. But its $599 price tag may give you pause.

Among the fax-capable devices, Brother's MFC-7150C costs the most—$499—and offers the most complete set of functions for the money. If you can live with its less-than-stellar print quality, you'll find its simple, easy-to-use design and strong fax features well worth the price.

—Dan Littman ■

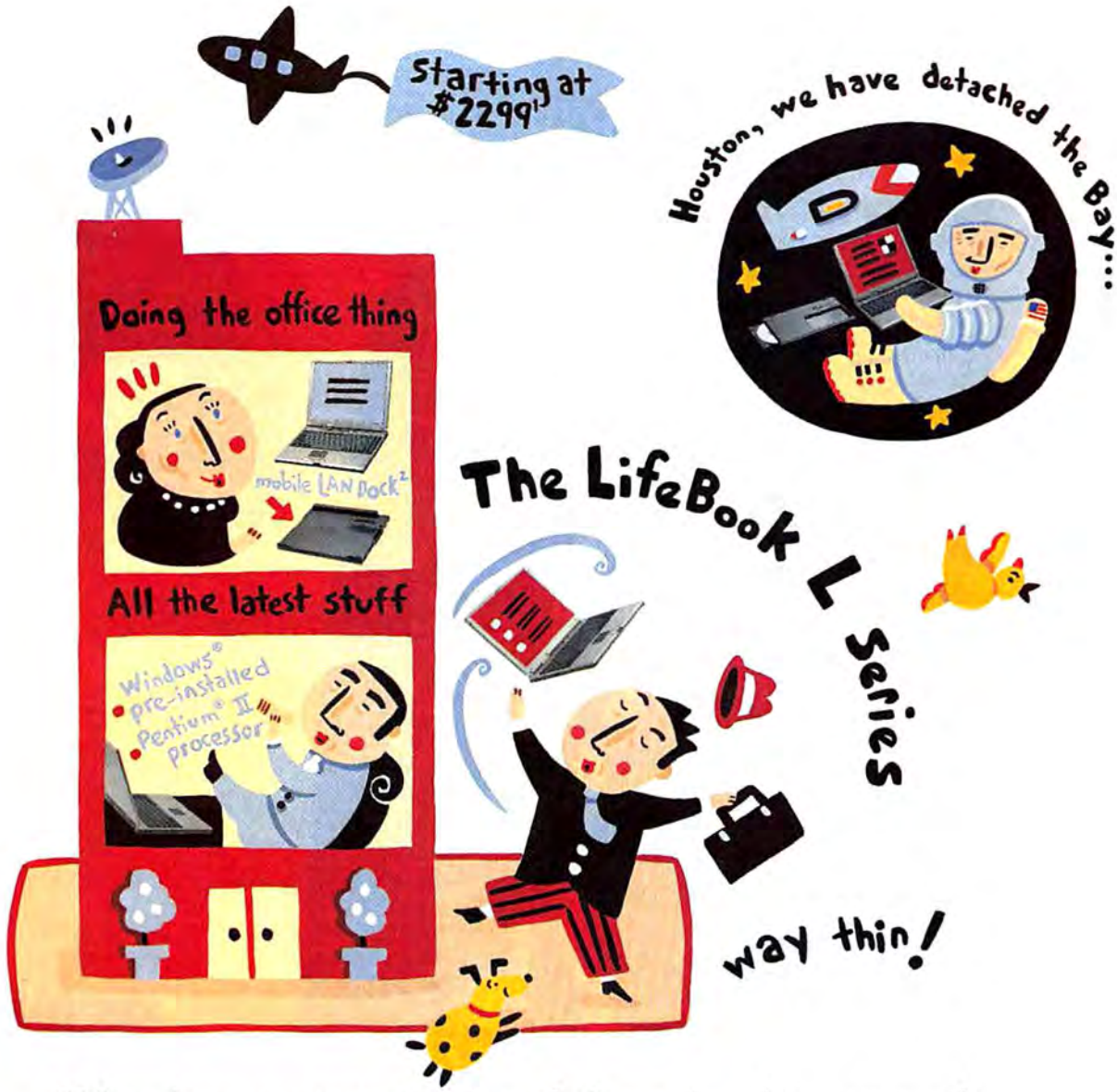
PHOTOGRAPH: KEVIN CANDLAND

FEATURES

One Box, Many Functions: An MFD Can Save You Space, Money, and Time

PRODUCT	Street price (5/3/99)	Copying/scanning features	Fax features	Print quality	Comments	Product info number
Brother MFC-7150C* 800/276-7746 www.brother.com	$499	Copies color or black without PC, enlarges, reduces, prints copies in any color.	Polling, remote retrieval, forwarding, phone number downloading, built-in cover pages.	Pale text and color.	Includes telephone handset and video-in port, easiest control panel and fax, print quality merely adequate.	774
Compaq A900 800/345-1518 www.compaq.com	$399	Copies black without PC, copies color with aid of PC scanning software.	Easy wizard-style function, calling-card support, fax backup and restoration.	Solid letters and gritty color.	Least expensive MFD here, can initiate scans, copies, and faxes with a control form, many features disabled in bundled "Basic" version of fax software.	775
HP OfficeJet R40* 800/752-0900 www.hp.com	$599	Copies color or black without PC, enlarges, reduces.	none	Rich text with jagged edges. Colors are slightly off, but subtle.	Most expensive MFD here, no fax capability, very easy to use, fast printing and copying, removable scanner lid.	776
Xerox WorkCentre 480cx 800/349-2796 www.xerox.com	$499	Copies black without PC, copies color with aid of PC scanning software.	Polling, cover-page design software.	Sharp black letters, very good detail and hue on color graphics.	Confusing control panel and menus, good print quality.	777

* Recommended



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Micron Millennia Max desktop PC

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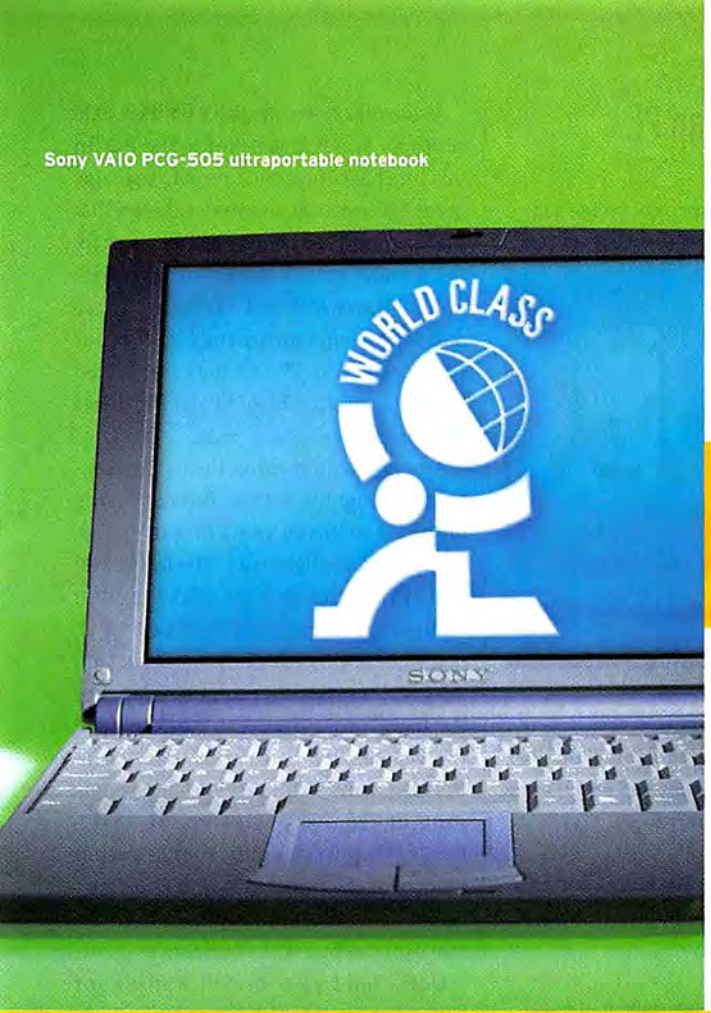

Sony VAIO PCG-505 ultraportable notebook

Best Products of 1999

PCs over 500 MHz, PCs under $500. **Astonishing growth in e-commerce,** astonishing erosion of online privacy.

Our picks for 67 of this year's best performers show just how wild **the end of the millennium** is.

By **PC World** Editors

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PRODUCT *of the Year* — The Cheap PC

LAST YEAR WE bestowed the title of Most Promising Hardware Newcomer on the sub-$1000 PC. Nowadays, even a $999 PC seems a tad pricey. Thanks in large part to the AMD K6 processors and their ongoing battle with Intel's low-cost Celeron chips, competition in the budget PC market is intense. How about an Emachines AMD K6-2-300 PC for $399? Or a Microworkz Webzter Jr. with a Cyrix MII-300 chip for a paltry $300? Even business machines are cheaper. Witness a powerful Celeron-466 PC for $1499. We say (with apologies to Herbert Hoover): a PC in every pot.

Emachines AMD K6-2-300

NOT TO BE alarmist, but we recommend you savor these 17th annual World Class Awards—because they could be our last. According to a rumor flying around *PC World*'s offices, our brains are not Y2K-compliant. Therefore, when the calendar changes at year's end, we may be reviewing products like it was 1900. Can you imagine what your great-grandparents would have made of the Palm IIIx?

Seriously now, that's the last you'll hear of millennial madness for the next eight pages. Despite the media furor over the Y2K bug, the past year saw a lot of other developments worth getting excited about: An eight-year-old operating system called Linux was born; PC prices fell to the point where it wasn't so crazy to pay in cash; and Big Brother carved out some space on the new Intel Pentium III processor so he could follow you around the Web.

Amid all this excitement, *PC World*'s editors, testers, and contributors examined a universe of products, Web sites, and companies. For weeks, we squabbled over which ones were the best. In the end, we crowned some previous unknowns (Amorphium and the Castlewood Orb drive come to mind), as well as some old favorites (Dell's Dimension PCs and Adobe Photoshop). And caught up in the spirit of giving, we couldn't resist handing out brickbats for some of the past year's more dubious achievements (see "The No-Class Awards," page 105).

But enough with the idle pleasantries. It's time to recognize the final World Class honorees of the '90s—that's the 1990s, not the 1890s.

PCs

- **Best Corporate Desktop PC** Dell OptiPlex GX1p Series *Solid reliability and performance for networked offices everywhere.*
- **Best Small-Business Desktop PC** Micron Millennia Max Series *Fully loaded systems at very reasonable prices.*
- **Best Home Desktop PC (tie)** Dell Dimension XPS T Series, Quantex QP6 M-1c Series *Power from Dell; value from Quantex.*
- **Best Notebook PC** Dell Latitude CPi Series *Classy case and a very comfy keyboard.*
- **Best Subnotebook PC** Toshiba Portégé Series *Thin, thinner, best.*

THOUGH BENCHMARKS are tricky, we're pretty sure Intel processors now outrun Wonder Woman and Superman. But if you're more Dilbert than Clark Kent (that is, you amble around cubicles, rather than leaping over them), you only need so much power. Which is why it's such good news that today's $1000 PC will handle basic computing chores as nimbly as a $2500 system. (Just don't unleash the latest 3D games on an unsuspecting cheap PC.)

At the office, we like **Dell's OptiPlex GX1p** series for larger installations. The PCs in this line have integrated remote management features and an interior design that makes multiple-system upgrades a snap. For smaller-scale business needs, check out the **Micron Millennia Max** series. These desktop systems consistently excel in our PC WorldBench 98 tests and come loaded with extras like DVD-ROM and Zip drives and topflight graphics cards.

Among home systems, the top two contenders fought to a draw. But depending on how much you're willing to spend, your decision will be easy. The **Dell Dimension XPS T** series systems offer the latest technology in home PCs—a fast CPU, oodles of RAM, a DVD-ROM drive, and 3D graphics. But they aren't cheap. For the fiscally conservative, we recommend the **Quantex QP6 M-1c** series of Celeron-based systems. With baseline chip speeds ranging from 333 MHz to 466 MHz, these PCs give you outstanding performance for the price. And with Quantex's reliability and service reputation on the rise, you can buy with confidence.

Don't hold your breath waiting for supercheap notebooks. Though prices are coming down, they're not in free fall. The hard-working **Dell Latitude CPi** corporate

Clockwise from left: Toshiba's Portégé 3015CT superslim notebook is one in a World Class line of subnotes; Mitsubishi's Diamond Pro 900u is a giant gem of a monitor; and Matrox's Millennium G200 should drive all your graphics.

notebooks top out above $3000, but they're the series of portables you want for your business. They've dominated our *Top 10 Notebook PCs* power chart this year, with a classy look and superior keyboard. The latest model, the Latitude CPi A366 XT, is relatively thin and lightweight, too, though we wouldn't call it a subnotebook. The best ultraportables come from **Toshiba's Portégé** line. Its Portégé 3015CT may not be the best superslim (less than an inch thick) notebook, but group it with the high-class Portégé 7000CT (just over 1 inch thick) and you've got the best brace of thin, lightweight notebooks around.

Components

- **Best Modem** Diamond Multimedia SupraExpress 56e *Fast and incredibly easy to use.*
- **Best Graphics Card** Matrox Millennium G200 *Makes AGP look like a good idea.*
- **Best Monitor** Mitsubishi Diamond Pro 900u *The Mercedes-Benz of big monitors.*
- **Best Input Device** Logitech MouseMan Wheel *Sorry, lefties, but this mouse rules.*
- **Best Sound Card** Creative Labs Sound Blaster Live *Can you hear gamers drool?*
- **Best PC Speakers** Cambridge SoundWorks SoundWorks *Love 'em, love 'em.*

IF THE EXPLOSION of cheap, no-frills computers has taught us one thing, it's that you can't do without certain components. Not only must you have a reasonably roomy place to store your data (see our Storage awards, at right), you need reliable ways to see it, manipulate it, and send it over the Internet. We'd also argue that hearing what your PC has to say (or play) is a basic part of computing.

That said, you don't have to be satisfied with the generic parts that come with most cheap PCs. Our favorite components start with the $100 **Diamond Multimedia SupraExpress 56e** external modem. It's fast, affordable, and a breeze to set up. We also like the $129 **Matrox Millennium G200** graphics card. It functions best as an AGP card, handling mixed-media graphics with aplomb, but it's no slouch at supporting the occasional 3D game, either. Hook up the Millennium to a big, bright **Mitsubishi Diamond Pro 900u** monitor and revel at the sight of everything from desktop publishing layouts to Web pages. This $799 19-incher displays some of the sharpest, most vibrant colors we've seen on a computer screen. And when you're clicking around in cyberspace, use the $50 **Logitech MouseMan Wheel**. Granted, southpaws are out of luck, but this is still the most comfortable mouse around—even our left-handed editors agree.

For listening to basic audio files, you need a good sound card. Throw in MIDI instruments or 3D games, and you'll want a great sound card: the $200 **Creative Labs Sound Blaster Live**. It's pricey—but worth every penny. If you paid for PC speakers by the pound, our World Class winner would also be expensive. The $150 **Cambridge SoundWorks SoundWorks** speakers are the size of your fist. But add the bundled subwoofer and you get audio that rivals the output of much larger systems.

Storage

- **Best Hard Drive** IBM Deskstar 22GXP *Who says big can't mean fast?*
- **Best DVD-ROM Drive** Sony DDU-220E/H5X *Finally, a DVD-ROM drive that can deliver the goods.*
- **Best CD-ROM Drive** Plextor UltraPlex 40max *Really fast—'nuff said.*
- **Best CD-Rewritable Drive** MicroSolutions Backpack 4X CD-Rewriter *Create your own CDs on the run.*
- **Best Removable Storage Drive** Castlewood Orb 2.2GB *Upstart drive challenges the Iomega dynasty.*

WHEN YOU GET serious about upgrading your PC, you'll probably consider bolstering your storage system. After all, few components have improved as quickly as the various drives that hold your data. Just look at hard drives: A year ago, 14GB was considered huge; this year's World Class winner—**IBM's Deskstar 22GXP**—packs 22GB. Despite its vast capacity, the Deskstar is noticeably faster than previous generations of hard drives; and at $459, it costs only about 2 cents a megabyte.

Hard drives aren't the only rapidly evolving storage device. CD-ROM, DVD-ROM, CD-Rewritable, and removable-media drives also made big strides in the past year. Early DVD-ROM drives could barely play DVD movies, and they ran ▶

Most Promising HARDWARE NEWCOMER

Sony VAIO PCG-505 Series

IT MAY NO LONGER be the best superslim notebook PC line (see May's "The Skinny on Ultraportables," www.pcworld.com/may99/ultraportables), but **Sony's VAIO PCG-505** was the first of its kind. This VAIO line takes the prize for Most Promising Hardware Newcomer this year because it made us excited about portable computers again. The systems in this series have a sleek design, an IEEE 1394 port for plugging in a Sony Handycam, and a built-in V.90 modem. And they're less than an inch thick! Frankly, we can't wait to see what the electronics giant does next. The new VAIO PCG-505TX with a 300-MHz Pentium MMX chip has just hit stores, and you may also want to check out the VAIO C1 PictureBook with its built-in digital camera.

CD-ROM programs sluggishly. The current generation plays DVD discs at about 5X speed and does justice to legacy CD-ROMs. Our favorite, the **Sony DDU-220E/H5X** drive, costs around $250 and is relatively easy to install.

But don't count out CD-ROM drives just yet. **Plextor's UltraPlex 40max** ($189 for an internal drive, $269 for an external drive) is breathtakingly quick; and if you need to create your own CDs, go for the portable $399 **MicroSolutions Backpack 4X CD-Rewriter**. Although the Backpack attaches to your computer's parallel port, it doesn't sacrifice much speed—a combination no other CD-RW drive can claim.

Rounding out our top storage products is the $200 **Castlewood Orb 2.2GB** removable-media drive. It uses 2.2GB removable cartridges that, like the drive itself, are considerably less expensive than Iomega's offerings. And if that isn't incentive enough, it's also significantly faster. Are you ready to upgrade?

Peripherals

- **Best Personal Color Printer** Canon BJC-5000 *Laserlike text output.*
- **Best Personal Monochrome Printer** Brother HL-1040 *Won't break your SOHO's budget.*
- **Best Scanner** Epson Perfection 636 *Nice colors, easy to set up.*
- **Best Digital Camera** Nikon Coolpix 950 *For pros and hobbyists alike.*
- **Best Flat-Panel Display** Silicon Graphics 1600SW *Stunning digital images for the well-to-do.*
- **Best Projection System** Proxima UltraLight LS1 *Fully loaded—and priced to match.*
- **Best Personal Digital Assistant** 3Com Palm IIIx *Last year's winner just gets better.*

Clockwise from top: The Epson Perfection 636 scanner, Proxima's UltraLight LS1 projection system, and the Palm IIIx PDA from 3Com.

NO PC IS AN ISLAND. The best peripherals make a computing experience complete. The past year has seen developments in peripherals that simply make stuff look better. The $199 **Canon BJC-5000** color ink jet printer (recently joined in the line by the BJC-5100) may not be the fastest model on the block, but it turns out laser-quality text. And because it holds two ink cartridges, you can vary the output speed as needed. If you never need color, we recommend the $300 **Brother HL-1040**. This small-office/home office printer has lots to offer: It's inexpensive and fast, and it prints great-looking documents.

But enough about getting things out of your computer. There are also a couple of great ways to get documents and images into your PC. The speedy $299 **Epson Perfection 636** flatbed scanner produces good scans and is easy to set up—despite its SCSI interface. If you want to skip the scanner intermediary, **Nikon's Coolpix 950** ($999) is the digital camera to buy. A thousand bucks is a lot of money, but the Coolpix can capture images at 1600 by 1200 resolution, which makes for beautiful 8-by-10-inch printouts.

Speaking of big images, you should see what they look like on the **Silicon Graphics 1600SW** 17.3-inch flat-panel monitor. The 1600SW comes as part of the $2795 Digital Flat Panel Solution Pack, which includes a Number Nine Revolution IV FP graphics board. Because the Solution Pack is a 100 percent digital system (no analog conversions to muddy the waters), the images it produces rank among the sharpest, most stunning we've seen on a computer display. Another source of striking images is the $5999 **Proxima UltraLight LS1** projection system. At this price you'll want to make sure it doesn't walk out of your conference room, but it's ideal for making presentations.

Even our favorite personal digital assistant made notable advances in image quality. The new four-gray-scale LCD of the $369 **3Com Palm IIIx** is a big improvement over the Palm III's version. In addition, the Palm IIIx has twice as much RAM as its predecessor, and it can accept cool little expansion cards for such upgrades as flash memory and pagers.

LOSER *of the Year*

Privacy

"YOU ALREADY have zero privacy. Get over it," said Scott McNealy, CEO of Sun Microsystems. True, the IRS, your bank, even your video rental store probably know more about you than some of your friends do, but that's no excuse for the assault on personal privacy waged by technology companies in the past year. Web sites delayed spelling out how they intended to protect privacy online. Intel assigned serial numbers to Pentium III chips so Web sites could identify visitors. And Microsoft admitted to harvesting PC hardware information without users' permission. Both companies have taken measures to rectify the situation (see June's *Bugs and Fixes*, www.pcworld.com/jun99/bugfix). And it can be argued that some compromise of privacy is a necessary trade-off for enjoying the power of technology. But few observers deny that PC users have lost even more of what scant anonymity they had left.

PHOTO ILLUSTRATION (LEFT): WILLIAM DUKE

Business Software

- **Best Operating System** None *Sorry.*
- **Best Application Suite** Microsoft Office 97 *We're not sold on 2000 just yet.*
- **Best Personal Information Manager** Lotus Organizer 5 *Simple, useful, powerful.*
- **Best Utility Software** Norton SystemWorks 2 *The best of all Nortons.*
- **Best Antivirus Software** Norton AntiVirus 5 *Melissa, meet Peter.*
- **Best Accounting Software** Peachtree Office Accounting *Peanut counters rejoice!*

WE'LL CUT TO THE CHASE and let the letters to the editor fly: No operating system deserves a World Class Award this year. We love what the Linux flavors have done for the OS landscape, but they haven't reached mass usability yet. And naming a best Windows service pack is like awarding a Pulitzer Prize for the best newspaper retraction. Let's get things right the first time, people.

Of course, bugs are a fact of life. Our World Class application suite, **Microsoft Office 97**, certainly had its share, but it reigns as the best collection of bread-and-butter programs on the market. (Its successor, Office 2000, doesn't offer enough of an upgrade to cause a mass exodus from 97.) The only thing missing from Microsoft's suite is the best personal information manager—**Lotus Organizer 5**. For the time being, this $79 program provides the easiest way to manage schedules and contacts, though Outlook 2000 appears to be gaining on it.

Suites aren't always about word processing and spreadsheets. The **Norton SystemWorks 2** utility suite from Symantec does everything but wipe the crud off your keyboard. Among the latest additions to the $59 package are CleanSweep, the wonderful uninstall utility, and CrashGuard, for system protection and recovery. SystemWorks also includes the year's best antivirus program—**Norton AntiVirus 5**. The $50 stand-alone antivirus package has an efficient Scan and Deliver feature that roots out new viruses, quarantines them, encrypts them, and e-mails them to Symantec's researchers for analysis.

Left to right: First-rate business apps Lotus Organizer 5, Microsoft Office 97, and Norton AntiVirus 5.

Looking for the best way to track the financial health of your business? Try **Peachtree Office Accounting**. For $149, you get a complete set of tools that integrate seamlessly with Microsoft Office. ▶

The NO-CLASS Awards

YOU'VE SEEN THE BEST, now here's the rest. Join us in razzing some of the year's most notably underwhelming performers.

BARON MÜNCHHAUSEN LIFETIME ACHIEVEMENT AWARD to **Vice President Al Gore,** who in an interview with CNN said that he "took the initiative in creating the Internet." Amazingly, Al also invented the steam engine, the incandescent light bulb, and those little clips that prevent eyeglasses from sliding off your nose.

Mr. Gore

Mr. Gates

OLIVER STONE "IN VIDEO VERITAS" AWARD to **Microsoft's crack demo team,** which was forced to admit that three videotapes shown at Microsoft's antitrust trial were "bollixed up." English translation: faked.

POWER SPRINGS FROM THE BARREL OF A KEYBOARD AWARD to **the Chinese government,** which sentenced Shanghai businessman Lin Hai to two years in jail for supplying 30,000 Chinese e-mail addresses to a U.S. online publication. The magistrates showed mercy; Lin's original sentence was two years in an AOL chat room.

THERE'S ONE BORN EVERY NANOSECOND AWARD to **Intel,** for slapping three (count 'em, three!!!) exclamation points after the name Pentium and expecting gullible computer users to believe the new chip was something more than a dolled-up version of the Pentium !!, er, II.

"THAT DEPENDS ON WHAT YOUR DEFINITION OF 'IS' IS" AWARD to **Bill Gates.** When questioned by a government attorney during the Microsoft antitrust trial about what he "would ask of Apple," Gates replied, "I have no idea what you're talking about when you say 'ask.'" Other words and idiomatic expressions not in Bill's vocabulary: "competition," "bugs," "backward-compatible," and "the product will be released on time."

CLAUDE RAINS "I AM SHOCKED, SHOCKED" AWARD to **Iomega.** Just as the Zip drive's Click of Death was fading from memory, Iomega had to recall 60,000 Jaz power supplies that potentially expose users to electrical shock. Hey, maybe the company should call 'em Zap drives.

SHOW ME THE MONEY AWARD to **Amazon.com,** for posting book "recommendations" that publishers paid for. Rumor has it that, for $20 million more, company CEO Jeff Bezos is willing to advise readers to buy the books at barnesandnoble.com.

THE MARRIAGE MADE IN HADES AWARD to **AOL,** which after being dogged for years by complaints about poor service, gobbled up Netscape—a company notorious for shipping software late or not at all. Finally, some real competition for Microsoft.

PHOTOGRAPHS: AP PHOTO/HANS DERYK (BOTTOM LEFT); ANDY FREEBERG (BOTTOM RIGHT)

Most Promising SOFTWARE NEWCOMER

Linux SURE, IT'S BEEN a cult fave of the geek elite for years. But this was the year **Linux** emerged as a legitimate competitor to Microsoft Windows. And no wonder: Thanks to a worldwide team of talented, unpaid programmers, Linus Torvalds's brainchild is stable, powerful, and (depending on where you get it) either cheap or free. Admittedly, Linux still has some distance to go before it qualifies as an operating system for the masses (easier installation, broader hardware support, and a wider array of applications would help). But with big guns like Compaq, Dell, Intel, and IBM in its corner, this underdog could end up being Bill Gates's worst nightmare.

Personal Software

- **Best Personal Financial Software** Microsoft Money 99 Financial Suite *Smart alternative to Quicken's bugs.*
- **Best Tax Software** Kiplinger TaxCut Deluxe 98 *Free state forms!*
- **Best Freeware** NetSonic 1.02 *A Web accelerator that actually works.*
- **Best Voice Recognition Software** Dragon NaturallySpeaking Preferred 3 *Highest level of accuracy, easiest error correction.*
- **Best Reference Software** Microsoft Encarta Reference Suite 99 *DVD-ROM bursting with information and useful clips.*
- **Best Game** Links LS 1999 *Tired of Web links? Then hit these greens instead.*

EXPERIENCED PC USER seeks personal software. Should be comprehensive but not a hard drive hog, reasonably priced but not buggy, innovative but not gimmicky. Dancing paper clips and singing icons need not apply.

Hey, you have a right to be picky: Personal software involves your time and your money. Consider our financial software winner, **Microsoft's Money 99 Financial Suite**. Microsoft Money and its chief rival, Intuit's Quicken, have been serving people well for years. But this time around, Microsoft's $65 package gets the nod, for two reasons: First, Money's latest makeover adds plenty of wizards, forward-looking planning tools, and links to useful online content. Second, the application seems even better in light of Quicken 99's bug problems (see *Bugs and Fixes*, www.pcworld.com/apr99/bugfix).

Intuit's TurboTax is a seasoned veteran of the personal income tax wars, but the company fell behind in this category, too. Block Financial's $40 **Kiplinger TaxCut Deluxe 98** is every bit as easy to use as TurboTax, and this year it offered free state forms. If Intuit follows suit next year, consumers will win big.

On the Net, some of the best utilities are free, like Web 3000's **NetSonic 1.02** browser accelerator (www.web3000.com). It won't make you feel like you've upgraded to a T1 line, but it will make your 56-kbps modem run at closer to 56 kbps. NetSonic installs easily and significantly reduces the loading time of your favorite Web pages.

Top to bottom: Links LS 1999, Microsoft Money 99 Financial Suite, and Kiplinger TaxCut Deluxe 98.

As an ongoing locus of innovation, voice recognition continues to intrigue even jaded PC users. Though it remains imperfect, the technology made progress in the past year. **Dragon NaturallySpeaking Preferred 3** ($160) beats its competitors on accuracy and ease of correction.

It's hard not to be charmed by **Microsoft's Encarta Reference Suite 99**. The $139 version packs Encarta Encyclopedia Deluxe, Virtual Globe 99 Atlas, and Bookshelf 99 onto one DVD-ROM disc. You'll find sharper audio and bigger and better video clips than ever before.

When you need a break, try **Links LS 1999**, recently bought by Microsoft. Four golf courses, admiring fans, nifty sound effects, and advice from Arnold Palmer make it a tiger of a $40 golf game.

Graphics Software

- **Best Presentation Graphics Software** Lotus Freelance Graphics 9 *Simple tools edge out PowerPoint.*
- **Best Desktop Publishing Software** Microsoft Publisher 2000 *Already a cinch to use, now more powerful.*
- **Best Image Editing Software (tie)** Adobe Photoshop 5, JASC Paint Shop Pro 5 *Photoshop's the industry standard; Paint Shop Pro packs a wallop for a low price.*
- **Best Draw Software** CorelDraw 9 *Do-everything product stays ahead.*
- **Best Business Graphics Software** Visio Standard 5 *Tops for brass-tacks graphics.*
- **Best 3D Graphics Software** Amorphium *3D modeling made easy—and entertaining.*

WHO SAYS competition is dead in the software industry? Seven graphics companies receive nods this year. Among presentation packages, **Lotus's Freelance Graphics 9** takes the first prize, on the strength of its interface and templates. Plus, Freelance Graphics 9's Web ▶

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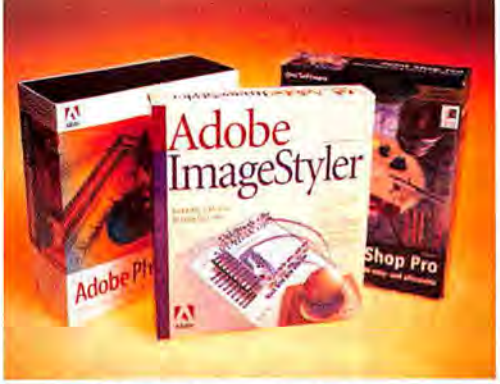
tools work well with various browsers, whereas Microsoft's PowerPoint 2000 seems to assume that all the world uses IE 4.0 or higher.

Of course, most people get their presentation package as part of a suite. Case in point: Freelance is available only as part of Lotus's SmartSuite Millennium Edition. And suites may be on the verge of swallowing desktop publishing—most editions of Microsoft's new Office 2000 include **Publisher 2000** ($99 as a stand-alone package). Publisher has top-notch wizards and templates, and the new version also prepares publications like color catalogs and brochures to be professionally printed.

Ever since folks began tweaking photos on computers, Adobe's Photoshop has been synonymous with high-end image editing. **Photoshop 5** maintains that tradition, albeit at a steep price—$649. For casual photo editing, we recommend **JASC's Paint Shop Pro 5** ($79); it's easy to use, it's powerful, and, refreshingly, it comes with an excellent manual.



Left to right: Adobe's finest—Photoshop 5 and ImageStyler 1—and JASC's classy Paint Shop Pro 5.

Yet another excellent photo editor forms part of the graphics megabundle known as **CorelDraw 9.** This $199 upgrade adds dozens of improvements (including the ability to publish PDF files) to what was already a remarkably capable product. In contrast to Corel's versatility, the $180 **Visio Standard 5** does one thing, but does it exceptionally well: It lets neophytes create flow charts and other diagrams with little fuss. (Look for Visio 2000, a major upgrade, sometime this summer.)

While Visio is all business, Play's $149 **Amorphium 1** is, well, playful. This one-of-a-kind package allows you to design and animate three-dimensional creations by squishing, squashing, and painting them with your mouse. It's virtual Play-Doh.

Internet

- **Best Internet Utility** ICQ 99 *Your mother's online. Wanna chat?*
- **Best Web Graphics Software** Adobe ImageStyler 1 *Putting a pretty face on the World Wide Web.*
- **Best Web Authoring Tool** Microsoft FrontPage 2000 *Programming a VCR should be this easy.*
- **Best Web Browser** Microsoft Internet Explorer 5 *Death to the Channel Bar!*
- **Best E-Mail Software** Microsoft Outlook Express *Only a P.O. box is easier to use.*
- **Best Internet Service Provider** IBM Internet Connection *Keeps you online.*

THE PAST YEAR SAW even more people piling online—so many, in fact, that some observers predict the load will break the Net's backbone. And what are all these new Web wanderers doing while the lines of communication creak beneath their weight? They're chatting up a storm, and millions are using our favorite Internet utility, **ICQ 99** (that's "I seek you"). ICQ is the immensely popular, free buddy list program that lets you know when your friends are on the Web so you can send them instant messages. Of course, your buddies have to use ICQ, too; but with 15 million registered users to date, you can always make new buddies.

When they're not chatting, Webheads may be creating their own sites. To make your site look marvelous, try the $129 **Adobe ImageStyler 1.** It comes chock-full of shapes, images, and textures (and 14 levels of undo, in case you mess up) for creating eye-catching Web graphics. And it works with our favorite authoring tool, **Microsoft's FrontPage 2000** ($149). The latest FrontPage has the same capabilities as its precursor (last year's World Class winner), but it makes the job of building Web pages easier. You also get more flexibility in selecting text styles, colors, and layouts. Some cool features, however—like cascading style sheets—must be viewed in version 4.0 (or higher) browsers.

Cue **Internet Explorer 5**, the latest, World Classiest browser from Microsoft. In its perennial struggle with Netscape for World Wide Web domination, IE now has the upper hand. It's faster and considerably slimmer than its predecessor, and (hurray!) it won't load that infernal Channel Bar unless you really want it to. ▶

Most Promising WEB NEWCOMER — MP3

HIP, IMMENSELY popular, and controversial, **MP3** caused a stir in the music scene rivaled only by the buzz generated by R&B singer Lauryn Hill. The technology creates highly compressed, near-CD-quality sound files you can download off the Web in a jiffy. It has endeared itself to millions of PC users. And it's struck fear into the hearts of recording industry execs because it lends itself to audio piracy. Still, MP3 is rapidly going legit. Sites such as www.mp3.com offer thousands of authorized files, and Diamond's Walkman-like Rio PMP300 player is a hit. Next up: Empeg's in-dashboard MP3 player for cars, with a carrying capacity of 7000 digitized tunes.

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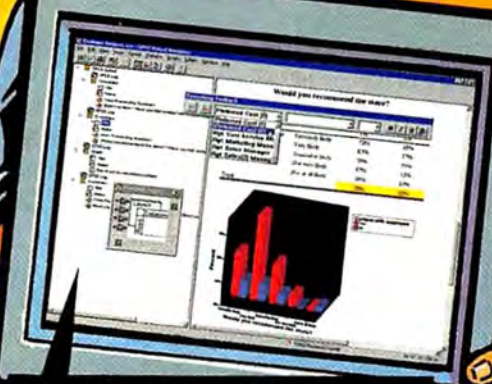

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You'll definitely want IE 5's **Outlook Express** e-mail client, of course. It remains the easiest e-mail software to use.

Finally, none of this excitement is possible if you can't connect to the Net. For our money, **IBM Internet Connection** does the best job of getting people online. It's easy to install; provides fast, reliable connections; and earns praise from users. Not so long ago, AT&T WorldNet was the ISP to beat (see March's "Good Providers: The Best National and Regional ISPs," www.pcworld.com/mar99/isps), but recent growing pains have dramatically worsened that provider's service.

Web Sites

- **Best Web Portal** Yahoo *It's not just for searching anymore.*
- **Best Shopping Web Site** Amazon.com *E-commerce as it should be.*
- **Best Web Brokerage Site** Charles Schwab *Research and service are tops.*
- **Best News and Information Web Site** CNN Interactive *Timely and comprehensive.*
- **Best Recreational Web Site** The Internet Movie Database *Authoritative, addictive.*

IF YOU DOUBT THAT the Web has ingrained itself in the American consciousness, consider this: 1999's Super Bowl was sandwiched between commercials for job-hunting sites and Victoria's Secret's first online lingerie show. Our World Class picks, however, are old-timers.

Not that they're resting on their laurels. **Yahoo** (www.yahoo.com), for instance, has morphed into the best Web portal. And unlike some of its competitors, it didn't sacrificed quality for quantity in doing it.

The Web's best, most popular bookstore, **Amazon.com** (www.amazon.com), has branched out, too—into CDs and videos. Heck, it's even started running online auctions. Of course, its growth has not been bump-free: Amazon.com raised shoppers' hackles last winter at the disclosure of its policy (thereafter quickly rescinded) allowing publishers to purchase editors' recommendations.

Speaking of irate customers, recent service outages at several major online brokers have had investors up in arms. Even though **Charles Schwab** (www. schwab.com) has experienced some glitches, it's still a World Class winner. The site is easy to navigate and offers the best research, and the company's service can't be touched.

With Ted Turner's empire behind it, **CNN Interactive** (www.cnn.com) is hardly an upset winner. (Note: much of its technology coverage is provided by International Data Group, *PC World*'s parent company.) On the other hand, having a reference database snare our award for Best Recreational Web Site may qualify as a shocker. But then the **Internet Movie Database** (www.imdb.com) is no ordinary reference work. You could spend hours happily lost in its seemingly infinite trove of movie and TV trivia.

Networking

- **Best Network Operating System** Novell NetWare 5 *You gotta be in it to win it.*
- **Best Group Application Software** ERoom 3 *Still the best for virtual groups.*
- **Best Network Server** Compaq ProLiant 1600 *Fast, smart, and affordable.*
- **Best Workgroup Printer** Tektronix Phaser 740/N *Speedy, colorful, affordable.*
- **Best SOHO Networking Product** Boca Research HAN Kit *A low-cost network in your own home.*

THE BIGGEST NETWORKING noise came from **Novell NetWare 5**. Some recent NetWare versions lost market share to Windows NT, but NetWare 5 has a legitimate chance to reverse that trend. It runs natively over TCP/IP and has improved network directory services—a feature that NT won't support until Windows 2000.

If you want users to collaborate on projects—in your office or across the country—you need **ERoom 3** ($4995 for the server, $199 per user) from Instinctive Technology. The latest version of this repeat winner is easier than ever to customize (version 4 should be out soon).

Charles Schwab is the online broker to beat.

For running a network, we like **Compaq's ProLiant 1600** server. It moves files around at lightning speeds, without breaking the bank. And if things are about to go wrong, Compaq's Insight Manager promises to warn you in advance. If you like, you can hook the ProLiant up to the $1995 **Tektronix Phaser 740/N**, a superior network printer that pumps out monochrome and color pages at a reasonable price.

But maybe productivity on this scale is more than you need. For a small or home office, **Boca's HAN Kit** offers cheap, fast, and easy home area networking for $109.

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But maybe you prefer to order direct from a PC manufacturer. Then check out **Dell**. *PC World* subscribers consistently tell us in our semiannual PC Reliability and Service survey that Dell is the best direct vendor—for desktops and notebooks. What's more, they say Dell offers the best support of any PC maker.

Of course, you need support for software, too. In a separate survey, readers told us **Microsoft** remains the best among software makers. Considering all the legal distractions it faces, we applaud Microsoft for finding time to answer the phone! ■

Where to Buy

3Com Palm IIIx
3Com; 800/881-7256; www.palm.com
PRODUCT INFO NO. 738

Adobe ImageStyler 1
Adobe Photoshop 5
Adobe Systems; 800/492-3623; www.adobe.com
PRODUCT INFO NO. 739

Amorphium
Play; 800/306-7529; www.play.com
PRODUCT INFO NO. 740

Boca Research HAN Kit
Boca Research; 561/241-8088; www.bocaresearch.com
PRODUCT INFO NO. 741

Brother HL-1040
Brother; 800/276-7746; www.brother.com
PRODUCT INFO NO. 742

Cambridge SoundWorks SoundWorks
Cambridge SoundWorks; 800/367-4434; www.hifi.com
PRODUCT INFO NO. 743

Canon BJC-5000
Canon; 800/652-2666; www.canon.com
PRODUCT INFO NO. 744

Castlewood Orb 2.2GB
Castlewood Systems; 925/461-5500; www.castlewood.com
PRODUCT INFO NO. 745

Compaq ProLiant 1600
Compaq; 800/345-1518; www.compaq.com
PRODUCT INFO NO. 746

CorelDraw 9
Corel; 800/772-6735; www.corel.com
PRODUCT INFO NO. 747

Creative Labs Sound Blaster Live
Creative Labs; 800/998-5227; www.soundblaster.com
PRODUCT INFO NO. 748

Dell Dimension XPS T Series
Dell Latitude CPi Series
Dell OptiPlex GX1p Series
Dell; 800/388-8542; www.dell.com

Diamond Multimedia SupraExpress 56e
Diamond Multimedia; 800/468-5846; www.diamondmm.com
PRODUCT INFO NO. 749

Dragon NaturallySpeaking Preferred 3
Dragon Systems; 800/437-2466; www.dragonsys.com
PRODUCT INFO NO. 750

Epson Perfection 636
Epson; 800/463-7766; www.epson.com

ERoom 3.0
Instinctive Technology; 888/593-7666; www.instinctive.com
PRODUCT INFO NO. 751

IBM DeskStar 22GXP
IBM; 888/426-5214; www.ibm.com/harddrive

IBM Internet Connection
IBM; 800/821-4612; www.ibm.net

JASC Paint Shop Pro 5
JASC Software; 800/622-2793; www.jasc.com
PRODUCT INFO NO. 752

Kiplinger TaxCut Deluxe 98
Block Financial; 800/235-4060; www.taxcut.com
PRODUCT INFO NO. 753

Links LS 1999
Microsoft; 800/793-0073; www.microsoft.com/sports/golf
PRODUCT INFO NO. 754

Logitech MouseMan Wheel
Logitech; 800/231-7717; www.logitech.com
PRODUCT INFO NO. 755

Lotus Freelance Graphics 9
Lotus Organizer 5
Lotus; 800/343-5414; www.lotus.com
PRODUCT INFO NO. 756

Matrox Millennium G200
Matrox; 800/361-1408; www.matrox.com/mga
PRODUCT INFO NO. 757

Micron Millennia Max Series
Micron; 888/546-0501; www.micronpc.com
PRODUCT INFO NO. 758

Microsoft Encarta Reference Suite 99
Microsoft FrontPage 2000
Microsoft Internet Explorer 5
Microsoft Money 99 Financial Suite
Microsoft Office 97
Microsoft Outlook Express
Microsoft Publisher 2000
Microsoft; 800/426-9400; www.microsoft.com
PRODUCT INFO NO. 759

MicroSolutions Backpack 4X CD-Rewriter
MicroSolutions; 800/890-7227 ext. 200; www.micro-solutions.com
PRODUCT INFO NO. 760

Mitsubishi Diamond Pro 900u
Mitsubishi; 800/843-2515; www.mitsubishi-display.com
PRODUCT INFO NO. 761

Nikon Coolpix 950
Nikon; 800/526-4566; www.nikonusa.com
PRODUCT INFO NO. 762

Norton AntiVirus 5
Norton SystemWorks 2
Symantec; 800/441-7234; www.symantec.com
PRODUCT INFO NO. 763

Novell NetWare 5
Novell; 888/321-4272; www.novell.com
PRODUCT INFO NO. 764

Peachtree Office Accounting
Peachtree Software; 800/428-6957; www.peachtree.com
PRODUCT INFO NO. 765

Plextor UltraPlex 40max
Plextor; 800/886-3935; www.plextor.com
PRODUCT INFO NO. 766

Proxima UltraLight LS1
Proxima; 800/447-7692; www.proxima.com
PRODUCT INFO NO. 767

Quantex QP6 M-1c Series
Quantex; 800/896-4898; www.quantex.com
PRODUCT INFO NO. 768

Silicon Graphics 1600SW
Silicon Graphics; 800/744-7373; www.sgi.com/go/flatpanel
PRODUCT INFO NO. 769

Sony DDU-220E/H5X
Sony VAIO PCG-505
Sony; 888/315-7669; www.sony.com
PRODUCT INFO NO. 770

Tektronix Phaser 740/N
Tektronix; 800/835-6100; www.tektronix.com
PRODUCT INFO NO. 771

Toshiba Portégé Series
Toshiba; 800/867-4422; www.toshiba.com
PRODUCT INFO NO. 772

Visio Standard 5
Visio; 800/248-4746; www.visio.com
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The Journey of Hope.

It's said that even the longest journey begins with a single step. If that's the case, Starlight Children's Foundation has already put thousands of miles behind them. As a premier children's charity, Starlight Children's Foundation improves the quality of life of seriously ill children and their families through in-hospital entertainment programs, and out-patient programs and services.

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It's the kind of thing good neighbors and good corporate citizens must do. We hope it helps and we hope you'll come out and take part when the Journey of Hope tour visits a city near you.

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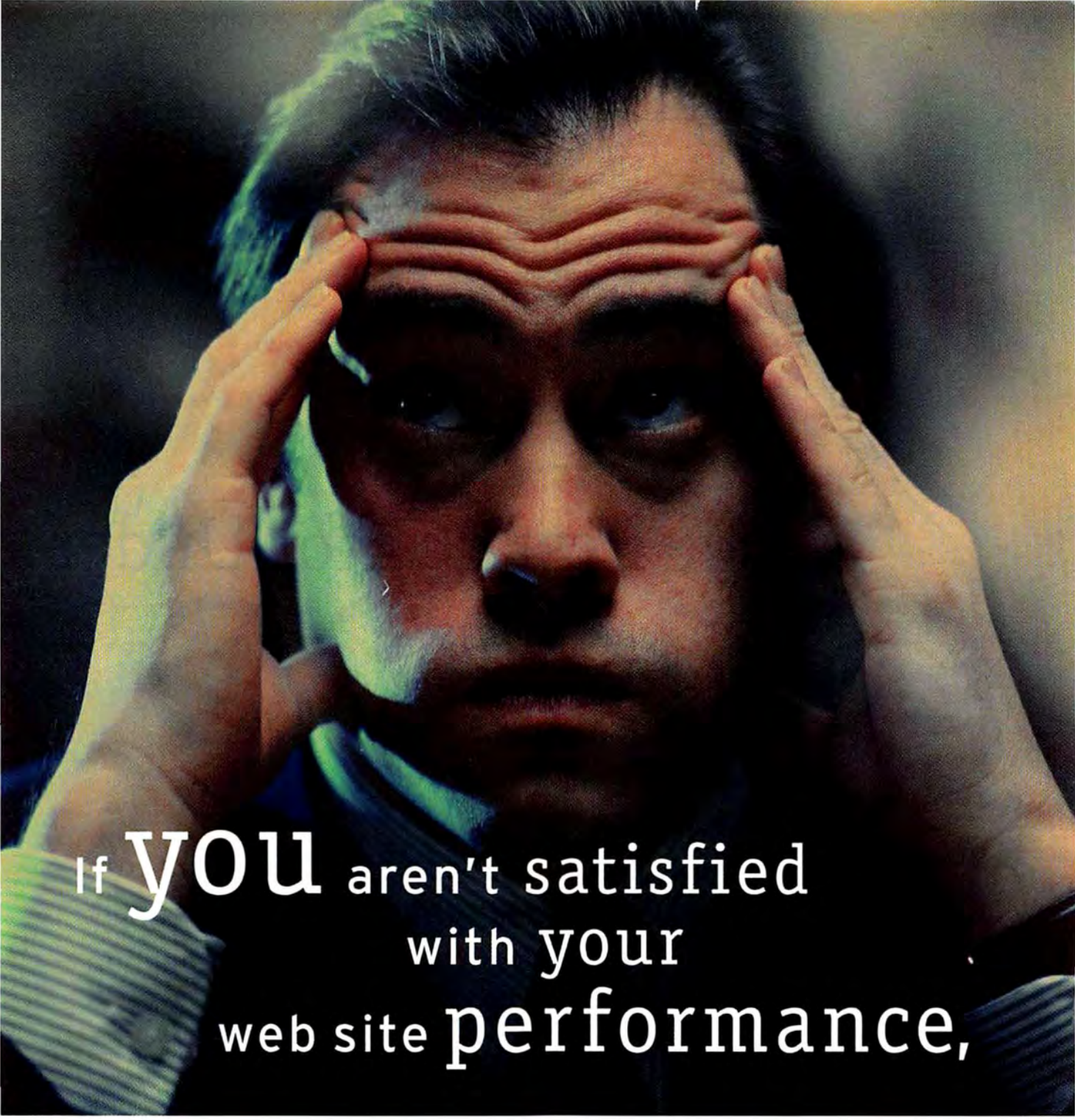

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How Low Can They Go?

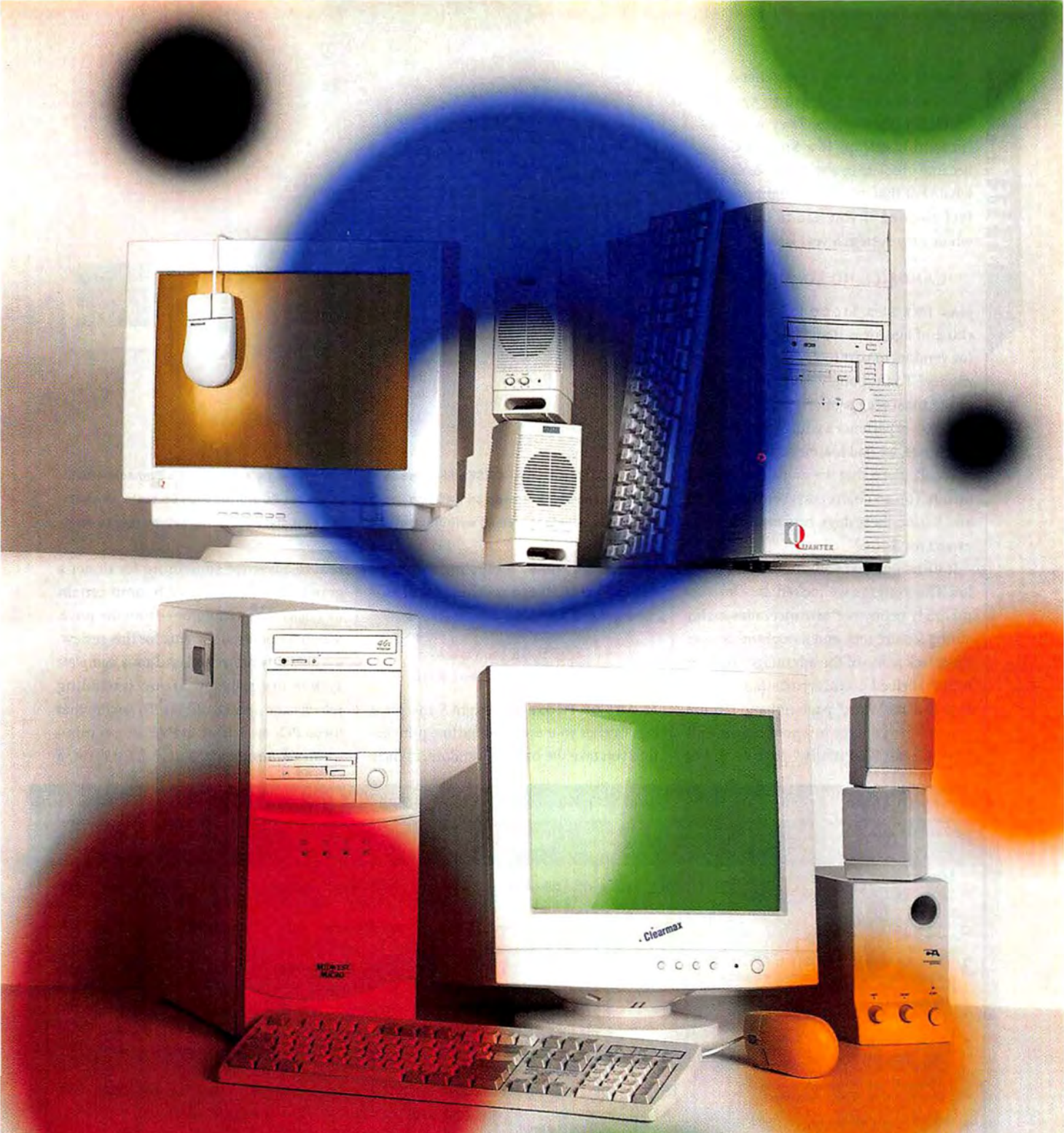
The Best PCs for Under $1000

Sub-$1000 PCs are flying off shelves and into millions of homes and offices. We review 21 budget friendly systems in search of the best combination of value and performance.

By Jon L. Jacobi and Andrew Brandt

POLL EXPERIENCED COMPUTER USERS about sub-$1000 PCs, and you'll hear words like *slow, compromised, limited,* and *obsolete* used to describe them. Not long ago, those terms would have been accurate. PCs in this class typically offered the slowest processors, the smallest hard drives, aging graphics subsystems, and terrible sound. They were often small, difficult-to-upgrade boxes with cheap keyboards and tiny monitors—attractive only to unlucky first-time buyers who didn't know any better. ▶

PHOTOGRAPHS BY PIERRE-YVES GOAVEC



BEST OF THE BARGAIN PCs: Quantex's M400c (top) and MidWest Micro's Office MWO-400C took top honors in the review. Both systems—one targeted at home users, the other at office workers—offer outstanding features and speedy performance at a very low price.

Nonetheless, even experienced users considered sub-$1000 systems, for one reason: They were incredibly cheap. If a $999 PC became obsolete in a year or two, so what? For that price, you might not feel cheated if you had to buy a whole new system a year later.

LANDFILL NO LONGER

HAS THE SUB-$1000 PC finally come of age, or is it still just a way for vendors to part fools from their money? To find out, we ordered 21 of the most recent offerings. From our past experiences with low-cost machines, we had low expectations. After all, given that the average computer on our Top 20 charts costs between $1500 and $2000 these days, how much can you expect for $999?

SMALL-OFFICE WORKHORSES like Emachines' Etower 366i (left), Kingdom's Pinnacle 400S (middle), and Dell's Dimension V400c performed well in our PC WorldBench 98 tests. Most of these PCs include thorough, well-illustrated manuals that make the initial setup process easy.

It turns out that you can expect quite a lot. The systems we looked at offer surprisingly peppy performance, reasonably strong feature sets, and thoughtful design. They lack some of the advantages of their higher-priced counterparts (see "For a Few Dollars More," page 117) and require you to watch out for inferior components (see "Cheap PC Pitfalls," page 120), but for general business computing and Internet browsing, these machines will suit most people's needs.

$999 GETS YOU THE WHOLE ENCHILADA

IF ONE OF THOSE big, bright $999 price tags catches your eye, read the fine print before you take the bait. PC vendors, in their zeal to advertise something for under a grand, have been known to omit certain niceties—like a monitor—from the price. When we ordered systems for this review, we asked vendors to send us a *complete* system priced below $1000 (excluding rebates and special offers). To ensure that these PCs were truly usable, we set minimum requirements: a 4GB hard drive, a

SUB-$1000 PCs SCORECARD

	SYSTEM	Street price (4/20/99)	Ease of setup	Features	Monitor quality	PC WorldBench 98 score/ performance	3D graphics quality	Vendor's PC reliability/support quality	Vendor's support policies	Product info number[1]
1	MidWest Micro Office MWO-400C 800/728-8582 www.mwmicro.com	$975	outstanding	outstanding	good	192/outstanding	average	[2]/fair[3]	outstanding	648
2	Quantex M400c 800/896-4898 www.quantex.com	$999	good	outstanding	average	192/outstanding	poor	good/good	good	649
3	Kingdom Pinnacle 400S 800/385-3436 www.kingdomcomputers.com	$947	good	outstanding	very good	172/good	average	[2]/fair[3]	fair	650
4	Acma A333 800/786-6888 www.acma.com	$798	good	very good	average	172/good	good	[2]/good[3]	good	651
5	Dell Dimension V400c 800/388-8542 www.dell.com	$999	good	very good	average	172/good	average	outstanding/good	good	–
6	Axis Systems Orion LXN 800/378-9014 www.axissys.com	$999	fair	outstanding	good	193/outstanding	average	[2]/good[3]	outstanding	652
7	IBM Aptiva E Series 240 800/426-7235 www.direct.ibm.com	$998	good	satisfactory	good	163/satisfactory	average	good/good	fair	–
8	NexTrend NexStar C366 877/833-8833 www.nextrendpc.com	$999	fair	very good	very good	176/good	average	[2]/fair[3]	good	653
9	Compaq Presario 5070 800/345-1518 www.compaq.com	$999	outstanding	satisfactory	very good	153/satisfactory	poor	fair/fair	good	654
10	Emachines Etower 366i 877/566-3463 www.e4me.com	$738[4]	outstanding	satisfactory	average	153/satisfactory	poor	[2]/[2]	poor	655
	Best Buy	Price 20 percent	Setup 15 percent	Features 12.5 percent	Monitor quality 12.5 percent	Performance 10 percent	Graphics 5 percent	Reliability/support 10 percent each	Policies 5 percent	

[1] For more information about all of the products listed in this table, select product info number 909 or visit www.pcworld.com/productinfo.

[2] Insufficient data to assign a rating.

[3] Due to insufficient data from the Reliability and Service survey for the vendor's work PCs, this rating is derived from survey scores for the vendor's home PCs, from anonymous support-quality calls, or from both.

[4] Includes price of $129 monitor, sold separately.

12X–24X CD-ROM drive, 32MB of system memory, speakers, either a modem or a network card, and a 15-inch monitor.

Most of the systems we received exceeded our minimum requirements. They offered an average hard drive capacity of 6GB, and 16 came with 64MB of RAM—twice our baseline amount. Six systems (including five in the Top 10) shipped 17-inch monitors, and three bundled DVD-ROM drives—an elegant touch unheard of at this price a few months ago. A few systems held above-average sound cards and speedy 3D graphics boards, too.

Historically, vendors have crammed their cheapest PCs into small cases and built them around bargain motherboards, sacrificing upgradability in the process. But most of the sub-$1000 systems we reviewed are as expandable as PCs that cost two to three times as much. The mid-size tower and minitower cases typical of this class offer users a generous number of open drive bays, memory sockets, and expansion card slots.

CELERON BOUNCES BACK

NOT SURPRISINGLY, low-cost processors—such as Intel's Celeron and AMD's K6-2 and K6-III—lie at the core of this new generation of PCs. But something has changed since the unveiling of last year's $999 PCs: The budget processors in today's sub-$1000 PCs are among the newest on the market. Most systems in this roundup use 366-MHz or faster versions of Intel's Celeron—a once-maligned class of CPU that has made remarkable performance strides. In fact, 11 of the PCs in our *Top 20 Budget Desktops* list this month use Celerons.

Intel is churning out new Celeron processors so fast that some vendors will no longer offer the Celeron-366 by the time you read this. But take heart: The vendors tell us you should be able to buy a Celeron-400–based system with the same configuration, for under a grand.

Overall, these cheap PCs perform surprisingly well. Even the slowest of the systems managed a PC WorldBench 98 score of 153—close to the average for all Pen- ▶

For a Few Dollars More...

THOUGH WE imposed a $1000 price ceiling for admission into this roundup, your cutoff may be higher. After all, the cheapest PCs inevitably have limited expandability and upgradability. And because so many low-priced PCs use integrated components that are hard to upgrade, examining the advantages of paying a few extra bucks up front is worthwhile.

We looked at three sub-$1000 systems from companies that let you upgrade individual components when you buy the PC: Dell's Dimension V400c, Gateway's Essential 366C, and Quantex's QP6/333 M-1c. We weighed the cost of upgrading the hard drive, RAM, CD-ROM drive (to DVD), and monitor against the attendant performance benefits and found that most of the upgrade options merit consideration—especially if you plan to keep the PC for more than a couple of years. And upgrading these parts at the outset will not only save you money but also make subsequent upgrades faster and easier. Most PC makers also offer speedier processors, 3D graphics cards, removable-storage drives, better keyboards and mice, and higher-quality speakers.

Better Memory If you upgrade memory when you buy the system, get a single, larger DIMM and keep the other slot(s) free for later upgrades. Dell's standard 32MB of RAM can be upgraded to 64MB for $49. Both the Gateway and Quantex systems start with 64MB, which can be upgraded to 96MB or 128MB for around $60 or $125, respectively. Beyond 128MB, RAM costs increase prohibitively; and unless you're a graphics designer or a serious multitasker, the performance benefits of more RAM are negligible.

More Space While the size of hard drives increases exponentially, storage prices continue to shrink. With minimal investment, you can sometimes double your hard drive capacity. Both the Dell and the Quantex come with a 6.4GB drive. You can upgrade the Dell's to 8.4GB for just $20 more, and the Quantex's to 8.4GB for $40 or to 10.2GB for $60. Gateway's Essential 366C starts with a 4.3GB drive, which you can increase to 8.4GB for $65, to 13GB for $110, or to 15GB for $185. If you're a glutton for space, you can buy a 22GB drive for the Gateway, but it'll cost you $440 extra—the law of diminishing returns kicks in on drives larger than 10.2GB.

I Want My DVD Most sub-$1000 PCs come with a high-speed CD-ROM drive. A few include a DVD-ROM drive instead. A third-generation DVD-ROM drive is surprisingly affordable, but ask whether you get a software or hardware decoder with it. (A hardware decoder is preferable, but unusual at this price point.) Gateway and Quantex offer a 4.8X DVD-ROM drive for $80 or $120, respectively. They also offer CD-Rewritable drives; Gateway's is $155, while Quantex's runs $189. Dell sells a DVD-ROM drive with software decoder for $49 (hardware-based options cost $109), or a CD-RW drive for $104.

Sights for Sore Eyes A larger monitor—or one with a tighter dot pitch (smaller dot pitch numbers mean a sharper picture)—can help you savor images without incurring eyestrain. All three systems start with scarcely adequate 15-inch monitors. Dell offers a 17-inch, 0.26-dot-pitch replacement display for $89 more or an extremely sharp Trinitron for an extra $188.

Gateway's 17-inch options include an okay 0.28-dot-pitch model ($115) and a better 0.26-dot-pitch unit ($165). Quantex's 17-inch upgrades bump the system price up $100 for the standard 0.28-dot-pitch monitor and $180 for the 0.25 variety (rated sharper than Gateway's 0.26-dot-pitch display). For 19-inch and larger monitors, upgrade costs start at $300.

Of course, the total expense of adding the extras you want can quickly push your low-end PC into the price range of our Top 20 budget desktops. If you find you need a lot of these upgrades, you may be wiser to buy into the next price level of PCs from the get-go and obtain all the features you want as standard parts of the configuration. **–Joel Strauch**

tium II-333 systems, and more than adequate for typical business applications. Our two Best Buys earned a PC WorldBench score of 192, which makes them front-runners among PCs with the same CPU and amount of memory.

LOWER COST, FEWER CHOICES

ON A MACHINE tagged in the low three figures, expect fewer options. In fact, the further a PC's price sinks beneath the magic $999 mark, the less flexibility you get. Emachines' Etower 366i, for example, is a take-it-or-leave-it proposition. At $738, it's the least-expensive system in this roundup. But like all Emachines PCs, it ships in a fixed configuration. Similarly, PC maker Microworkz can sell its ultra-cheap Webzter Jr. for just $300 because the company doesn't use state-of-the-art components or customize its PCs. Microworkz couldn't send us a system in time for inclusion in this review, but we tested a pair of the vendor's PCs for this month's *Top 10 Home PCs* (see page 216). Neither system made the Top 10 chart. We also cover Microworkz in this month's *On Your Side*, page 35, in which we detail some readers' complaints that Microworkz failed to ship systems within the promised three- to four-week time frame.

HEAVY-DUTY HOME SYSTEMS break the beige box syndrome. Among the home-oriented PCs in this roundup that blend attractive design features with good multimedia performance are Acma's A333 (left), Compaq's Presario 5070 (middle), and IBM's Aptiva E Series 240.

1 MIDWEST MICRO OFFICE MWO-400C

BEST USE: Superb as a corporate workstation, the MidWest Micro Office MWO-400C becomes a terrific home-office system if you specify a modem in place of the network card our test system included.

WHAT'S HOT: This peppy performer falls just 1 point shy of this roundup's PC WorldBench 98 champ. Uncommonly easy to get up and running, the 400C comes with a color setup poster complete with technical support information. This exceptional multimedia PC includes Cyber Acoustics CA-50 speakers, a subwoofer, and a crisp 15-inch KDS monitor.

WHAT'S NOT: Redundant front and rear power switches may confuse new users. The scope of the user guide is somewhat limited in areas beyond initial setup, and no online manuals are available.

VALUE: The Office MWO-400C offers excellent performance, good components, easy networkability, and a five-year warranty on the CPU and system RAM.

SUB-$1000 PCs — STANDARD FEATURES

	SYSTEM	CPU	RAM (MB)	Level 2 cache (KB)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor size (inches)	Modem (protocol) or network card	CD/DVD-ROM drive speed
1	MidWest Micro Office MWO-400C*	Celeron-400	64	128	6.4	ATI Rage Pro Turbo	8/SDRAM	15	network card	16X-40X
2	Quantex M400c*	Celeron-400	64	128	6.4	Joy Tech Apollo Media2 AGP	4/SDRAM	17	V.90	14X-32X
3	Kingdom Pinnacle 400S	Celeron-400	64	128	10	Intel740	8/SGRAM	17	V.90	16X-40X
4	Acma A333	Celeron-333	64	128	4.3	STB Velocity 128	8/SGRAM	15	V.90	12X-40X
5	Dell Dimension V400c	Celeron-400	32	128	4	ATI 3D Rage Pro Turbo AGP	8/SDRAM	15	V.90	14X-36X
6	Axis Systems Orion LXN	Celeron-400	64	128	6.4	Intel740	8/SDRAM	17	V.90	4.8X DVD-ROM
7	IBM Aptiva E Series 240	AMD K6-2-350	64	512	6	ATI Rage Pro Turbo AGP	8/SDRAM	15	V.90	14X-32X
8	NexTrend NexStar C366	Celeron-366	64	128	6.4	integrated ATI 3D Rage Pro	8/SDRAM	17	V.90	22X-48X
9	Compaq Presario 5070	AMD K6-2-350	64	128	4.3	integrated SiS 350	4/UMA	17	V.90	12X-32X
10	Emachines Etower 366i	Celeron-366	32	128	4	integrated ATI 3D Rage IIC	4/SDRAM	15	V.90	12X-24X

* Best Buy

[1] *PC World* defines vertically oriented cases as towers (taller than 20 inches), midtowers (15.5 inches to 20 inches), or minitowers (shorter than 15.5 inches); and horizontally oriented cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

2 QUANTEX M400C

BEST USE: This PC handles everyday home-office or schoolwork apps with ease, but not 3D games.

WHAT'S HOT: The M400c tied for second place on our PC WorldBench 98 test suite, scoring a 192. With six free drive bays and four free slots, the system offers more room for expansion than any other PC in the roundup, and its easy-open case makes upgrading a breeze. The excellent user guide augments a basic online help system.

WHAT'S NOT: The included 17-inch Shamrock XP170S monitor displays both text and graphics just passably well. Though the system ships with Windows 98, its documentation refers to Windows 95. Inadequate 3D performance restricts the M400c's use as a game machine.

VALUE: Powerful business performance at a reasonable cost, though you may want to invest in a better monitor.

3 KINGDOM PINNACLE 400S

BEST USE: Excellent components and good all-around performance make the this a reliable choice for SOHO users.

WHAT'S HOT: The PC comes equipped with a generous 10GB Seagate hard drive and an excellent 17-inch monitor. Free slots and bays abound, and a roomy case allows easy access. A bundled Microsoft Natural keyboard, the only "ergonomic" unit in this roundup, offers crisp action.

WHAT'S NOT: The Pinnacle's PC WorldBench 98 score puts it on a par with the fifth-place Dell Dimension V400c for the lowest score among Celeron-400 systems. Novices may have to hunt for help: Daily tech support is limited to 12.5 hours, with no service on Sundays; and the second-rate user guide doesn't provide much help.

VALUE: Excellent PC for the price, provided that your computer needs don't extend to top-level performance. Best suited for users who are unlikely to need help on Sundays or during nonbusiness hours.

4 ACMA A333

BEST USE: Its low price makes the A333 a good choice for first-time buyers; with better speakers, multimedia would be great.

WHAT'S HOT: Its PC WorldBench 98 score of 172 matches those of comparably ▶

OFFICE POWER COMES courtesy of a pair of corporate-minded, high-performance workstations. The Axis Systems Orion LXN (left) and the NexTrend NexStar C366 also include excellent monitors, though the models come bundled with cheap, poor-quality speakers.

Sound board	Case style [1]	Max. RAM (MB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
integrated Yamaha YMF740B-V	midtower	768	2	3/1	2	varies [2]/3	24	Sat, Sun	BBS, WWW
Sound Blaster Audio PCI 64V	midtower	384	2	3/3	4	3/1	24	Sat, Sun	BBS, WWW
integrated Yamaha YMF724G	minitower	768	2	2/1	4	varies [2]/1	12.5	Sat	WWW
Sound Blaster Audio PCI 64V	minitower	256	1	1/1	3	3/1	24	Sat, Sun	BBS, WWW
integrated Yamaha XG64V	midtower	384	2	3/1	4	3/1	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
integrated Yamaha XG724	midtower	384	2	3/0	4	3/3	24	Sat, Sun	WWW
integrated ESS Solo 1	minitower	256	1	1/0	2	1/1	24	Sat, Sun	AOL, BBS, CIS, WWW
Yamaha DS-XG PCI Audio	desktop	512	1	1/0	2	3/3	24	Sat, Sun	WWW
integrated ESS Solo 1	minitower	384	2	1/0	2	3/1	24	Sat, Sun	AOL, BBS, CIS, WWW
integrated Crystal Sound Fusion	minitower	256	1	1/0	2	1/1	18	Sat, Sun	WWW

EXPANDABILITY

CUSTOMER SUPPORT

[2] Five years on CPU and RAM, three years on other parts.

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equipped PCs, and the Acma is the second-cheapest PC on the chart. Good 3D and one of the better 15-inch monitors we saw (an Impression 5VXm) round out the deal.
WHAT'S NOT: Cheap speakers and keyboard reduce the A333's appeal, and the system's 4.3GB hard drive is smallish.
VALUE: Good performance, a long parts warranty, and a low price make this a great all-around SOHO machine.

5 DELL DIMENSION V400C

BEST USE: Dell's terrific customer support record make this PC perfect for home-office users who might need extra help.
WHAT'S HOT: The V400c's roomy interior offers plenty of open card slots and drive bays. Its PC WorldBench score of 172 is about average for a PC in its class with 32-MB of RAM. Online documentation augments an excellent setup sheet and user guide. Color-coded ports facilitate setup.
WHAT'S NOT: The "easy-open" case isn't, and the 15-inch monitor offers mediocre picture quality. The V400c's 4GB hard drive and 32MB of RAM are adequate but unremarkable. Despite their well-known name, the PC's Harman-Kardon speakers produce unimpressive bass response.
VALUE: If reliability and support are primary considerations, by all means buy Dell. If not, go for a system that offers a heftier configuration for the same price.

6 AXIS SYSTEMS ORION LXN

BEST USE: High-quality components and great performance make the Orion suitable for corporate use.
WHAT'S HOT: With a PC WorldBench 98 score of 193, the Orion roared past all other chartmakers (and the average Celeron-400 PC with 64MB of memory, regardless of price). The high-quality 17-inch monitor and 4.8X DVD-ROM drive help this PC adapt to work and play. Clear documentation is accompanied by a large setup sheet.
WHAT'S NOT: The generic case is hard to open and has duplicate power switches on the front and back. Color-coding or better labeling of the rear ports would help.
VALUE: Stellar features and celestial performance distinguish the Orion LXN as a fine office machine.

7 IBM APTIVA E SERIES 240

BEST USE: A solid home-office–oriented PC with name-brand security.
WHAT'S HOT: The famous logo and handsome case and monitor stand out. The setup sheet, user guide, and online help via Windows Active Desktop rate above average. The system ran 3D games fairly swiftly, though some images were poorly rendered in our tests.
WHAT'S NOT: A Quantum Bigfoot hard drive (the industry's slowest) hogs a 5.25-inch drive bay. IBM recklessly includes a password-protected screen saver (intended for retail-store use) on all systems; if you install the screen saver, assign a password, and then forget that password, you'll be locked out of your machine. The only way to reenter your system is to completely rebuild it from a CD-ROM—bye-bye, data. Finally, the Aptiva E Series 240's PC WorldBench 98 score of 163 is below average for systems of comparable configuration, though still respectable.
VALUE: With good bundled software, respectable 3D, and handsome looks, the Aptiva is a decent deal despite major flaws.

8 NEXTREND NEXSTAR C366

BEST USE: The NexStar is a fairly strong Celeron-366 office system suitable for relatively experienced users. ▶

Cheap PC Pitfalls

JUST BECAUSE your expectations are low, that doesn't mean you have to settle for whatever the vendor offers. The sub-$1000 PC landscape is riddled with potholes and pitfalls. Here are a few hazards to watch for among the cheap-PC specs:

Underwhelming UMA Unified Memory Architecture lets graphics cards use system RAM rather than dedicated video memory, but the resulting performance decrease can kill 3D graphics. Our UMA-equipped Compaq test system, for example, could barely run our 3D game tests; not surprisingly, it tied for last place in our PC WorldBench 98 suite overall. Even a speedy processor can't compensate for UMA's woes: Despite earning a relatively high PC WorldBench score, an HP Brio equipped with a Celeron-433 processor we tested for this roundup proved ill-equipped for 3D tasks.

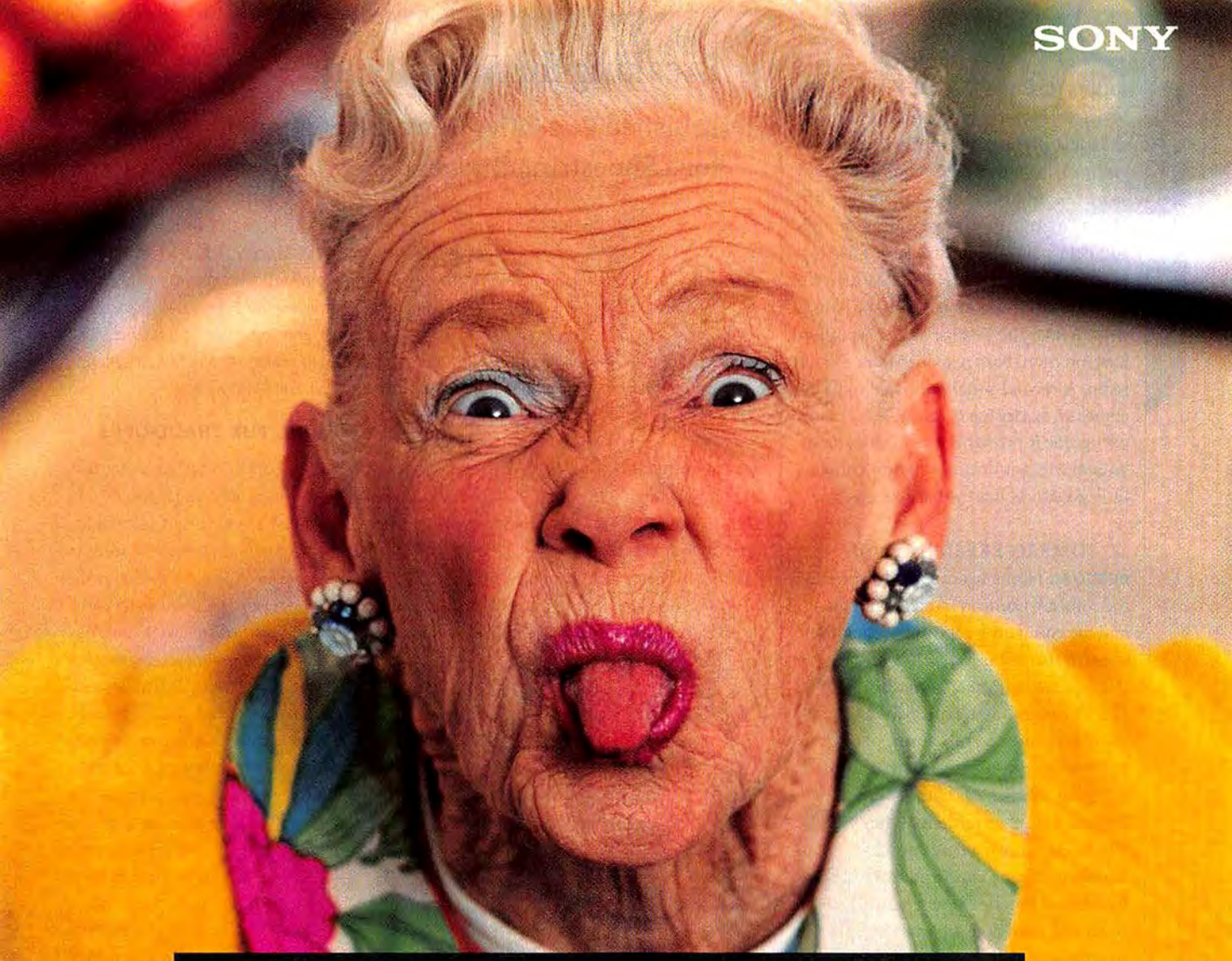
Mediocre Multimedia At this price point, few buyers expect top-notch multimedia hardware. Speaker quality usually takes a hit; most of the speakers we tested produced such dismal audio quality that any sound beyond error beeps and start-up chimes presented a significant challenge. Graphics is another frequent victim of budgetary belt tightening; most of our test systems came with either UMA hardware or two-generation-old video chip sets. Optical disc drives also tend to be meager: Most of the systems here didn't improve on the 12X-24X CD-ROM drives we specified as a bare minimum; surprisingly, though, a smattering of systems came equipped with DVD-ROM drives.

Dismal Documentation To shave a few bucks off the bottom line, some vendors neglect documentation; most of our systems had passable manuals, but a few lacked full system coverage or setup guides.

Paltry Peripherals Many of these systems' keyboards and mice looked like the last one out of the barrel. Remember the AT keyboard connector, serial mice, and other relics of outmoded technology? Well, sorry to say, they're ba-a-ack.

Skimpy Software Every unit we saw included Windows 98 and a few driver disks. About half offered less-expensive alternative office applications like Corel's WordPerfect Suite 8. Some also included voice-mail/speakerphone software, reference and "edutainment" titles, and one or two utilities (antivirus and crash recovery tools were most common). A few offered Microsoft Office 97 Small Business Edition, but those models missed the Top 10 chart for other reasons. **–Andrew Brandt**

SONY



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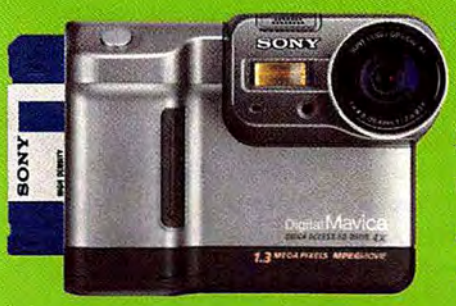

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WHAT'S HOT: The NexStar's 17-inch Cybervision monitor produced the clearest, sharpest picture of any display in this group. The system's PC WorldBench 98 score of 176 was the best among the 366-MHz Celerons in this roundup, though still below average for its class. The NexStar packs the fastest CD-ROM drive in the only full-size desktop case in the bunch.
WHAT'S NOT: The NexStar's cheap speakers have no more bass response than a clock radio. A second serial port needlessly occupies an expansion card bay. NexTrend's user guide is primarily a setup document.
VALUE: Meager documentation supplies little guidance, but the hardware is fine.

9 COMPAQ PRESARIO 5070

BEST USE: Home users should appreciate the software Compaq bundles with the PC and the company's solid support policies.
WHAT'S HOT: The Presario's attractive styling, great-sounding JBL speakers, a sharp 17-inch monitor, and 50 free hours of Internet access combine to make it a great buy for the home. The keyboard has convenient audio, CD-ROM, and Internet quick-launch buttons. Compaq throws in helpful touches like a setup sheet and color-coded ports.
WHAT'S NOT: The Presario 5070 ran a substantial 8 percent slower than comparably configured systems. The graphics chip turned in poor 3D performance, probably because it uses main (UMA) memory for graphics (see "Cheap PC Pitfalls"). There's little room for expansion, so upgrades can be difficult. The lack of technical documentation may hamper users' ability to tweak the system.
VALUE: Though targeted at home users, this Presario works better than it plays. Game-happy home users should opt for a PC with dedicated graphics memory.

10 EMACHINES ETOWER 3661

BEST USE: Low price and easy setup make this a great home or small-office system.
WHAT'S HOT: At $738, the Etower easily ranks as the most affordable system we tested. For such a low price, you might not expect to get design touches like front-mounted USB or game ports, but ▶

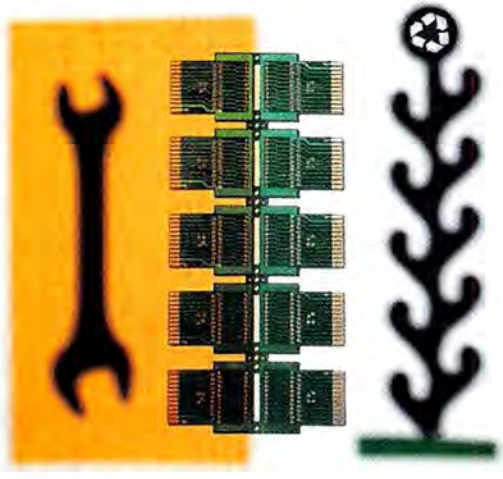
Breaking the Stereotype

Refurbished PCs Offer Powerful Systems for a Shoestring Budget

AS LOW-COST PCs continue to attract buyers, people are getting increasingly price sensitive. "If I can get this much for under a grand," they reason, "what can I get for less?"

Low-cost refurbished models offer a fine alternative for cost-conscious small businesses, home-office users, and schools. And these PCs aren't 8086-era relics. Their specifications often read like those that appeared on last season's *Top 20 Budget Desktops* chart. Packard Bell/NEC's refurbished systems division, for example, sells a K6-2-233 PC—with 64MB of memory, 10GB hard drive, 12X-24X CD-ROM drive, and modem—for under $700.

And though the term *refurbished* may conjure up images of preworn, flawed, or repaired systems, many vendors' refurbished-PC programs primarily offer undamaged, practically new units that were returned by customers and thus can't legally be sold as new. To reduce the risk of inheriting someone else's problems, buyers are commonly given the same warranties on refurbished models as on new PCs. Some manufacturers also clear their inventories of recently discontinued new systems through their refurbished-PC outlets.



BIG-LEAGUE BRANDS

NEARLY EVERY major build-to-order PC maker offers a selection of refurbished systems: Gateway, Compaq, and Packard Bell/NEC hawk refurbished PCs both online and through retail stores; Dell, Micron, HP, and IBM market refurbished models only on the Web. Other firms—like Pre-Owned Electronics, ReCompute, and Computer Renaissance—deal exclusively in selling reconditioned systems direct to end users via the Web.

WEIGHING THE TRADE-OFFS

THOUGH REFURBISHED systems cost less than all but the very least expensive PCs on the market, most offer current technology rivaled only by that in the newest models. In addition, vendors clean and test all their refurbished PCs, and repair or replace faulty parts.

But buying a refurbished system also has drawbacks. The biggest disadvantage is limited model availability. Because manufacturers' inventory changes constantly with the ebb and flow of overstock and returns, a system you see online in the morning might be gone by the afternoon. In addition, you're unlikely to encounter cutting-edge processors or multimedia components in a refurbished PC. On the other hand, if you don't need the world's fastest system or FireWire ports, you'll probably find everything you need in a reconditioned system.

A GROWING TREND

IF YOU DO DECIDE to buy a refurbished system, you can count yourself among a growing contingent of consumers. According to industry experts, the market for this kind of PC is just starting to take off. International Data Corporation analysts anticipate that reconditioned-PC sales will climb to an estimated 9.8 million in 2002 from 5.5 million units in 1997.

Already, today's refurbished systems offer solid value and performance, and the benefits will only multiply as technological advances continue to be achieved, rendering today's breakthroughs obsolete within the lifetime of an aphid. Web bargain-hunters may see powerful Pentium III systems—like those that currently dominate our *Top 20 Power Desktops* chart—available as refurbished bargains as early as summer's end. **—Tom Spring**

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Emachines provides both. The 15-inch monitor offers better-than-average picture quality, albeit in a rather small window. A helpful setup sheet, a well-written user guide, and color-coded ports on the back of the system simplify installation.

WHAT'S NOT: The system's aging ATI 3D Rage IIc graphics chip turned in poor 3D performance. A stingy 32MB of RAM contributed to the 366i's unimpressive PC WorldBench 98 score of 153 (5 points below the average of 21 systems we tested). Two open PCI card slots and a single unused drive bay leave little room for homespun expansion. The tiny speakers generate lackluster bass response.

VALUE: The Etower 366i makes a great starter or backup system for a small or home office. The company's PCs are solid deals but not transcendent bargains.

Jon L. Jacobi and Joel Strauch are freelance writers based in the San Francisco Bay area. Andrew Brandt is an associate editor for PC World, *and Tom Spring is a reporter/editor for PC World Online. Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeffrey Kuta, and Mike Salayko of the PC World Test Center designed and administered the performance, graphics, and monitor tests for the systems in this roundup.* *See page 12 for contact information.* ■

online

We also tested the following systems, but they didn't score high enough to rank among the Top 10. For brief reviews of these PCs, see PC World Online (www.pcworld.com/jul99/sub$1000):

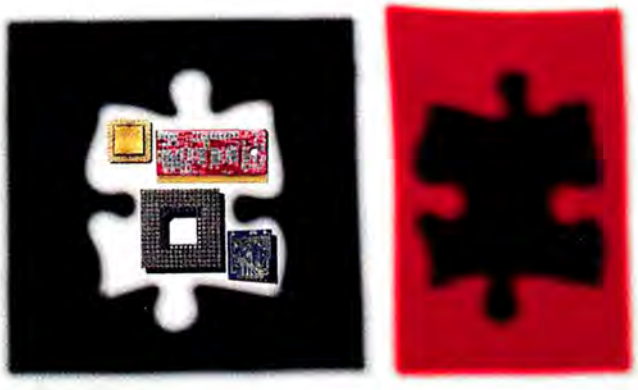
- CyberMax Enthusiast KII-350
- HP Brio BA
- IDot.com 400 LXA
- Kiwi Computer Aubra AII
- Micro Express MicroFlex-40A
- Netis Starburst 7333
- Packard Bell Multimedia 7900
- PowerSpec PS-4322
- Premio Telesto 2
- ProGen Atlas X C366
- Sys Taskmaster Z-333

Building Blocks Assembling Your Own PC From Scratch or From Parts

IF YOU'RE technically savvy, you can build a powerful new system for far less than a thousand bucks. And you may be able to save even more money by upgrading your current computer into the system of your dreams.

BUILDING FROM SCRATCH

BUILDING A PC isn't a task to undertake lightly. You're your own tech support, your computer's parts come with shorter warranties, and you can't blame anyone else if something goes wrong. That said, assembling your own system can be extremely satisfying: You decide which peripherals go in, you become very knowledgeable about your PC, and (best of all) you can save lots of cash.



If you opt to build a PC, you must first pick a processor. You can find versions of Intel's Celeron and AMD's K6-2 chips for around $100. Web sites such as PriceWatch (www.pricewatch.com) let you compare the costs of all your components from various sources.

Beware the lowest-priced chips, though: OEM chips ship to PC makers first, who then build them into complete PCs. By the time you buy one, these chips are shop-worn and are more likely to fail than a brand-new unit in a shrink-wrapped box. Worse, many OEM chips carry a meager 15-day warranty.

You'll also need a motherboard, and it's a good idea to purchase the motherboard from the same company where you buy the processor. If you're building a Celeron system, using jumperless boards (such as those made by Abit) will allow you to configure all the settings through software. Otherwise, look for name brands like ASUS, Intel, or SuperMicro. And make sure you get a warranty of no less than one year.

When shopping for a motherboard, make sure the one you buy has enough expansion card slots—a pair of 16-bit ISA slots, at least three 32-bit PCI slots, and at least two RAM sockets. If you plan to install a new AGP graphics card, make sure the board has an Accelerated Graphics Port.

You'll also need to buy the right type of RAM. If your motherboard runs at 100 MHz, it requires PC-100 memory to function properly. A 64MB PC-100 memory DIMM costs about $60; a 128MB DIMM costs about twice that. (Memory prices can fluctuate daily, so if the price seems a bit high when you go shopping, wait a few days for prices to settle.)

With your PC's remaining components, you have a lot of leeway. Get the largest-capacity hard drive you can afford. CD-ROM and floppy drives (priced at around $40 and $15, respectively) are so inexpensive and reliable you needn't worry much about the brand you choose. The same goes for input devices such as keyboards and mice: Simple ones are cheap, but you can opt for ergonomic and wheeled species for a few bucks extra.

Sound and video card prices vary widely, depending on their abilities. If you get a kick out of multimedia or games, you'll want to splurge on more expensive units. But for general business, schoolwork, or Internet use, the low-cost stuff will get the job done.

STRIPPING OUT AN OLD PC

IF YOU'VE GOT a Pentium II system you're looking to overhaul, adding a speedier CPU, more RAM, or a faster video card can be cheap.

On the other hand, if you're starting with a Pentium 60 or slower system, just salvage your hard drive, CD-ROM and floppy drives, your monitor, and your input devices—and build around those pieces. Check out PC World Online's Upgrade Guide (www.pcworld.com/upgradeguide) for detailed information on how to soup up your existing system.

Building or upgrading a PC is no trivial matter, but it's not brain surgery, either. And if you do it right, you can acquire maximum power for your PC at a minimal price. **—Joel Strauch**

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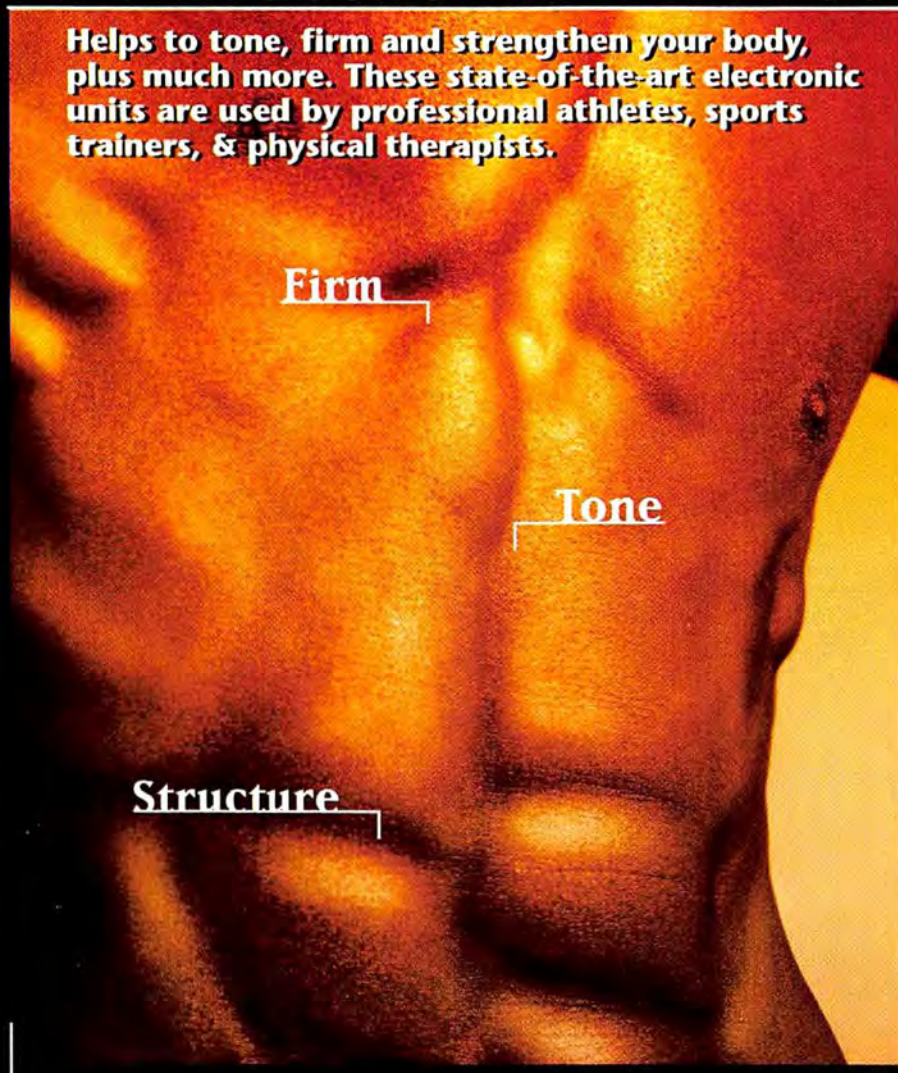

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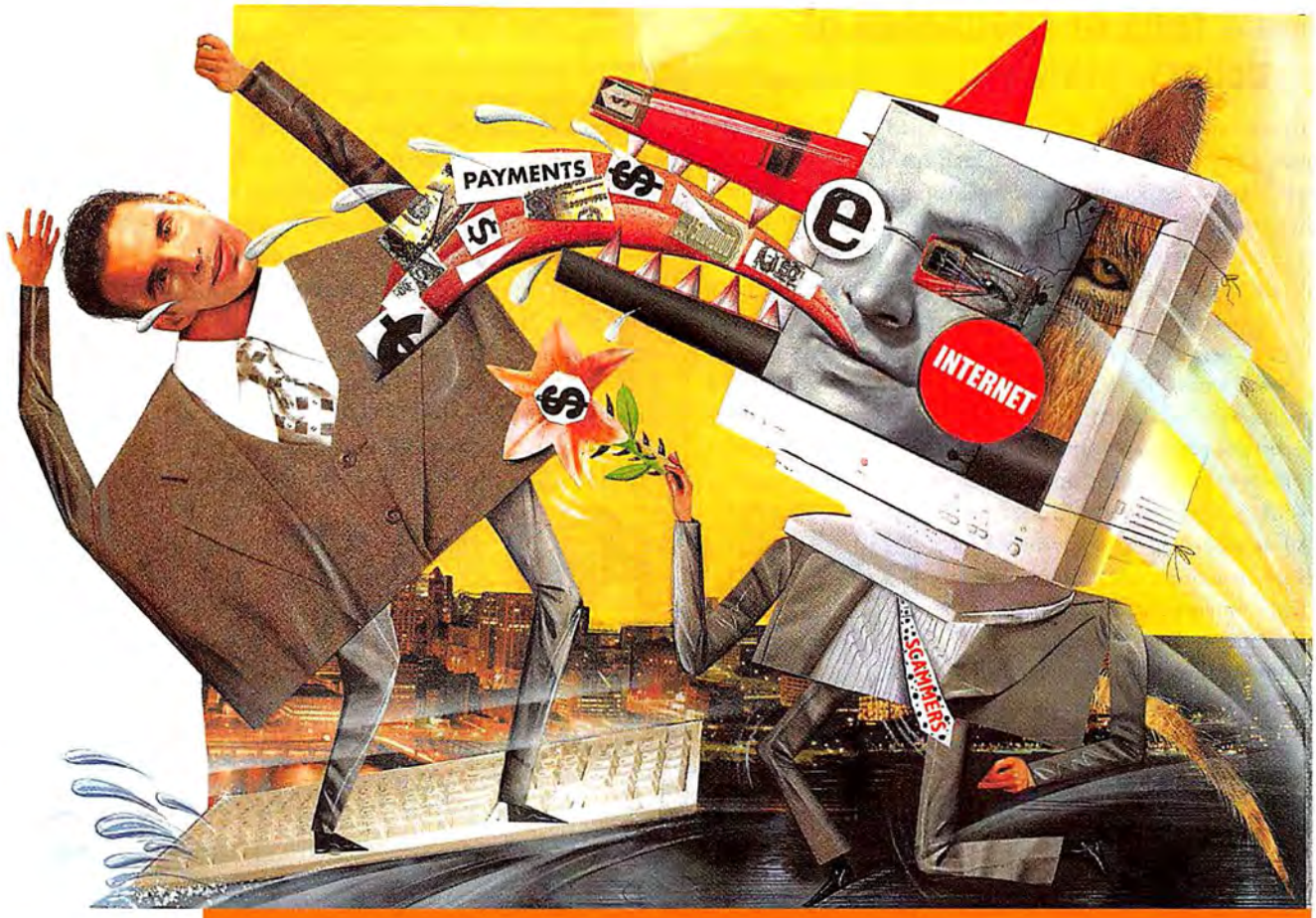


The Online CON

BY JEFFREY ROTHFEDER

ILLUSTRATIONS BY JANET WOOLLEY

Early one morning in April, **a scam operation** took just a couple of hours to swindle **dozens of investors** out of **tens of thousands of dollars.** It all began with a message on a Yahoo stock board alerting investors that PairGain Technologies, a Tustin, California, maker of high-speed Internet products, was about to be bought by an Israeli company for $1.35 billion, nearly twice its market value. To reinforce its authenticity, the message contained a link to a Bloomberg news story giving details of the deal. That was enough proof for many investors, who dived into PairGain's stock, immediately bidding it up more than 30 percent, from $8.50 a share to over $11.

It was a hoax: PairGain wasn't being bought by anybody. The "news story" was a phony article, written to mimic a Bloomberg report and posted anonymously on Angelfire, a Web page service.

If eager investors had only stopped to do a little digging, they would easily have uncovered the fraud. All someone had to do was to look for a legitimate press release on www.pairgain.com, for instance, or search for the announcement on any portal.

But the hoax went unchallenged for almost 2 hours before anyone discovered the lie and warnings started appearing on the Web. Thereupon, PairGain stock quickly tumbled to prehoax levels, leaving bandwagon investors with stock of a much lesser value.

One week later, federal authorities arrested Gary Dale Hoke, a PairGain employee, on charges of stock manipulation. An FBI task force had tracked Hoke down by following electronic footprints from Angelfire and Hotmail.

"This is the first case in which an individual has abused the power of new technology to spread false news to millions of investors at lightning speed," says Alejandro Mayorkas, United States district attorney in Los Angeles, who is handling the case.

FRAUD ON THE RISE

ILLEGAL STOCK-TOUTING is just one of the countless scams executed on the Internet these days. Thousands of new surfers plunge into the Web each week, but the same technology that they find so attractive also makes it simpler for scammers to rook them. The Internet permits anyone selling good or bad investments, business ideas, or products to reach hundreds of thousands of people at once with virtual anonymity. For the unscrupulous, nothing is more mouthwatering than an expanding pool of potential victims.

The Securities and Exchange Commission currently gets more than 100 complaints a day about illegal Internet activity—mostly involving online stock scams and dubious investment touting, known as pump-and-dump scams. In 1998, the National Consumers League received 7752 Internet fraud complaints—up from less than 2000 the year before. "These scam artists are waging war," says John Reed Stark, the SEC's chief of the office of Internet enforcement. "They're committing frauds that can ruin lives."

Scammers Find Weakness The maliciousness of these acts is especially clear when the criminals target the desperate and weak, according to Federal Trade Commission officials. The proliferation of phony weight-loss plans and cheap fake Viagra pills that are nothing more than placebos, official say, are the best evidence of scammers' deviousness. "Deceptive health claims and pseudocures are an epidemic on the Internet," says Betsy Broder, the FTC's assistant director of the Bureau of Consumer Protection.

To combat the alarming surge in Internet fraud, the FTC, the SEC, and many state law enforcement agencies have set up SWAT teams

PHOTOGRAPH: BILL CRAMER

Spam Me SCAM ME

While working on this story, **author Jeffrey Rothfeder** became a **scam magnet.** He put up a new AOL screen profile, stating that his hobbies were investing in businesses, **stocks, and moneymaking** opportunities. He wanted to come across as an **easy mark for a scam**—and he succeeded. Here's what happened.

I CREATED A NEW AOL name and posted my mantra: "He who leaves with the most toys wins"—clearly the words of a fool ready to part with his money. Then I waited. And within two days, the offers started rolling in.

I got all kinds of spam: ways to speed up Internet access, some allegedly sponsored by AOL; home-business opportunities in which I could make thousands simply by licking envelopes; training programs that would transform me into a world currency expert; schemes to change my identity and start life anew for $20; and weight-loss programs.

One scheme intrigued me immediately because of its heartwarming wrinkle: It offered me the opportunity to "create wealth through giving." I e-mailed back and asked for details.

Within a day, I got a call from Virgil C., vice president of marketing for Prosper America. An amiable fellow from Dayton, Ohio, Virgil was prolix, but his sell was soft.

To get into the plan, he said, I'd pay $45 a month, which would go to buy picture frames that would be distributed free to youth organizations to sell for fund-raising projects. For every new recruit I brought into Prosper America, and for every new recruit that my recruits signed up, I'd get $20 a month. Or something like that.

Multilevel Magic

BY THE TIME Virgil had me completing my fifth level of recruits (that's 1024 new signees), the math was making my head spin. But at

to police the Internet daily. At press time, the National White Collar Crime Center and the National Fraud Center announced the formation of the Internet Fraud Council. Later this summer, the IFC promises to launch its Internet Fraud Complaint Center for consumers, and the Federal Bureau of Investigation will take on an advisory role. Despite the ongoing efforts of federal authorities and law enforcement to curb crime, scammers continue to represent moving targets, in an environment that's perfect for hit-and-run tactics.

Watch the Web

For more information on Internet scams and tips on how to avoid being taken, make sure you bookmark the following sites:

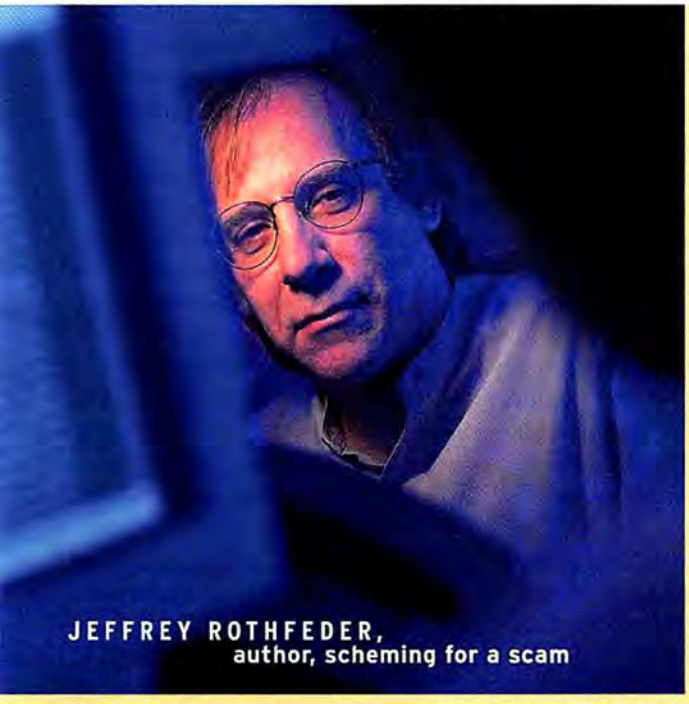
- **Bestfares USA:** www.bestfares.com/scam/scam1.htm
- **Credit Infocenter:** www.creditinfocenter.com
- **Internet Fraud Council:** www.internetfraudcouncil.org
- **National Fraud Center:** www.nationalfraud.com
- **ScamBusters:** www.scambusters.com
- **Scamwatch:** www.scamwatch.com
- **Stock Detective.com:** www.stockdetective.com

WEB SCAMS MADE EASY

"EVERYTHING ABOUT the Internet makes it perfect for criminals bent on perpetrating a scam," says Susan Grant, director of the National Consumers League's Internet Fraud Watch program. Of course for scams to work, the perpetrators must find gullible people. In the past, contacting potential suckers required expensive mass mailings of come-on literature or labor-intensive hours calling from boiler-room telephone banks. Now, armed with mass-marketing software and a CD-ROM of e-mail addresses, a criminal can contact thousands of online targets with one keystroke, relatively cheaply. Or by attaching press releases to a few well-traveled portal sites, announcing a fantastic ground-floor investment opportunity with a hot company, the crook can lure potential victims to the scam's home page for practically nothing.

As e-commerce thrives, more and more people use their credit card numbers to order products over the Internet. Consumers like the protection of being able to cancel a charge on their card if an item they buy doesn't match its specifications. But hackers steal, collect, and sell credit card numbers to "crammers," who in turn use the data to hit the card owners with fraudulent billing charges.

And on the Internet, criminals can operate in relative anonymity: Phony merchants tend to work without a fixed address, relying instead on various mail drops. Their modus operandi involves maintaining multiple e-mail addresses and using a raft of ▶



JEFFREY ROTHFEDER, author, scheming for a scam

that point my take would be about a quarter million dollars a year. According to Virgil, I'd be driving a new Lincoln every two years and returning from a cruise. As for the youth groups, Virgil never mentioned them again.

I asked if I could talk to the head of the company. "Mr. Hawk" of Columbus, Ohio, a self-styled 42-year veteran of network marketing (euphemism for pyramid schemes), contacted me within an hour. I shared with him my main concern about Prosper America: As far as I could tell, it was a multilevel marketing scheme and was therefore illegal. Right? Hawk didn't flinch. "There is a lot of opinion about what is legal and what's not, but every industry is some form of network marketing," he said, in a gravelly voice. "Sam Walton started with one store and multiplied his effort."

To further allay my concerns, Mr. Hawk told me that Harvard University offers a course in network marketing, so it couldn't be illegal. Also, he said, I could probably write off the amount I paid as a charitable deduction.

Charity? What Charity?

I ASKED HAWK for the names of the youth organizations that would benefit from the program. He admitted there weren't any yet. Other problems with Hawk's story surfaced as well. For one thing, Harvard doesn't offer a course in network marketing. And for another, tax laws forbid taking a charitable deduction for a venture set up as a profit-making organization.

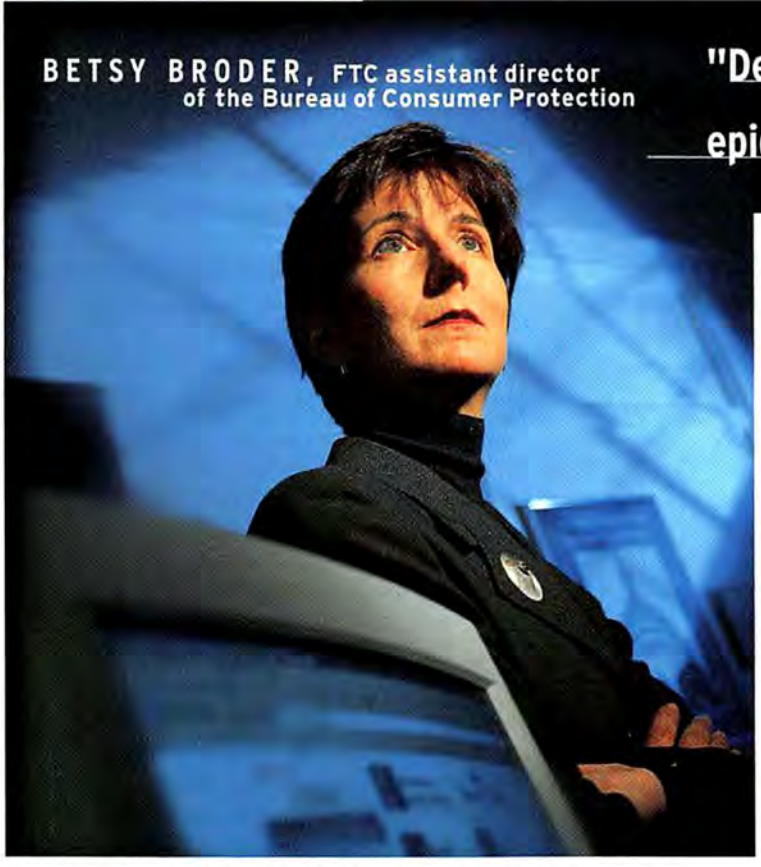
I contacted Mr. Hawk's attorney, Thayer Lindauer, who has represented network marketers for 30 years. Lindauer defended the practice of network marketing but refused to comment specifically about the business operations of Prosper America.

Multilevel Is Illegal, Right?

THE FEDERAL TRADE COMMISSION and the Ohio attorney general's office say pyramid schemes or multilevel marketing schemes are against the law no matter how you soft-soap their activities or marketing practices with charitable overtones. "It's illegal for a business to promise wealth that's generated through the signing up of other people," says the FTC's Betsy Broder.

I decided to keep my $45 a month. I reported Prosper America to the FTC, the National Consumers League's Internet Fraud Watch, and the attorney general's office in Ohio.

As of this writing, I haven't received any response from those officials as to what action they might take. **–Jeffrey Rothfeder**



BETSY BRODER, FTC assistant director of the Bureau of Consumer Protection

"Deceptive health claims and pseudocures are an epidemic on the Internet."

pseudonyms. Shysters can set up virtual shop, make some money, shut down, and relocate to another URL—all without leaving a paper trail or risking detection.

What's more, as evidenced by the Bloomberg hoax, shoddy products and false information can be digitally airbrushed onto a glossy Web site that looks as legitimate as Warren Buffet's or IBM's.

Clearly, con artists are milking the Internet for all it's worth, making stacks of quick bucks. Sometimes their profits depend on volume business—duping many people into losing small sums of money, rather than bilking relatively few out of large amounts. The more you open yourself up to e-commerce, the more likely you are to run into these kinds of scams. Here's a look at the top four scams on the Net according to the National Consumers League's Internet Fraud Watch.

ONLINE-AUCTION FRAUD

When buying goes bad

Telltale signs: Unbelievably low prices for desirable items, seller's general evasiveness about providing a contact phone number, lack of response to e-mail queries, promises to get you an item that's not currently in stock.

The danger: You post the winning bid, send in your check or money order, and get nothing in return—or you get an item that's nothing like the one advertised.

TOPPING THE National Consumers League's list of Net complaints is fraud related to online auctions. Though most transactions conducted through auction sites come off without a hitch, the medium gives scammers an easy way to rip people off. Says the Internet Fraud Watch's Grant, "The typical complaint is 'I won the auction, paid for [the item], and got something that wasn't remotely like what it was supposed to be.'" "For instance," she says, "one person was expecting a portable collapsible wheel chair and received a lawn chair on casters."

William P., a Maryland biologist, reports being burned at an EBay auction. Last July he was a high bidder at $615 for a new Pentium PC. He wrote a check in that amount and sent it to a California address. The check was cashed quickly, but William P. never received the PC. The seller ignored the buyer's repeated

Top Ten SCAMS

ACCORDING TO THE FTC, the SEC, and Internet Fraud Watch, online-auction fraud tops the list of common Web scams.

1 **Online-Auction Fraud** The products promised differ significantly from the products delivered, or they aren't delivered at all—particularly when they're bought in person-to-person transactions.

2 **Pump-and-Dump Stock Scams** Small-capital companies are touted by people who are paid by the companies but don't disclose that relationship. New investors pour in, pumping up stock prices; insiders sell the stock for a healthy profit, prices tumble, and investors are left high and dry.

3 **Multilevel Marketing** Participants pay a monthly fee and are required to recruit people into the program. Profits come from signing up others, not from the sales of goods or services.

4 **Credit Card Cramming** Charges for services that the card's owner never ordered, typically subscriptions to Internet sites or orders for books and software.

5 **Loans and Credit With Advance Fees** An online service offers loans or credit cards contingent on consumers paying a large advance fee. Though the fee is paid, the service fails to disburse the loan or credit card.

6 **Credit Repair** An online service offers to remove negative information from a person's credit report. Typically, the data remains untouched; in any case, deleting accurate data from such reports is illegal.

7 **Bogus Travel Prizes** Fabulous vacations offered at attractive prices turn out to be cruises on tugboats or seven nights' accommodation in a shabby hotel.

8 **Get-Rich-Quick Schemes** Victims are invited to pay thousands of dollars for the secrets behind surefire moneymaking opportunities. In return they receive a handful of worthless videos and brochures.

9 **Health and Diet Elixirs** Special offers of pills or herbal formulas guaranteed to help people lose weight without exercising or changing their diet; and cures for impotence, hair loss, cancer—you name it.

10 **Work-at-Home Plans** Promises that workers can earn from $2 to $20 for each brochure they put in an envelope. Victims pay a hefty fee for materials and then learn that the people behind the offer never intended to pay them a dime. —Jeffrey Rothfeder

PHOTOGRAPH: KATHERINE LAMBERT

e-mails and couldn't be reached by phone. "I still buy things from Internet auction sites," William P. says, "but I won't make such an expensive purchase again."

With the growing number of Internet auction sites, it's almost impossible for the authorities to monitor all the goings-on. And scam artists, like the the one who took William P. for a ride, can easily skirt capture. Then using a different name, they can repeat the same flimflam on a new victim.

In an effort to stem illegal activity, some auction sites have instituted feedback systems where customers warn other buyers about problem sellers; some sites even bar particular sellers from participating if their rating falls too low. These auction houses also demand that anyone with a Web-based e-mail address (like Hotmail or Yahoo) register with a credit card.

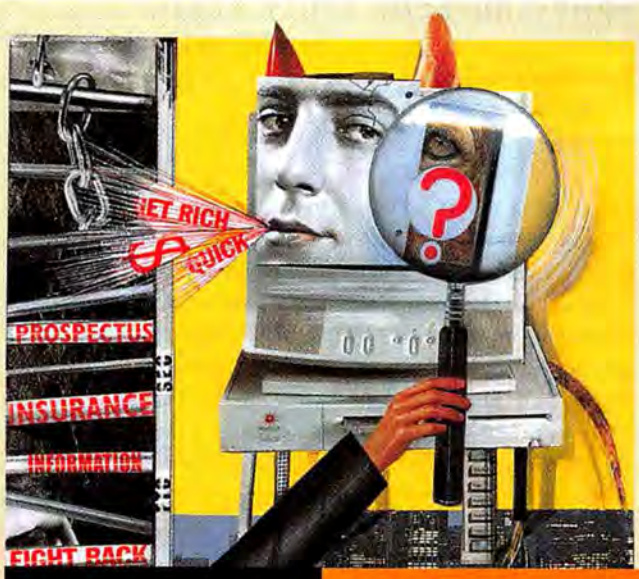
Security Threat Unfortunately, federal authorities say, these measures offer scant protection to consumers. Scammers can evade the rules and appear legitimate by using multiple e-mail accounts and stolen credit card numbers when they sign up.

And if that's not disconcerting enough, hackers can wreak havoc at sites that have inadequate security. In March, for instance, a hacker claimed to have changed auction prices on EBay's site, posted fake ads, and directed visitors to other sites. EBay, however, says it has no indication that this actually happened. EBay does state that subsequent to the claim, the hacker briefly posted this message on EBay: "Proof...that you can't always trust people...not even huge companies." The company says that the hacker didn't steal any credit card information.

A key difficulty in combating auction fraud, federal authorities say, is the tendency of some online auction houses to cultivate a hands-off attitude about activities on their sites. To minimize their exposure to liability, proprietors of these auction sites assert that all they do is offer a place for people to trade goods for money, and they disclaim any responsibility for ensuring the legitimacy of those transactions.

Quest for Safety This attitude was evident in May 1998, when the FTC asked executives from several top auction sites—including Auction Addict, Auction Universe, EBay, Haggle Online, and Up4sale—to do more to prevent fraud on their sites. Nothing substantial came of that meeting, FTC officials say. The short answer is that auction sites' policies protecting consumers are not consistent across the board. "It's a big field," says the FTC's Broder. "Different auction houses are taking different approaches. Some sites take great pains to provide safety measures, and they see it as a competitive edge to have their site safe for consumers."

With the disparity that exists among auction sites' policies on fraud, it's up to consumers to protect themselves. Some simple tips: Pay attention to an auction site's evaluation system—where buyers rate sellers based on their own personal experience—and don't buy anything from anyone who has a spotty record. Pay by credit card whenever possible, or better yet, try using an escrow agent such as www.escrow.com. For a fee of about 5 percent of the product's cost, an escrow agent will hold your money and send it to the seller only after you confirm that you've received the goods in satisfactory condition. ▶



Anatomy of a SCAM

DESPITE the devious ploys and carefully crafted e-mail that scam artists use to lure you to their sites, you *can* spot a scam a mile off. Here's how you can protect yourself.

What to look for:

- You can't find independent confirmation of the claims made about a company's performance.
- You're asked to pay up front for a credit card or a loan that is offered to people who have bad credit backgrounds and no collateral.
- The Web site, even if it looks professional, contains grammatical or spelling errors; or the banner ads are from companies you've never heard of.
- The opportunity requires you to send money (especially a money order or a cashier's check) to a mail drop or post office box.
- The individual making the offer wants to meet you in person.

What you can do:

- Always demand written information about the company behind the investment.
- If the opportunity involves a stock offering, request a prospectus or financial statement.
- Check the Web sites of the Better Business Bureau, the SEC, the FTC, and consumer agencies (see "Watch the Web," page 131) to determine whether the company or investment has elicited any previous complaints. Your state attorney general's office or your local district attorney's office may also record consumer complaints.
- If you receive a hyped news release about a particular company's stock, be sure to visit the particular company's Web site before you part with your money. If the claims are true, the good news is sure to be posted prominently.
- If you plan to buy something from an online auction, check the seller's previous transactions at the site and at buyers' feedback forums. Don't buy from anyone with a bad track record. Pay with a credit card when possible; if you can't, use an escrow service.

–Jeffrey Rothfeder

PUMP-AND-DUMP STOCK SCAMS

Hot tips, lies, and losses

Telltale signs: Company stocks hyped (and artificially inflated) out of the blue, without supporting or background information.

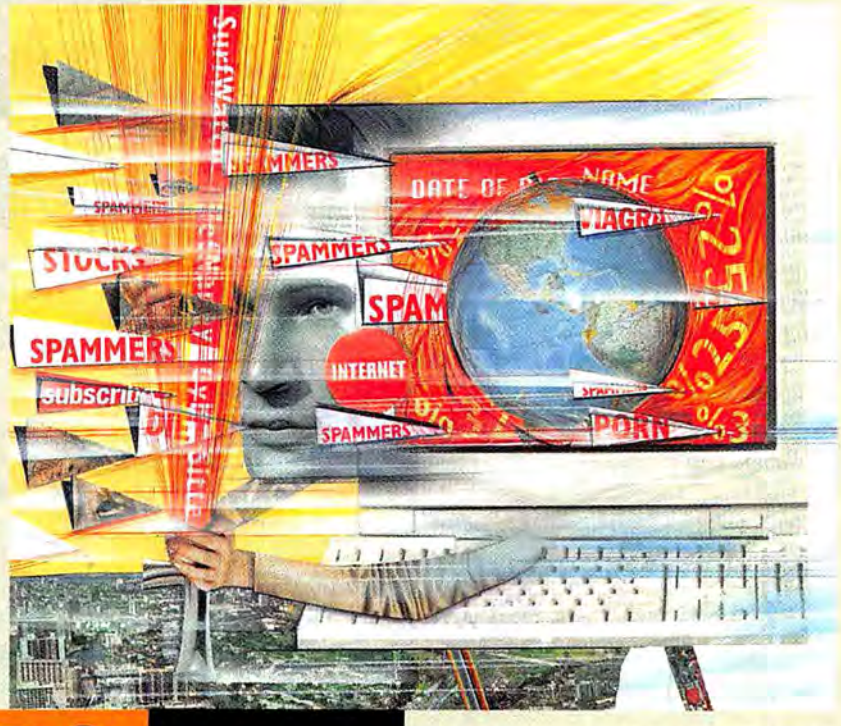
The danger: No real value driving up the price of the stock, loss of the entire amount of the investment with little or no chance of recouping it.

"THE INTERNET IS DELIVERING a new, rapidly growing universe of victims to scam artists," says Kevin Lichtman, publisher of Stock Detective.com, a two-year-old independent online resource that focuses on Internet security fraud. Supported by advertising dollars, mostly from small electronic trading brokerages, Stock Detective.com includes sections like "Stinky Stocks" and "Red Light District" that highlight stocks to avoid.

One victim of a classic pump-and-dump scam was Art M., an aircraft mechanic in the Midwest. He considered himself a conservative investor, but in November 1996 Art M. did something completely out of character. Surfing the Web for investment opportunities, he came across a site called Future Superstock that offered investment tips. He wasn't planning to buy any stock that night but was struck by Future Superstock's claims about its track record, displayed prominently on the site: Its stock picks consistently paid off in a big way.

One recommendation stood out. Level Best Golf had risen solidly recently but was still cheap enough for small-stock traders at not quite $5 a share. According to Future Superstock, Tiger Woods' manager had endorsed Level Best's golf instruction equipment, and the firm had just signed new agreements with companies like Best Buy. Impulsively Art M. paid $5625 for 1200 shares.

As the stock tiptoed over $5 during the next few days, Art M. congratulated himself. Then the share price of Level Best stock suddenly plunged by more than 25 percent, followed by a more gradual but steady descent. That didn't seem to matter to Future Superstock. Throughout 1997 and early 1998, the site told investors to ignore price fluctuations.



SCAMMERS Find New Ways to Hide

THE ART OF THE CON hasn't changed much in 50 years, but scammers' tools have grown more sophisticated. The newest spam scam: *dotless IP addresses,* which hide the true location of the spammer's Web site, thwart antispam software, and could even leave your machine open to attack.

Here's the pitch: A scammer e-mails an invitation to visit a Web site, say, to buy Viagra or view pornography. But instead of supplying a standard Web URL, the e-mail contains a dotless IP address—so named because it lacks the dots found in standard Web URLs (such as www.pcworld.com) and IP addresses (like 209.1.23.30). Instead, dotless URLs employ a series of numbers and/or percent signs (for example, http://3506509598 or http://%33%35%30%36%35%30%39%36).

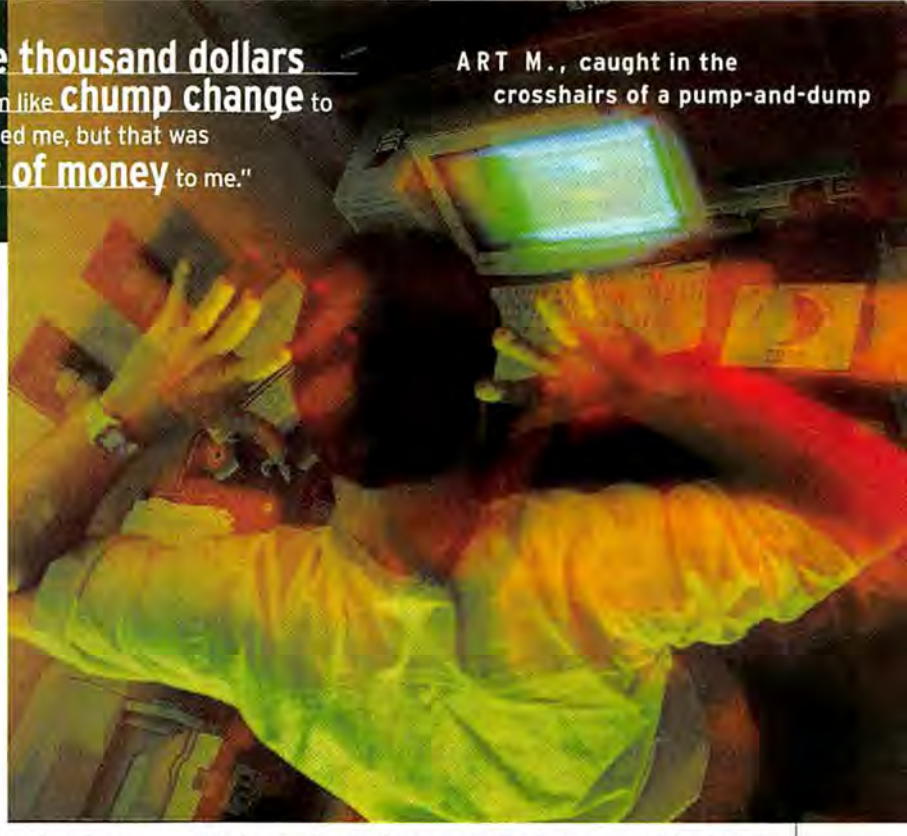
Dotless addresses make hunting down the location or registered owner of a scam site much harder. That obstacle makes it more difficult for users to report an offending site to its hosting service or to authorities. And when you click on such a link, you open up a Pandora's box of security and privacy hazards.

When Microsoft's IE 4.*x* or higher encounters a dotless address, it treats the URL as if it resided on your company intranet. Depending on your browser security settings, this could make your PC vulnerable to hostile applets. A patch posted last October solves that problem in IE 4.*x*. But any browser, even a patched one, will "resolve" dotless IP addresses and open their associated Web pages.

In our research, we discovered one fishy site called Vsource (not affiliated with either of two other companies that registered the Vsource.com or Vsource.net domain names), a slick-looking Web page from a pseudo-Viagra pitchman. Vsource's thorough "online consultation" asked for all kinds of information, including financial and personal data like our social security number. The site had no e-mail address, postal mail address, or telephone number. It disappeared 24 hours after we first saw it.

Protect yourself by using a little common sense. Make sure the company publishes its address and telephone number on the site. Call the Better Business Bureau in the company's city, and browse the FTC's Web site (www.ftc.gov) for news about the latest scams.

And of course, if you see a dotless IP address link, don't click on it. **—Andrew Brandt**



"I was taken. **Five thousand dollars may seem like chump change** to the guys who conned me, but that was **a lot of money** to me."

ART M., caught in the crosshairs of a pump-and-dump

Level Best's stock currently is trading near zero. The celebrity endorsements and retail store deals turned out to be fabricated. As for Art M., he is still holding on to the stock. "It would cost me more in commission to sell it now," he says with a mixture of bitterness and resignation. "I can't figure out what happened, but I was taken. Five thousand dollars may seem like chump change to the guys who conned me, but that was a lot of money to me."

According to SEC allegations, companies like Level Best paid Future Superstock and its owner Jeffrey R. Bruss a total of more than $1.6 million to hype their stocks, and Future Superstock illegally failed to disclose this arrangement. By enticing investors with lies about its client companies, the site artificially inflated the value of Level Best stock. Then, the SEC charges, insiders (including Bruss) sold their stock shares at a large profit, at which point the bubble burst, prices tumbled, and individual investors took the losses. The agency brought charges against Future Superstock and Bruss last October, but the case has yet to go to trial. Bruss declined to comment.

The SEC has made a number of high-profile busts recently, but pump-and-dump scams still abound. It's unclear exactly how many people lost money in the PairGain scheme, but the stock's sales volume that day approached its record high, so a large number of investors got stung. And although authorities have charged Gary Dale Hoke with fraud, the victims won't ever get their money back.

MULTILEVEL MARKETING

More recruitment, more money?

Telltale signs: Profit comes exclusively from recruitment effort, no real product or service is sold.

The danger: Only about 2 percent of investors ever make any money; the rest of the participants lose everything.

VICTIMS OF recruitment-based get-rich-quick programs—also known as pyramid schemes—are slower to complain than people who lose money in online auctions. They may not know for months that they've been victimized, and some people keep hoping that they weren't taken and that they're just a step away from reaping a windfall. "When we try to shut down multilevel schemes, at first people treat us like we're ripping up their winning lottery ticket," says Paul Luehr, FTC assistant director of marketing practices.

The classic multilevel marketing or pyramid scheme requires participants to pay a monthly fee and to sign up additional people in order to make money. In fact, according to federal and state authorities, even if the program involves your selling products (like cosmetics or key chains) that you get in exchange for your monthly fee, the program cannot legally require you to recruit people before you can make money. "The first people to sign up for those programs actually make some money off the people who come in after them," reports the FTC's Broder. "But our economists tell us that even in the best case, 98 percent of the people that get involved in a pyramid scheme get nothing back."

In March 1999 the FTC and state officials filed suit or recommended disciplinary action against 67 promoters of Internet pyramid schemes. A typical instance: Five Star Auto Club of Poughquag, New York, promised earnings of $180 to $80,000 and an opportunity to lease a "dream car" for free, in exchange for an annual fee, monthly payments of $100, and recruitment of new participants. The FTC received a temporary injunction from the U.S. District Court to shut down the operation. So far, no criminal charges have been filed against Five Star.

"[Filing charges against pyramid scheme promoters] is a good step," says Jim Lanford, coeditor of Internet ScamBusters, a Web newsletter that educates people about Internet fraud. "But if you type in 'multilevel network' or 'get-rich-quick' on a search engine, you'll find dozens more who brag openly about offering the same things those guys were busted for."

The lesson here? If an e-mail offer sounds too good to be true, delete the message and forget all about it.

CREDIT CARD CRAMMING

Little charges, big problems

Telltale signs: Mysterious charges on your credit card statement and telephone bill for Internet products or services you never ordered.

The danger: Initial charges may be insignificant and go unnoticed; victims may have a hard time getting previous charges removed.

PERHAPS THE MOST insidious type of Internet fraud is a scam known as *cramming*, which involves charging Internet products or services to other people's credit cards.

Cramming is a tremendously popular criminal activity built on stolen credit card information, some of it collected by hackers who prowl the Net for nonsecure and unencrypted sites where consumers have used their credit cards to buy things. The crammers then use these credit card numbers to order goods for them- ▶

PHOTOGRAPH: ANDY SNOW

selves. Though the FTC has not had much success stopping crammers, it did finally hook a huge operation in May 1999 that had allegedly defrauded consumers out of as much as $45 million.

In that scheme, according to the FTC, numerous individuals and companies using a long list of aliases—Kenneth H. Taves, Kenneth Till, Netfill, N-Bill, Webtel, and Online Billing, among others—charged thousands of consumers $20 apiece for subscriptions to pornographic sites they had never requested.

Upon discovering those charges on their credit card bills, many victims attempted to contact the scam artists, according to the FTC. But the crammers were inaccessible, hidden behind a long string of mail-drop boxes, postal boxes, and voice mail.

"I called the credit card company and had the charge removed," says one victim who asked not to be named. "But it kept reappearing. I finally canceled the credit card."

At press time, federal agents had arrested Taves for the alleged credit card swindle. A trial date has been set for October 26.

Regulators believe this scam has probably claimed some 900,000 victims who remain unaware that they've been cheated because they don't look at their bills closely before paying them. The FTC advises consumers to check all charges and to report any they don't recognize to the FTC and their credit card company.

Got a Complaint? Jump Online

If you suspect you've come across a scam, report any leads (names of individuals or companies; appropriate e-mail addresses, URLs, and phone numbers) and other details immediately. These complaints are broadcast to law enforcement agencies throughout the United States and Canada. Find complaint forms at:

- **Better Business Bureau:** www.bbb.org/complaints/file/html
- **FTC:** www.ftc.gov/ftc/complaint.htm
- **Internet Fraud Watch:** www.fraud.org/info/repoform.htm
- **SEC:** www.sec.gov/enforce/comctr.htm

CONSUMERS FIGHT BACK

LAW ENFORCEMENT AGENCIES can't catch all the scammers who set up shop on the Web, but a growing grassroots movement is working to unearth online scams, issue warnings, and offer tips on how to avoid getting cheated in the first place. This information can be found on a number of sites, including www.scambusters.com, www.scamwatch.com, www.stockdetective.com, and www.bbb.com. Some sites offering products or services that tend to attract swindlers have a section for consumer complaints, where buyers can expose scams. Two such helpful sites are www.bestfares.com and www.creditinfocenter.com.

One tireless Internet-scam vigilante goes by the screen name Steve Pluvia. He is often found on one of the Web's most popular stock chat sites, Silicon Investor. Pluvia has correctly identified several companies as engaged in deceptive activities and has watched day traders scurry out of stocks as their prices plunged.

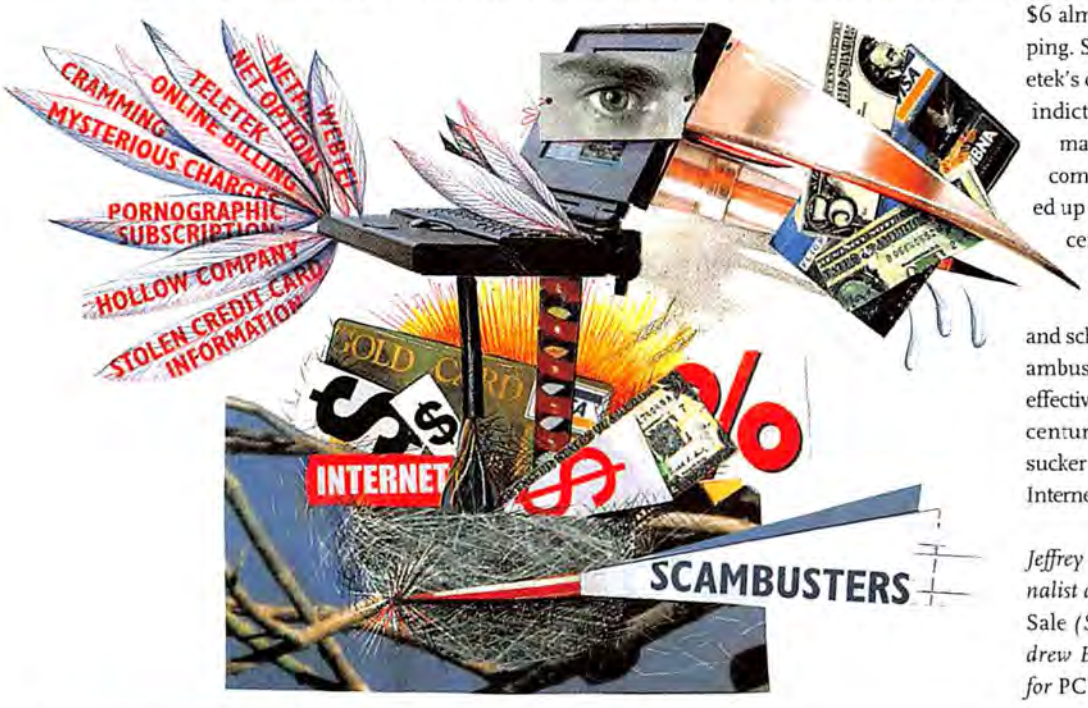
Scam Exposé One of Pluvia's favorite stories involves the unmasking of Teletek, a now-defunct Las Vegas telecommunications company, which in 1996 boasted about its planned expansion. On a hunch, Pluvia checked into Teletek's claims, calling creditors and researching SEC documents. "To keep up the lie about its growth, Teletek would offer long distance through MCI, not pay the bills, get shut off, and then move on to another carrier," says Pluvia. "Of course, none of this was disclosed to the public."

One person taken in by Teletek's illegal touting was Cliff Plas, owner of a Chicago printing firm, who bumped into the company's phony claims on an AOL chat board. He invested $10,000 in the stock, buying 5000 shares at $2 each. The stock's value peaked near $10 per share in March, at which point Pluvia spread the word on the Net about Teletek's deception.

"Pluvia put out some vicious stuff, so I called the company and they told me nothing negative was going on at the company and that Steve Pluvia had it all wrong," Plas recalls.

Plas held the stock as its price per share plummeted to below $6 almost instantly and kept dropping. Shortly thereafter, one of Teletek's controlling shareholders was indicted for fraud, the firm's top management resigned, and the company went bankrupt. "I ended up being right on about 99 percent of what I said," says Pluvia. Plas never got out.

With so many scams and schemes on the Web waiting to ambush victims, consumers' most effective shield may be skepticism. A century ago, P. T. Barnum said a sucker is born every minute. On the Internet, that birthrate is a lot higher.



Jeffrey Rothfeder is a freelance journalist and the author of Privacy for Sale *(Simon & Schuster, 1992). Andrew Brandt is an associate editor for* PC World. ■

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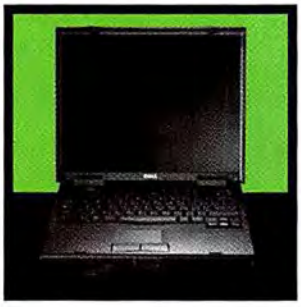

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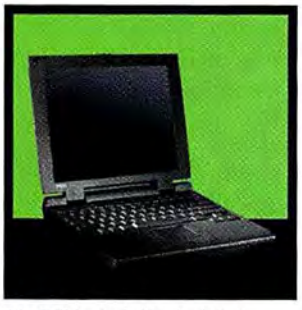

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- Inspiron 7000 A366LT – *PC World*'s Top 10 Power Notebooks, 4/99.
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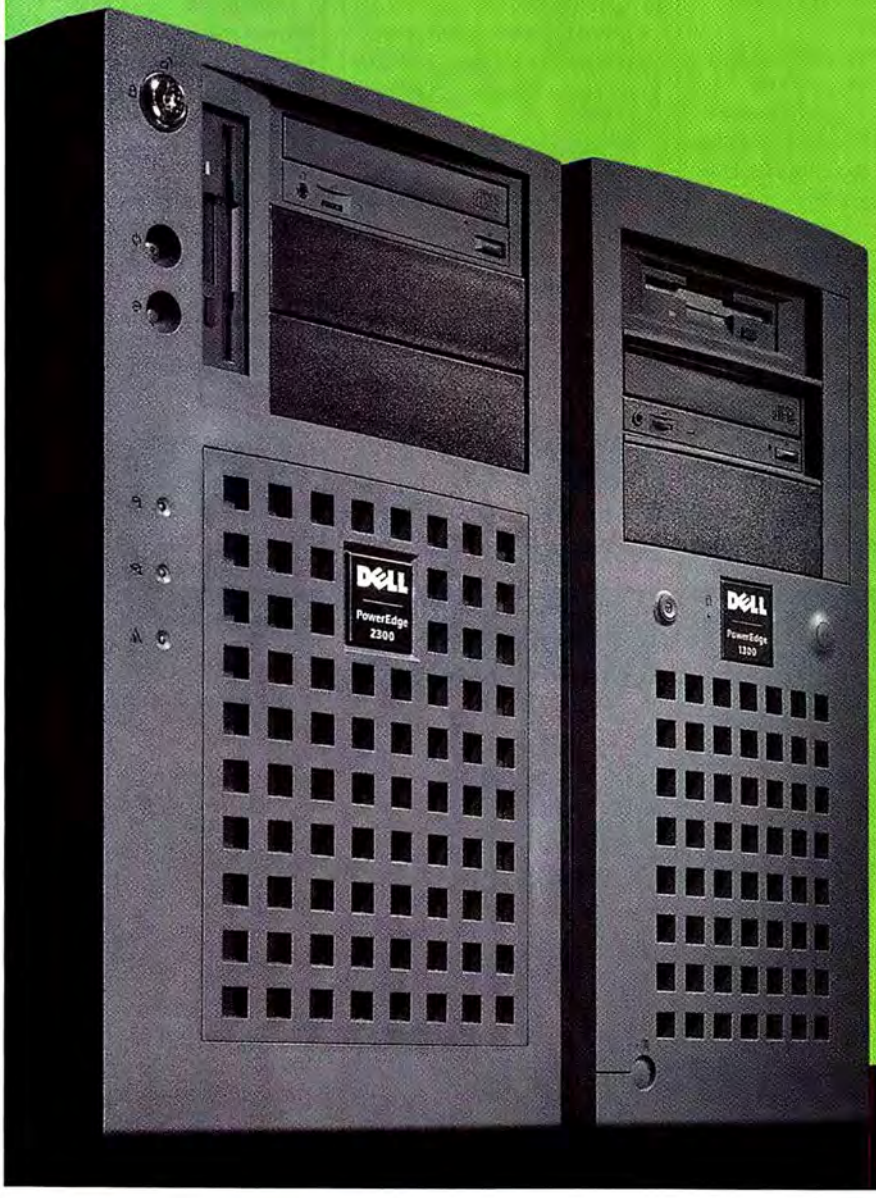

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- Integrated PCI Ultra-2/LVD SCSI Controllers
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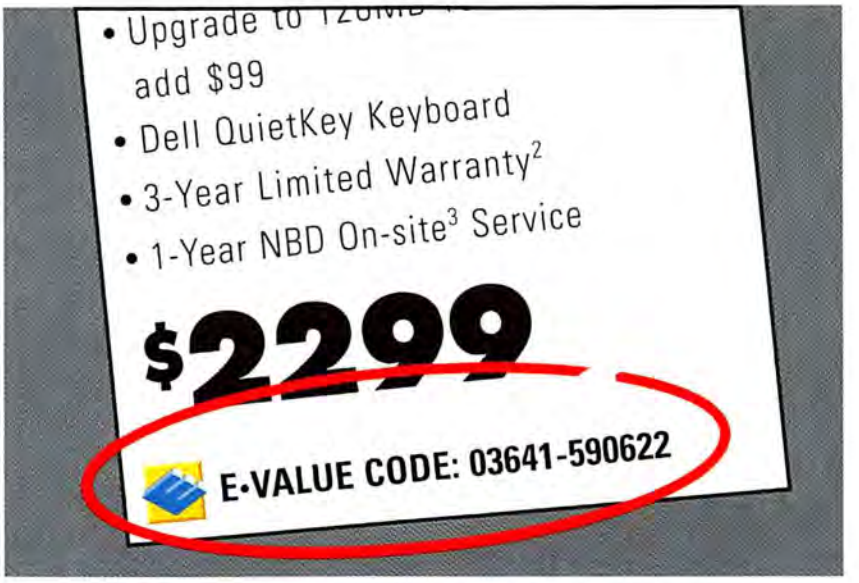

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Blazing Lasers

BY DAN LITTMAN

THE WORLD may exist in color, but for most businesses, printing remains a black-and-white proposition. Why, when you can get a serviceable color ink jet for $150, would you pay $250 and up for a monochrome laser? Lots of reasons—among them speed, lower long-term costs, and paper handling. And when it comes to reports, proposals, and other documents that require crisp and authoritative text, laser printers have the edge.

We considered 30 monochrome printers designed for small or home businesses or ▶

Faster than a speeding ink jet, laser printers are still the business standard. For sharp text, flexible paper handling, and low long-term costs, you can't beat these peppy monochromes.

PHOTOGRAPHS BY ARNOLD TIESEJO

for corporations, including 9 new models ranging in price from $399 to $1500. We evaluated all the printers' performance, print quality, ease of use, reliability and service, and overall value. In the final analysis, the most balanced printers—not necessarily those that stood out in any given category—were our top choices.

Black and White Basics

IN A BIG OFFICE, print speed is as fundamental as output quality—the faster the printer runs, the less time you'll spend waiting for documents to print. Even the fastest color lasers deliver plain text documents at less than 10 pages per minute; monochrome printers can run significantly faster. This month, for example, we saw some impressively swift performances, including better than 14 ppm from Kyocera's new FS-3700+ and 16 ppm from Minolta's new PageWorks 25.

If you've got a small staff, print speed probably doesn't matter quite as much. Regardless, you get a lot more speed for your money with a monochrome model. For example, our top-ranked small-business/home laser, Brother's HL-1040, costs just $299 and cranks out text at 8.4 ppm. By contrast, Hewlett-Packard's snazzy new color DeskJet 882C (see June's *Top 10 Color Printers*, www.pcworld.com/jun99/printers), costs the same but delivers text at only half the Brother's speed—and it's just about the fastest home ink jet in recent memory.

Once you've paid for your printer and set it up, how much will it cost to operate? Here, too, monochrome offers a big advantage over color. In fact, a page of color can cost five or even ten times as much as a page of plain old black on white. That's partly because color documents use more ink or toner per page and because consumables for color printers cost more than those for monochromes. Plus, periodically replaced components (like a laser printer's fuser) cost more on color units—and don't last as long.

Still another factor that makes monochrome lasers a better fit in the button-down world are their extensive paper handling options. Though you can find an extra paper tray for most color lasers these days, monochromes offer many more extras to keep a busy office humming—duplexers, envelope feeders, 2000-sheet paper bins, job stackers, and more.

Best Buy Lasers

Among low-end lasers, the **Brother HL-1040** (right) shines with its $299 price tag, quick printing, and very good text quality. A fine choice for small offices, it's easy to install and run. One caveat: The cost of consumables adds up if you print tons of pages.

For corporate types, the **Lexmark Optra S 1855** (left) can't be beat. This quick laser costs $1129 and whips text pages out at almost 14 pages per minute. Its numerous paper-handling options, including extra paper trays, can shorten those long lines waiting for output. Prints look good, too.

The Contenders

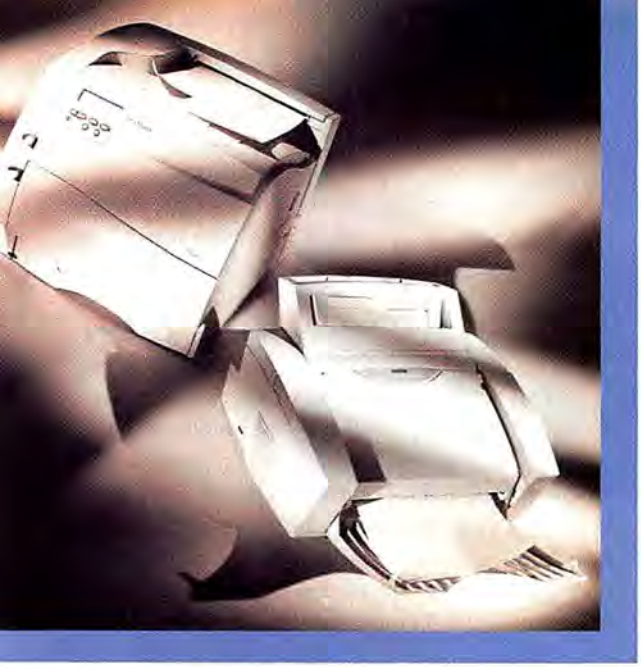
WE TESTED THREE new mono printers geared for the small-office and home markets: Lexmark's Optra E310, Okidata's OkiPage 12i, and Kyocera's FS-1700+. None of them made our Top 10, though

TOP 10 LASER PRINTERS — FEATURES COMPARISON

	SMALL-BUSINESS/HOME	Street price (3/23/99)	Overall rating	Vendor's speed rating (ppm)	Speed for plain text/full-page graphics (ppm)	Print quality for text/graphics	Standard RAM (MB)	Maximum resolution (dpi)	Paper capacity input/output
1	Brother HL-1040 800/276-7746 www.brother.com	$299	84	10	8.4/2.5	very good/adequate	2	600 x 600	200/100
2	Xerox DocuPrint P12 800/832-6979 www.xerox.com	$599	83	12	9.2/2.9	excellent/good	2	600 x 600	330/250
3	Minolta PageWorks 8L 888/264-6658 www.minoltaprinters.com	$379	83	8	6.5/2.5	very good/adequate	2	1200 x 1200	150/100
4	Okidata OkiPage 10ex 800/654-3282 www.okidata.com	$399	83	10	8.6/2.5	good/good	2	1200 x 600	250/100
5	Okidata OkiPage 6e 800/654-3282 www.okidata.com	$249	82	6	5.2/2.4	good/adequate	2	1200 x 300	100/100
	CORPORATE								
1	Lexmark Optra S 1855 800/539-6275 www.lexmark.com	$1129	87	18	13.8/2.8	very good/very good	4	1200 x 1200	350/250
2	Brother HL-1660e 800/276-7746 www.brother.com (NEW)	$899	86	17	12.3/2.8	excellent/good	8	1200 x 600	650/250
3	Lexmark Optra S 1625 800/539-6275 www.lexmark.com	$999	86	16	11.6/1.7	very good/very good	4	1200 x 1200	350/250
4	Samsung QwikLaser-7000 888/987-4357 www.samsungtelecom.com	$799	83	17	10.4/2.8	good/adequate	4	1200 x 1200	500/250
5	HP LaserJet 4050 800/752-0900 www.hp.com (NEW)	$1099	82	17	12.2/3.3	very good/adequate	8	1200 x 1200	600/300

Best Buy

HOW WE TEST The overall rating for both small-business/home and corporate laser printers is based on print quality (25 percent), price (25 percent), features (15 percent), speed (10 percent), service and support (10 percent), and ease of use (15 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.



such as the easy-to-use Minolta PageWorks 8L.) Okidata's OkiPage 12i is more affordable at $599, but it offers less than the identically priced Xerox DocuPrint P12, our number two choice for small-business and home users.

We also tested six new corporate-oriented monochromes. Brother's inexpensive ($899) and impressive HL-1660e lands in second place, and the $1099 LaserJet 4050 from HP debuts at number five. Falling just short of the chart are Kyocera's FS-3700+, which is identical to the small-business 1700+ except for dramatically faster performance and a slightly higher $1189 price tag; and Minolta's PageWorks 25, an excellent printer that, at $1499, is simply too expensive (unless you need its ability to print 13-by-19-inch documents). Trailing the pack are Compaq's $1005 LN16 and Genicom's $970 MicroLaser 170—essentially two versions of the same unremarkable printer.

the $399 Lexmark missed by only a smidgen. Kyocera priced the FS-1700+ out of the small-office market at $1019 (that's as much as some 18- and 20-ppm corporate models cost). However, Kyocera's low per-page cost—which is due to inexpensive toner and long-lasting components—could make it a sensible choice for those who need high-volume printing. (Those with lesser volume needs and tighter budgets could go with any SOHO unit on the chart.

Comments	Product info number
This inexpensive unit offers impressive text speed, strong text output quality, and a convenient, easy-to-use design. We wish graphics weren't so dark, though.	638
Pricey for a home printer, but high speeds, good print quality (especially on text), and a three-year warranty recommend it for small-office use.	639
This quiet, easy-to-use model has great documentation, but it's a bit expensive considering its somewhat pedestrian text printing speed. Text output looks handsome, but graphics are dark.	640
This quick personal printer produces good output overall, though text can look slightly jagged, and you need to buy extra RAM for the highest resolution. Good documentation helps balance sloppy design.	641
Our former Best Buy, this low-cost model drops to last place due to weak new support scores and slightly downgraded print quality. A simple design helps keep it on the chart.	642
Fastest text printing on the chart, extensive paper-handling options. But its usually strong gray-scale graphics print quality can be inconsistent at times, and it's the costliest printer here.	643
Affordability, flawless text printing, and swiftness propel this new model onto the chart, but its baffling documentation and confusing control panel make some chores frustrating.	644
Low price for its class, competitive performance, and good overall print quality. Except for its print speed, specifications are identical to those of the Best Buy Optra S 1855.	645
Sharp, dark text output and a handy built-in duplex feature for printing on both sides of a page (rare at this price point) balance less-than-"qwik" text print speed and merely adequate gray-scale output quality.	646
New corporate laser is the fastest on the chart at printing graphics. Its even text output, clean design, and generous paper capacity make up for rough gray-scale image quality.	647
All products:	901

Small-Office Lifestyles

YOU'RE STRUGGLING to grow a new business. How can your printer help? First, it must be dependable, since you probably don't have a backup printer down the hall. And if it does start acting up, it must have good support and a warranty that commits the vendor to replacing a bad unit promptly (preferably overnight). Epson shines on reliability, while Lexmark comes out on top in terms of service, according to our reader survey (see "Reliability and Service," page 148). Only Xerox and NEC offer a warranty longer than a year (Xerox's runs three years, NEC's lasts for two). HP, GCC, and Genicom also got dings for lacking toll-free tech support.

But even the best-trained technicians won't come to your office to change a toner cartridge or clear a paper jam. With no in-house technical staff, you need a printer that's easy to set up, simple to maintain, and supported by thorough, clear documentation. Though it didn't make our chart, Lexmark's Optra E310 is exceptionally easy to use.

You also need a printer that will be affordable to own in the long run. Some vendors hook you with a low purchase price, then charge steep rates for toner and other replaceables. Other printers cost more up front but use less expensive supplies. Don't neglect the cost of consumables if your operating budget is tight; over the years it'll far exceed the purchase price. For example, Brother's HL-1040 costs just $299, but its toner prices out at a fairly high 1.2 cents a page, and its short-lived (20,000 pages) drum adds 0.8 cents a page. Print 40 pages a day for a year, and you've spent another $300.

Finally, you'll want a printer that's fast. But don't believe everything you read. Printer makers rate their models' speeds according to the engine's theoretical maximum, which never holds true in the real world: Among the 17-ppm–rated printers we've tested, for instance, the average text speed is just 11 ppm.

Print Quality: Xerox Rocks

THE NEWCOMERS from Lexmark, Okidata, and Kyocera faced some tough competition from established small-office printers. The Xerox DocuPrint P12, ▶

SOHO Solutions

The Xerox DocuPrint P12 (right) hits our chart at number two with its quick speeds and long warranty. In third place is the Minolta PageWorks 8L, a fine text printer that runs quietly, too.

for example, wowed us when we first looked at it a year ago, and continues to impress: Its clear, perfectly accurate text still deserves our rare Excellent rating. The OkiPage 12i's text looks somewhat rough by comparison, though it should be good enough for just about any business use. Unfortunately, the OkiPage 12i ran out of memory trying to print our test files at high resolution; you'll need to add more RAM if you plan to print complex graphics images. Lexmark's E310 prints very light but accurate text, whereas Kyocera's FS-1700+ prints very dark output but still manages to produce clear, attractive type. Our SOHO Best Buy, the Brother HL-1040, produces even, smooth large type and easy-to-read small letters.

Gray-scale graphics have long been the Achilles' heel of inexpensive lasers. But among the new SOHO printers, the Lexmark Optra E310 prints very attractive grays, good enough for proofing photos or illustrations—better, in fact, than those produced by the Xerox P12. The other SOHO printers do a perfectly adequate job for most gray-scale purposes.

Price/Performance: Don't Sweat the Details

THERE'S SURPRISINGLY little correlation between cost and performance in SOHO printers—more money doesn't necessarily buy you more speed. For

Reliability and Service

WILL YOUR LASER GO THE DISTANCE?

TO PARAPHRASE the Elvis album title, 7850 people can't be wrong. That's how many users responded to our first Reliability and Service survey focusing on printers (both color and monochrome). We asked 15 questions on everything from whether a printer worked the first time it was turned on to how courteous a vendor's tech support staff was. The answers helped us to rank seven printer makers on the reliability of their products, and to rate four of those companies on their service quality. The bottom line: Epson was a hit in reliability, while Lexmark led the pack in service. Okidata ranked low on reliability (but, like two other vendors, it did not get enough responses to service questions to tally a service score).

Printers That Keep Working

WE DEEM a printer reliable if it works when you first turn it on—and continues to do so, with minimal interruption, for its entire life. Survey participants rated Epson's printers the most reliable overall. Its models worked right out of the box 98 percent of the time. Okidata's printers weren't bad; about 91 percent of them worked on the first try. But based on the data we obtained, Okidata's printers tend to have more problems per printer than those of other vendors. Finally, when our readers rated their level of satisfaction with their printers' overall reliability, HP and Epson topped the list with 93 percent very or somewhat satisfied. Okidata was again last, but even so, 84 percent of its users were very or somewhat satisfied.

Epson, Lexmark Lead

COMPANY	Reliability	Service
Brother	fair	[1]
Canon	good	fair
Epson	excellent	good
HP	very good	fair
Lexmark	good	very good
NEC	fair	[1]
Okidata	poor	[1]

[1] Insufficient data from reader survey to give a rating.

HOW WE TEST *PC World's* Printer Reliability and Service survey was conducted in conjunction with World Research of San Jose, California. Our ratings are based on the responses from 7850 surveys completed in March 1999. For a company to qualify for a printer reliability rating, we required a minimum of 50 responses from its printers' users to three key questions pertaining to reliability. For a printer service rating, we required 50 responses to four key questions pertaining to service.

Desperately Seeking Service

GOOD SERVICE means different things to different people, but our survey ran the gamut, covering timely problem resolutions, courteous and knowledgeable tech support staff, and customers' satisfaction with the way they were treated. Lexmark scored high in every regard. An impressive 88 percent of Lexmark users who had problems said the company straightened them out in five days or less. Less than half of Epson users said the same thing, while Canon and HP users came in at 71 percent and 67 percent, respectively.

Everyone knows that good help is hard to find. In our survey, most readers said they talked to pleasant technical support representatives, but fewer were impressed with the technicians' knowledge about their printer. For example, more than 80 percent of Canon users deemed that company's reps extremely courteous, but less than 70 percent thought that those reps were exceptionally knowledgeable. Still, overall service satisfaction was pretty good. None of the vendors got ratings of less than 75 percent very or somewhat satisfied, and Lexmark stood out with 85 percent. Note to printer vendors: It helps if your well-mannered technicians know exactly what they're talking about. —Karen Silver

example, we clocked the OkiPage 12i at 9 ppm on text—slightly faster than the top-ranked Brother HL-1040—but the 12i costs $300 more. Kyocera's FS-1700+ comes close to 10 ppm but carries a hefty $1019 price tag. Meanwhile, Lexmark's E310 trails at 6.7 ppm and costs $399. If you plan to print a lot of images, avoid the OkiPage 12i: Most SOHO lasers print graphics four to five times faster.

Ease of Use: Getting Better

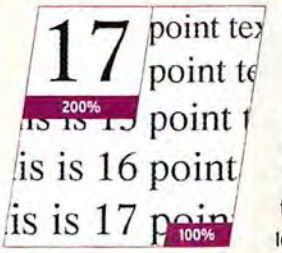
YOU'D THINK using one laser would be about the same as using any other. Not so. On the Okidata OkiPage 12i's confusing control panel, for example, some buttons perform two functions, while others do only one. Worse, the Lexmark Optra E310 has a lone, baffling button; some tasks involve sequences of turning the printer on and off, opening and shutting its cover, and pushing the button quickly or slowly. It's impossible to use without the manual. The Kyocera FS-1700+'s control panel proved cryptic even with the manual, but it does earn points for an illuminated schematic that shows the location of paper jams.

Fortunately, you can do most routine tasks—like picking paper trays—through a printer's software. Each of the three new models' drivers makes sense and lets you perform all the necessary functions.

All three new SOHO printers feature a thoughtful internal design: The toner and drum slip in and out easily; adjusting and filling the paper trays doesn't feel like assembling a jigsaw puzzle; and you can get your fingers inside to clear paper jams. The Kyocera's innards even slide out on rails.

And Okidata fixed an annoying design flaw that plagued most previous Okidata printers: The auxiliary tray on the 12i now opens easily—no more broken fingernails or scraped knuckles.

BEST BROTHER HL-1660E
Sharp type at every size distinguishes our new corporate number two. ▼



OUTPUT: WHO'S TOPS?

WORST COMPAQ LN16
Heavily banded gray-scale images that run too dark for our tastes helped keep the Compaq LIN16 off our corporate chart. ▼

BEST LEXMARK OPTRA E310 ▲
Though the Optra E310 did not make our SOHO chart, its grays impressed us with strong detail and no visible banding or streaking. Of the new printers we tested this month, its graphics looked the best.

Operating Costs: Cash or Credit?

THE SOHO PRINTERS in this review range from $250 to more than $1000, but cost-per-page figures on all but one of the printers come out roughly the same (between 1.9 and 2.6 cents per page). The exception, Kyocera's FS-1700+, prints at just a penny a page thanks to two factors. First of all, its toner is exceptionally inexpensive, at $100 for a 20,000-page cartridge, compared to almost $30 for Brother's 2400-page unit. More important, Kyocera's ceramic imaging drum, though expensive at $500, is supposed to last a phenomenal 300,000 prints—that's 15 times longer than Brother's $160 drum.

If you expect to use your printer heavily and keep it for years, buying a high-priced model like the Kyocera may save you money over the long haul. But if you're like most people and print a few dozen pages a day, it makes sense to buy a less expensive printer and pay more for consumables. (See www.pcworld.com/jul99/printers for additional details.)

Okidata Holds Its Own

Two Okidata printers bring up the rear of our SOHO chart. The quick **OkiPage 10ex** (left) and the cheap **OkiPage 6e** fill different needs, but they're both fine for small-business or home use.

Corporate Juggernauts

BIG OFFICES HAVE different printer needs than small ones do. When you share a printer with lots of colleagues, a fast print engine and quick driver can make the difference between being on time and holding everyone up. Print quality and paper-handling options are also important. Reliability counts, but it's not quite the top concern that it is with small offices—when your printer goes on the fritz, you can probably redirect your jobs to another unit. And when it's time to install ▶

"Still

Get the speed YOU need.

If you've been holding out for the cable or telephone company to bring high-speed Internet access to your neighborhood, chances are it's been a while. Which is a shame, because if you'd chosen DirecPC®, you could be surfing at up to 400 Kbps **right now**. That's up to 14 times faster than a standard 28.8 modem and almost three times faster than an ISDN line.

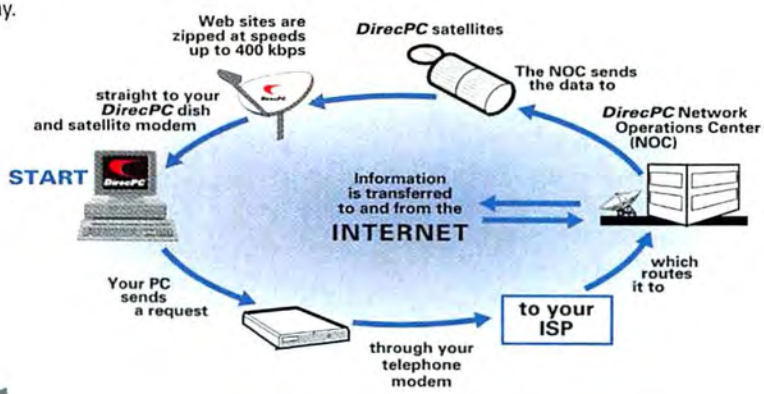
HARDWARE AS LOW AS **$199**

It's easy.

How do you get started? Just visit us at www.direcpc.com to find a retailer near you. If you can't find a store in the neighborhood, call us at 1-800-DIRECPC. We'll send you your dish, satellite modem, software and everything else you need. We can arrange professional installation for you, too. Either way, getting started is just a phone call or a mouse click away.

How does it work?

The engineers at Hughes figured out that the real bottleneck in the speed of the Internet wasn't the request **out** to the Web — telephone modems handle that just fine. Everything slows down when the Web tries to use the telephone system to send you **back** the media-rich information you requested. So, we use a much faster satellite connection for sending you the Web content you want. Check out the diagram — this is the system that makes DirecPC the fastest Internet access available nationwide.



waiting?"

DirecPC gets pushy.

Sure, you love the idea of surfing the Web at up to 400 Kbps. But what if you could get your favorite Web sites and Usenet Newsgroups delivered straight into your PC by satellite — **automatically**, without even having to tie up your phone line to ask for them? That's just what DirecPC's Turbo WebCast™ and Turbo NewsCast™ services do — so you're never behind on the news and information that's important to you. The best thing about these two services? They're **free** with your paid subscription to any Turbo Internet™ service package.

The good news.

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No other high-speed Internet access provider offers so much for so little. Take a close look at our service pricing — we're sure you'll find a package you like.

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We know what you're thinking: "If I'm going to put a dish on my roof, I might as well sign up for one of those satellite TV services, too." We agree! That's why, for a few dollars more, you can upgrade to our DirecDuo™ dish with your DirecPC satellite modem. Add a Hughes-brand digital satellite receiver (or the receiver you already own), and you get almost 200 channels of crystal-clear satellite TV from DIRECTV® as well as Turbo Internet from DirecPC. Just call 1-800-DIRECPC or stop by www.direcpc.com to find out more.

You already know how great the Internet is — you're just looking for a way to go faster. DirecPC is the fastest Internet access available nationwide. It's affordable, and it's available everywhere. So, if you're still plugging away with an old-fashioned telephone modem, you need to ask yourself:

What are you waiting for?

Service Plan Details	Residential		Business
Name of Service Plan	Executive Surfer	Family Surfer	Office Surfer
Price of Service Plan (Including ISP)	$29.99/Month	$49.99/Month	$129.99/Month
Price of Service Plan (Without ISP)	$19.99/Month	$34.99/Month	$109.99/Month
Hours of Service (Availability)	24 Hours a Day	24 Hours a Day	24 Hours a Day
On-Line Time (Hours of usage for Turbo Internet)	25 Hours /Month	100 Hours/Month	200 Hours/Month
Additional Hourly Rate (Including ISP) Additional Hourly Rate (Without ISP)	$1.99/Hour $.99/Hour	$1.99/Hour $.99/Hour	$1.99/Hour $.99/Hour
DirecPC Services			
Turbo Webcast: Broadcast delivery of popular Websites to your PC's hard drive	Included	Included	Included
Turbo Newscast: Broadcast delivery of up to 30,000 Usenet Newsgroups to your PC's hard drive	Included	Included	Included
Turbo Internet: Fully interactive access to the Internet at speeds up to 400Kbps	Included in Online Time	Included in Online Time	Included in Online Time
Free E-mail Accounts	1	1	4
Networking (Number of Seats)	N/A	N/A	4

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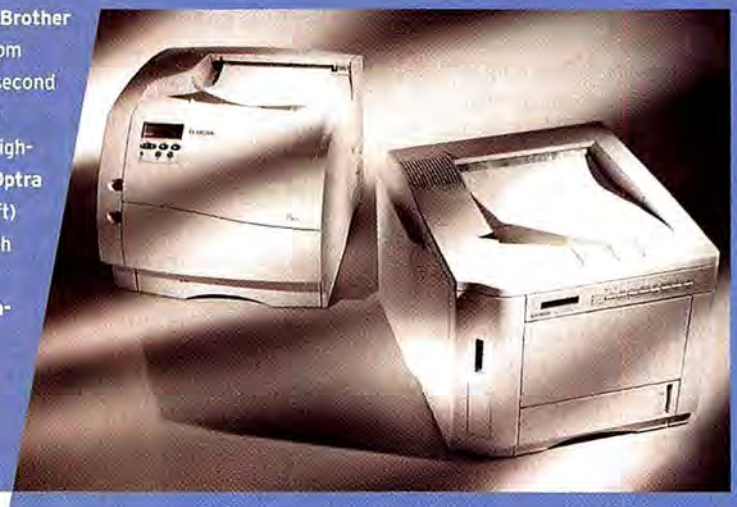
that 2000-sheet paper feeder, chances are that the chore will be handled by your organization's support staff.

Print Quality: Big Brother

WITH PRECISION-TUNED imaging components and a full complement of memory, most corporate lasers can produce exquisite documents. Though we've long admired the fine output of Lexmark's Optra S 1855 and 1625, Brother's new HL-1660e dazzled us with its flawless text, garnering the only Excellent rating for text quality among corporate printers.

Among the six new corporate models we tested, Minolta's PageWorks 25 and HP's LaserJet 4050 also impressed us. The Minolta draws the cleanest, straightest lines we've ever seen—a plus if you plan to print gigantic 11-by-17-inch spreadsheets. The HP LaserJet 4050's fine, evenly weighted text impressed us as well, appearing crisp even at very small type sizes.

Quick Lasers for Big Business



The affordable **Brother HL-1660e** (bottom right) comes in second on our corporate chart, while the high-quality **Lexmark Optra S 1625** (bottom left) takes third. In fourth and fifth places are the inexpensive **Samsung QwikLaser-7000** (top right) and the speedy, if pricey, **HP LaserJet 4050.**

By contrast, the Compaq LN16 prints too dark, while the Genicom MicroLaser 170 tends to lose fine details—and even very small characters. And Kyocera's FS-3700+ produces a slight shadow around its letters and images.

Though none of the new printers handles gray-scale images (like photographs) as well as either of the top Lexmarks do, all deliver adequate quality for most uses.

Price/Performance: Brother Encore

THE BROTHER HL-1660E debuts in second place on the strength of its impressive print quality, high speed, and low price. It prints text at 12.3 ppm—somewhat slower than the top-ranked Lexmark Optra S 1855—but it costs $230 less, at $899.

The Minolta PageWorks 25 is the zippiest performer we've seen, though its 16.1-ppm text speed falls short of its theoretical 25-ppm maximum. If you don't need the Minolta's ability to print tabloid-size pages, the $370 premium over the Optra S 1855 is a lot for the 2.4-ppm speed gain.

The Compaq LN16 and the Genicom MicroLaser 170 don't win any ribbons for performance. In fact, the Compaq is so slow—9.4 ppm on text and 1.4 ppm on graphics—that it evokes Kyocera's pricey SOHO printer, the FS-1700+. Interestingly, Kyocera's FS-3700+ prints text at 14.2 ppm, or almost half again as fast as the FS1700+, but sells for just $170 more. The FS-3700+ is still more expensive than anything on the corporate chart, but not by much, and it offers the same low lifetime cost as the FS-1700+.

Ease of Use: Effortless HP

THOUGH ITS PRICE and speed impressed us, the Brother HL-1660e wasn't easy to use. An indecipherable control panel, poorly organized documentation, and software that feels like a throwback to the eighties all kept the printer out of the top spot on the corporate chart. Still, the 1660e's design shouldn't hamper your ability to do simple things like add paper or replace the toner cartridge. But compared to the HP LaserJet 4050's effortless mechanical design and crystal-clear control panel, Brother clearly could have done better. The Lexmark Optra S 1855 and 1625 are just as easy to use as the HP. Meanwhile, Minolta's PageWorks 25 comes with one of the best manuals that we've seen—a luxury, perhaps, since the printer is remarkably easy to operate. We did encounter a design flaw in the Minolta, however: The toner/drum assembly catches on the door as it slides into the printer on rails. You might want a third hand when replacing it.

Operating Costs: Shell Game?

DESPITE HIGHER purchase prices and comparable maintenance costs, corporate-style office printers, since they're designed to produce more prints over their lifetime, cost slightly less per page than SOHO ▶

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models. For example, Compaq's LN16 comes in at about 1.6 cents per page, and the Brother HL-1660e at close to 1.7 cents. That said, cost per page can vary depending on how many pages you print and how long your printer lasts.

Paper Handling: Options and Extras

ONE FINAL CONSIDERATION for a busy office: What to do when the standard 250-sheet paper input tray can't accommodate everyone who needs to use the printer. The more paper your printer holds, the less often print jobs get shipwrecked on an empty tray, stranding anyone waiting for pages to print. Extra paper feeders can come to the reserve. Winning solutions include the Minolta PageWorks 25's extra 2500-sheet paper well ($989) and Lexmark's offerings for the Optra S 1855: up to three 500-sheet paper feeders ($249 each), and a 2000-sheet well ($852).

Making extra paper available isn't the only way to boost your office's printing prowess. Various other kinds of attachments can perform tricks you'd otherwise have to do by hand while standing at the printer. For example, an envelope feeder lets you print letterhead and an envelope from your computer in one step without reloading, and a collator can arrange multiple copies of the same document in separate stacks and in the correct page order.

Besides paper trays, Minolta sells more add-ons for the PageWorks 25 than Mattel does for Barbie, including job stackers that can accommodate five ($899) or ten ($1619) users at the same time, and a duplexing unit ($359) that enables you to print on both sides of a page automatically. The Brother HL-1660e's relatively modest offerings include a 500-sheet feeder ($329) and a duplexer ($549). And Lexmark sells so much hardware for its Optras that a fully loaded Optra can look buried. The Optra S 1855 supports an envelope feeder ($249), three output bins ($204 each), and a duplexer ($283). For the QwikLaser-7000, our number four corporate choice, Samsung offers only an extra 500-sheet paper tray ($199), but the printer does include a built-in duplexer—making this $799 laser a bargain.

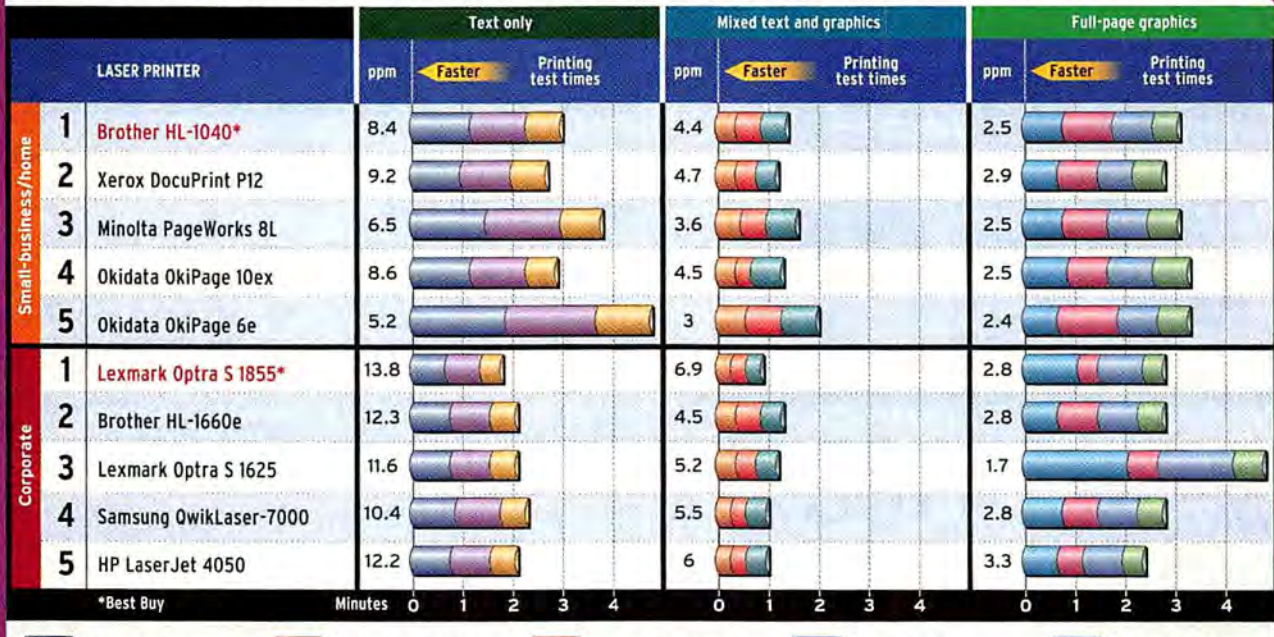
*A page of color printed on plain paper **can cost five or even ten times as much** as a page of plain old black on white.*

online *For a complete cost-per-page analysis and reviews of additional printers, visit PC World Online at www.pcworld.com/jul99/printers. Freelance writer Dan Littman writes* PC World's *monthly* Top 10 Printers. *Karen Silver is a senior associate editor for* PC World. ■

TEST REPORT

Lexmark Leads the Pack

For the quickest text, pick a corporate laser; but if graphics are your bag, almost any model here will do.



TEST PC WORLD CENTER **HOW WE TEST** All printers are tested in default mode under Windows 95 using a Gateway P5-166MMX with 32MB of RAM. Tests are timed from the point when the print command is issued until the last sheet is out of the printer. Test documents include ten pages of plain text and a two-page newsletter created using Word 97 SR-1 for Windows 95; a five-page plain spreadsheet and a two-page spreadsheet with a color pie chart created using Excel 97 SR-1 for Windows 95; the contents of an HTML page from a Web site; a five-page color presentation created in Lotus Freelance Graphics 97 Edition; a color and a black-and-white photograph created in Adobe PhotoShop 5.0; and a color photograph created in CorelDraw 8.369. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

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Pre-installed Software (All models):
- Windows® 98
- Microsoft® Outlook™ 98
- Microsoft Works®
- Adobe® PhotoDeluxe®
- Sony PictureGear™
- Sony DVgate™ Still

† Using optional second battery in floppy drive bay. Battery life may vary based upon usage. †† With weight saver in floppy drive bay.

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- **6.4 GB fixed hard drive**
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- 14.1" XGA TFT screen
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- High-capacity Lithium-Ion battery, dual battery capability
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★ Upgrade 128 MB RAM add $200

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The new Sony notebook with a built-in digital camera.

This compact wonder makes using digital pictures in documents, e-mail or Web sites easier than ever before—because the digital camera is built right in. Just swivel the camera toward your subject and capture video clips or still shots. Pre-installed software allows you to create animated special effects or even a 360° panorama from still frames. Not much bigger than a paperback book, it also delivers full notebook functionality that lets you run Windows 98.

Pre-installed Software:
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- Adobe PhotoDeluxe
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- Sony Smart Capture

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DSC-F55
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SONY CYBER-SHOT DIGITAL CAMERA

Thanks to its compact size and ease of use, the Sony Cyber-shot™ Digital Still camera makes a great companion for your Sony notebook computer. To quickly transfer images to your PC, simply take the Sony Memory Stick™ media from the Cyber-shot camera and plug it into your notebook's PC Card slot (Sony PC Card adapter required).

IC CHIP RECORDER AND PC GLASSTRON MONITOR

ICD-R100PC
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SONY IC CHIP RECORDER

The Sony IC Chip Recorder captures every word with digital clarity—and links right to your Sony PC. This palm-sized device (just 85g.) provides a swift, effortless way to save, download and e-mail your audio messages. Highlights include: 2.5 hours of recording time; digital VOR for start-stop speech; and playback control for seamless editing.

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SONY PC GLASSTRON PERSONAL MONITOR

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MEMORY STICK IC RECORDING MEDIA

Introducing the next generation of digital data storage—Memory Stick Media. Smaller than a stick of gum, but with five times the storage capacity (MSA-8A model) of a standard 3.5" floppy disk, Memory Stick Media is expected to become the new industry standard for storage and transfer media. Plus, it makes it even easier for you to transfer images, sounds, data and text between cameras, computers and more.

4 MB Memory Stick Media	**Model: MSA-4A**	**Price: $29.99**
8 MB Memory Stick Media	**Model: MSA-8A**	**Price: $39.99**
16 MB Memory Stick Media	**Model: MSA-16A**	**Price: $79.99**

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- **Rechargeable Battery Pack** PCGA-BP71: **$249.99.** Up to 7 hours with two batteries. Note: Battery life may vary based on usage.

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- **All-in-One Carrying Case** PCGA-CCF: **$99.99.** Easily holds notebook and accessories.

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- **Long-Life Rechargeable Battery Pack** PCGA-BP12: **$299.99.** Lithium-Ion battery provides up to 6 hours capacity. Note: Battery life may vary based on usage.
- **Battery Charger** PCGA-BC1: **$199.99.** Quickly charge two batteries simultaneously. Compatible with Standard and Long-Life batteries.
- **Standard Rechargeable Battery Pack** PCGA-BP11: **$149.99.** Lithium-Ion battery provides up to 3 hours capacity. Note: Battery life may vary based on usage.

VAIO 505 SUPERSLIM NOTEBOOK ACCESSORIES

- **External 14X CD-ROM Drive** PCGA-CD5: **$299.99.** AC adapter and PC Card interface supplied. Requires AC power for operation.

- **Leather Carrying Case** PCGA-CC5: **$149.99.** Custom case includes detachable compartments for all of its accessories.

- **Rechargeable Battery Pack**
  Long-Life: PCGA-BP52: **$299.99.** Up to 6 hours with 505TR. Note: Battery life may vary based on usage.
  Standard: PCGA-BP51: **$149.99.** Up to 2.5 hours with 505TR. Note: Battery life may vary based on usage.

- **Port Replicator** PCGA-PR5: **$99.99.** Ports: Parallel printer, PS/2* keyboard, PS/2 mouse and VGA monitor.
- **Battery Charger** PCGA-BC5: **$199.99.** You can charge 2 batteries simultaneously. Compatible with both Long-Life (L) and Standard (S) batteries.

- **Stereo Speakers** PCGA-SP51: **$99.99.** External clip-on speakers that give you even more sound.

- **AC Adapter** PCGA-AC51: **$49.99.** Get an additional AC adapter and keep one at home and one at work.

VAIO Z505 SUPERSLIM PRO NOTEBOOK ACCESSORIES

- **Rechargeable Battery Pack**
  Triple-Life: PCGA-BPZ52: **$399.99.** Up to 5 hours with Z505SX; up to 6 hours with Z505S. Note: Battery life may vary based on usage.
  Standard: PCGA-BPZ51: **$199.99.** Up to 1.5 hours with Z505SX and Z505S. Note: Battery life may vary based on usage.

- **Port Replicator with i.LINK** PCGA-UPR5: **$99.99.** Ports: Parallel, Serial, VGA Monitor, i.LINK, and USB.

- **Monitor Adapter** PCGA-DA5: **$49.99.** Connects VGA monitor without Port Replicator.

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- Sony PictureGear
- Adobe PhotoDeluxe
- Adobe Acrobat Reader
- Microsoft Works 4.5
- Intuit Inc.® Quicken® Basic 99
- Microsoft Money 99
- Microsoft Encarta® 99 Encyclopedia
- Microsoft Outlook 99

PCV-L600 $2,999.99

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- Ergo-Angle 14.1" TFT Multimedia LCD Display
- **Intel Pentium III Processor 500 MHz**
- 128 MB RAM (expandable to 256 MB max.)
- **10.8 GB Ultra DMA hard drive**
- 24X CD-ROM (max.)
- V.90 modem
- 2 USB ports (front and rear)
- 2X AGP 3D Graphics (ATi Rage LT Pro)
- 4MB Video Memory (SGRAM)
- High-fidelity 3D PCI Audio
- VAIO Smart Convertible Keyboard
- Type II PCMCIA slot
- Built-in Memory Stick slot

PCV-L400 $2,299.99

As low as $41.51 a month*

- Ergo-Angle 14.1" TFT Multimedia LCD Display
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- 64 MB RAM (expandable to 256 MB max.)
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- 24X CD-ROM (max.)
- V.90 modem
- 2 USB ports (front and rear)
- 2X AGP 3D Graphics (ATi Rage LT Pro)
- 4MB Video Memory (SGRAM)
- High-fidelity 3D PCI Audio
- VAIO Smart Convertible Keyboard
- Type II PCMCIA slot
- Built-in Memory Stick slot

PCV-L600S $2,199.99

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- Does not include LCD Display
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- 128 MB RAM (expandable to 256 MB max.)
- **10.8 GB Ultra DMA hard drive**
- 24X CD-ROM (max.)
- V.90 modem
- 2 USB ports (front and rear)
- 2X AGP 3D Graphics (ATi Rage LT Pro)
- 4MB Video Memory (SGRAM)
- High-fidelity 3D PCI Audio
- VAIO Smart Convertible Keyboard
- Type II PCMCIA slot
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- **12.1" XGA TFT Display**
- V.90 modem
- High-capacity Lithium-Ion battery
- Digital touch pad
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- Sony Smart Connect
- Sony Smart Publisher
- Sony Smart Write

Sony Exclusive Features: (All models):
- i.LINK (IEEE-1394) interface for DV still image capture
- Programmable Power Key (PPK) for unattended e-mail retrieval

Sony Exclusive Features: (505TR):
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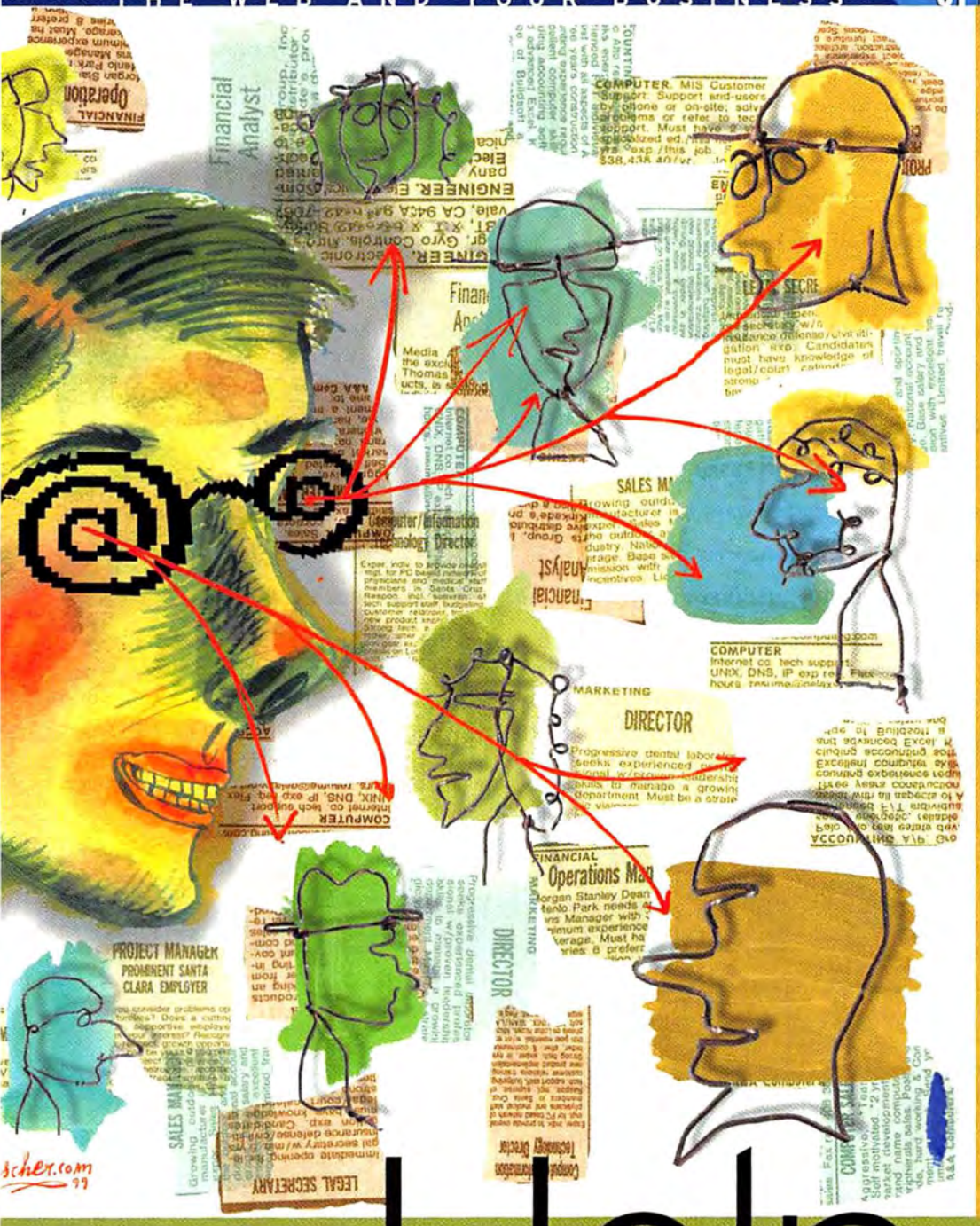


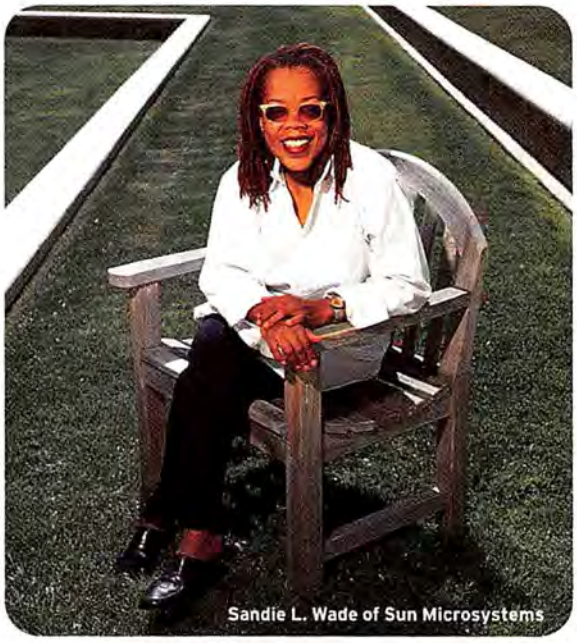
Smart recruiting has gone online—but don't think that makes hiring new employees on the Web a no-brainer.

Help W@nted

Hiring on the Web

By Michael Goodwin

ILLUSTRATIONS BY HENRIK DRESCHER


Sandie L. Wade of Sun Microsystems

PHOTOGRAPH: ANDY FREEBERG

Whether you're a department manager for a big company or a small-business owner in need of a hand with your firm, finding and hiring top-drawer talent is getting harder and harder. Most of the best candidates are happily employed, with high salaries and lucrative stock options; and college students are wading through job offers before they even don cap and gown.

That's where "e-cruiting"—electronic recruiting on the Internet—comes in. E-cruiting gives you access to an array of online hiring resources and provides ways to find and build relationships with candidates who may already be employed. But it takes more than a modem. Successful strategies start with Web-based classifieds (aka job boards), and move beyond them into new areas of recruiting technology.

GOOD JOB HUNTING

IF YOU'RE LOOKING to hire new employees online, you aren't alone. According to *The Industry Standard*, a sibling publication of *PC World* that covers the Internet economy, the volume of online job postings grew by 60 percent in the space of a single year. And we're not just talking about mailroom temps here, either. Job listings on the Web range from $15,000-a-year entry-level positions to senior executive posts paying well into six figures.

Big general-interest job boards offer recruiters one-stop shopping, but finding good candidates can be tough.

Most e-cruiters start their talent hunts at big general-interest job boards like **Monster.com** or **CareerPath.com**. For up to $600 a month, a job board will run a posting (often of unlimited length) on a virtual shingle viewable by anyone who can steer a browser. Interested candidates can filter listings by area, job type, and so on, and then respond via e-mail. Some job boards allow recruiters to search through a database of résumés posted by job seekers. Monster.com, for instance, currently stores 1 million résumés; and CareerPath.com, about half that many. If you want to search résumés on either site, however, you may have to pay a monthly subscription fee of from $200 to $1000.

To take full advantage of the Web, use boards that are tailored to your recruiting needs. For some positions, that may mean using a big general-interest board; but more often than not, smaller is better. The best of the national boards, like **Dice.com** (for techies and engineers) and **Exec-U-Net** (for high-

Trial by Hire: The Big Job Boards

JOB BOARD	Number of résumés listed	Cost to post one listing	Cost to search résumé database	Notice via e-mail
America's Job Bank www.jobsearch.org	300,000	free	free	●
Career Builder Network 888/670-8326 www.careerbuilder.com	0	$35-$150/month	n/a	●
CareerMosaic 888/339-8989 www.careermosaic.com	100,000	$160/month	$600/6 months $995/year	○
CareerPath.com 213/996-0200 www.careerpath.com	500,000	$200/month	$3000/year	○
HeadHunter.net 877/638-4473 www.headhunter.net	167,000	free	free	○
HotJobs.com 877/468-5627 www.hotjobs.com	300,000	$150/month	$600/month	●
JobBankUSA 404/266-9330 www.jobbankusa.com	90,000	$125/60 days	$1900/year	●
Jobtrak 800/999-8725 www.jobtrak.com	130,000	$18-$395/month	not available at press time	○
JobWeb 800/544-5272 www.jobweb.org	0	n/a	n/a	●
Monster.com 800/666-7837 www.monster.com	1 million	$225/60 days	$2300/90 days	●
NationJob Network 800/292-7731 www.nationjob.com	0	$95/month	n/a	○
Yahoo Classifieds www.classifieds.yahoo.com/employment.html	less than 2500	free	free	●

● Yes ○ No n/a = not applicable [1] For a higher price.

level executives), are extremely specialized. Indeed, some of the most effective boards are city- and industry-specific.

Hitting the job boards is only the beginning of your quest for the perfect employee. To find the best candidate online, you must focus your search on exactly the type of individual you want and build a customized strategy for finding and attracting that person. The most successful online recruiting occurs through an open-ended process—one that you should set in motion well before you've got an opening to fill.

HOT ECONOMY, COLD PROSPECTS

IN AN ECONOMY where unemployment among trained, talented people is almost nonexistent, competition to hire them has become cutthroat. Top online recruiters are scrambling to stay on top by reinventing their hiring strategies. Senior recruiters at Sun Microsystems, for instance, currently use the Internet for 80 to 90 percent of their recruiting.

According to Sandie L. Wade, an employment manager at Sun, the IT giant goes after active job-seekers by linking its Web page to a number of job boards and other Internet sites. But to find the best *passive* candidates—the hard-to-find engineers and writers who already have jobs and may not be looking for new ones—Sun's recruiters have to be more creative.

> "Recruiting the right people is all about finding names.... **It's not automated,** it's not easy, and it's extremely time consuming."
>
> **Sandie L. Wade, Employment Manager, Sun Microsystems**

"It's all about finding names," says Wade. "We start by sorting through the virtual communities, the online services, e-mail directories, university alumni chapters, discussion groups, and not-so-public Web servers. It's not automated, it's not easy, and it's extremely time-consuming."

In a world where the most talented people skip the want ads, top-notch hires are like true love: hard to find. Recruiters, online and off, face a circumstance they've never had to deal with before, says John Sumser, who runs the **Interbiznet.com** Web site. Sumser's site includes a daily newswire for e-cruiters, a library of software tools, and scads of other useful e-cruiting information. "Up to now," he says, "the unspoken assumption in growing a business was that there would always be more workers if you needed them. But that's no longer the case. For some positions, employers will need to recruit two to three years in advance."

Professor John Sullivan knows there's a lot more to successful recruiting than scanning job boards. Head of the Human Resource Management program at San Francisco State University's College of Business, Sullivan advises firms like Microsoft, Hewlett-Packard, Nike, Cisco Systems, and Charles Schwab about recruiting, especially online recruiting.

Here's what he tells them: If you're really good in your field, whether it's computers or basketball, you don't go looking for a job—because you don't have to. "The only people who read want ads on or offline are unemployed people," he says, "and the odds of an unemployed person being great are pretty close to zero. If Michael Jordan had gotten laid off from the Bulls, he wouldn't have had to look in the newspaper to find a job."

ALL A-BOARD

DOES THIS MEAN posting an opening on a job board—or searching its résumé database—is a waste of time? Not at all.

"Sometimes, using a board works wonderfully," says Joanie Pacheco-Anderson, manager of human resources at Chronicle Books in San Francisco. "Especially if you can find Web sites that are more like your company, more like your industry, more like your culture. But if I go to a general site like Monster, I get people who aren't quite what we're looking for."

John Sumser recommends testing the site before you post: Buy a help-wanted ad, scan the responses, and tweak the ad until you start getting the kind of people you want. "The search engines on ▶

Links to your company's Web site	Comments
●	Uncle Sam wants to help you. Posting a listing or searching résumés at this Department of Labor site is free. Plus you'll get information on trends in employment, wages, and training.
●	A convenient site for one-stop shopping: Career Builder Network enables you to post your ad on one or more of 21 relatively specialized career sites. No résumé database.
●	Leave no stone unturned. CareerMosaic offers—yes—a virtual mosaic of resources for recruiters, including job fairs, access to colleges, and international connections.
●	A great way to go local. CareerPath.com lets you access complete, up-to-date classifieds from 70 of the nation's top newspapers. Job applicants can send résumés to recruiters instantly from the site.
●	The more money you pay, the more precisely and accurately HeadHunter.net does the job of tracking down talent for you. For $1500 a year, you can see résumés a week before others do.
●	A great user interface and a no-headhunters policy (which helps protect confidentiality) make HotJobs.com one of the best of the general-interest boards.
○	Not the biggest database on the Net, and no links to your Web site, but this board can save you money. Job postings are broadcast to Usenet newsgroups automatically.
●	Partnered with an array of 850 college and career centers, Jobtrak gives recruiters the tools they need to tap successfully into the educated masses.
●	You can't post job openings here, just a profile of your company. But if you want to reach college career services, JobWeb is one of the best places to go.
●	The Big Daddy of job boards. Monster.com's huge database and wide visibility guarantee heavy response to your job posting. Special features help screen out unfit candidates.
●	Job seekers tell virtual matchmaker PJ Scout what kind of employment situation they're looking for, and Scout in turn sends their résumés to appropriate recruiters.
○	The price—nothing for posting jobs or scanning résumés—is right, and you know your listing will be widely seen. But the interface isn't very sophisticated.

these job boards work somewhat differently," he says, "so you have to optimize the job posting for the search engine. And the audiences for the job boards are different, so you have to optimize the job posting for the audience as well."

Finally, think local. Bernadette Samson, the human resources manager for Portal Publications in Novato, California, didn't plan on importing an employee from the East Coast, but when she posted a job opening on Monster and CareerMosaic, most of the résumés she got were from out-of-towners interested in relocating. "I was getting résumés from all over the country," she says. How do you avoid casting too wide a net? By posting your ad on a local job board instead of a national one. Most cities have at least one, and you can use an Internet search engine to find it. So if your company waxes widgets in Wichita, go to your favorite Internet search engine, type **employment+Wichita** in the search box (you may need to customize the syntax for your specific search site), and look for a local board specializing in widgets.

Ready to get started? Hold onto your hat. If you include area-specific boards and corporate sites that list job openings, altogether almost a million sites are dedicated to matching job seekers with jobs. Fortunately, you don't need to check out all of them. We've identified top sites in four categories: general-interest boards and those specializing in execs, techs, and finance wizards. Depending on what kind of job you're trying to fill and where it's located, these particular boards may not be the best match for you; but once you connect with them, you can link to local sites more closely tailored to your needs.

General-Interest Boards

IN THE MARKET FOR a temp worker, an elevator operator, or an in-house yoga teacher? If the job you need to fill doesn't fit on one of the narrow-focus boards, your best bet may be to spin the recruiting wheel at Monster.com or one of its competitors and see what happens.

General-interest sites, the so-called Big Boards, can dazzle you with the breadth of their listings. But the sheer number of replies you get may eat up your time and make it harder to zero in on applicants you want to hire. Still, when more specialized sites aren't appropriate, your Internet e-cruiting may well start with posting the opening on a Big Board.

How much does it cost? Some boards are free; others charge job seekers and let recruiters ride free; and yet others reverse that equation. Many allow you to pay for listings individually, while others require a year-long subscription. Check "Trial by Hire: The Big Job Boards" for specifics.

But even the pricier boards are cheaper than traditional print media. Would you rather drop $2400 to place a listing that runs for one Sunday in a major city newspaper, or spend $600 on an ad that runs for two months on a popular job board and has an automatic search option to funnel suitable résumés to your e-mail inbox or corporate Web site every morning?

Here are some of the biggest and best general-interest job boards:

Career Builder Network (www.careerbuilder.com) carries no résumés and no job listings; instead, it serves as a medium for posting job openings on any of 21 professional, diversity-minded career Web sites, including American Banker Online, Black Enterprise Online, Hispanic Magazine Online, and Women Connect Online. Depending on how many positions you list, you pay between $30 and $150 for a 30-day posting on each site. Job seekers apply directly to you.

CareerMosaic (www.careermosaic.com) offers only about 100,000 résumés, but it provides a raft of useful information for recruiters and job seekers alike. You'll find links to sites focusing on job opportuni- ▶

Hire Education

HOW DO YOU learn ways to expand your search beyond the job boards? One avenue is to contact your local university and see whether it offers a course in e-cruiting. An alternative approach is to take advantage of various online resources.

RECRUITING 101

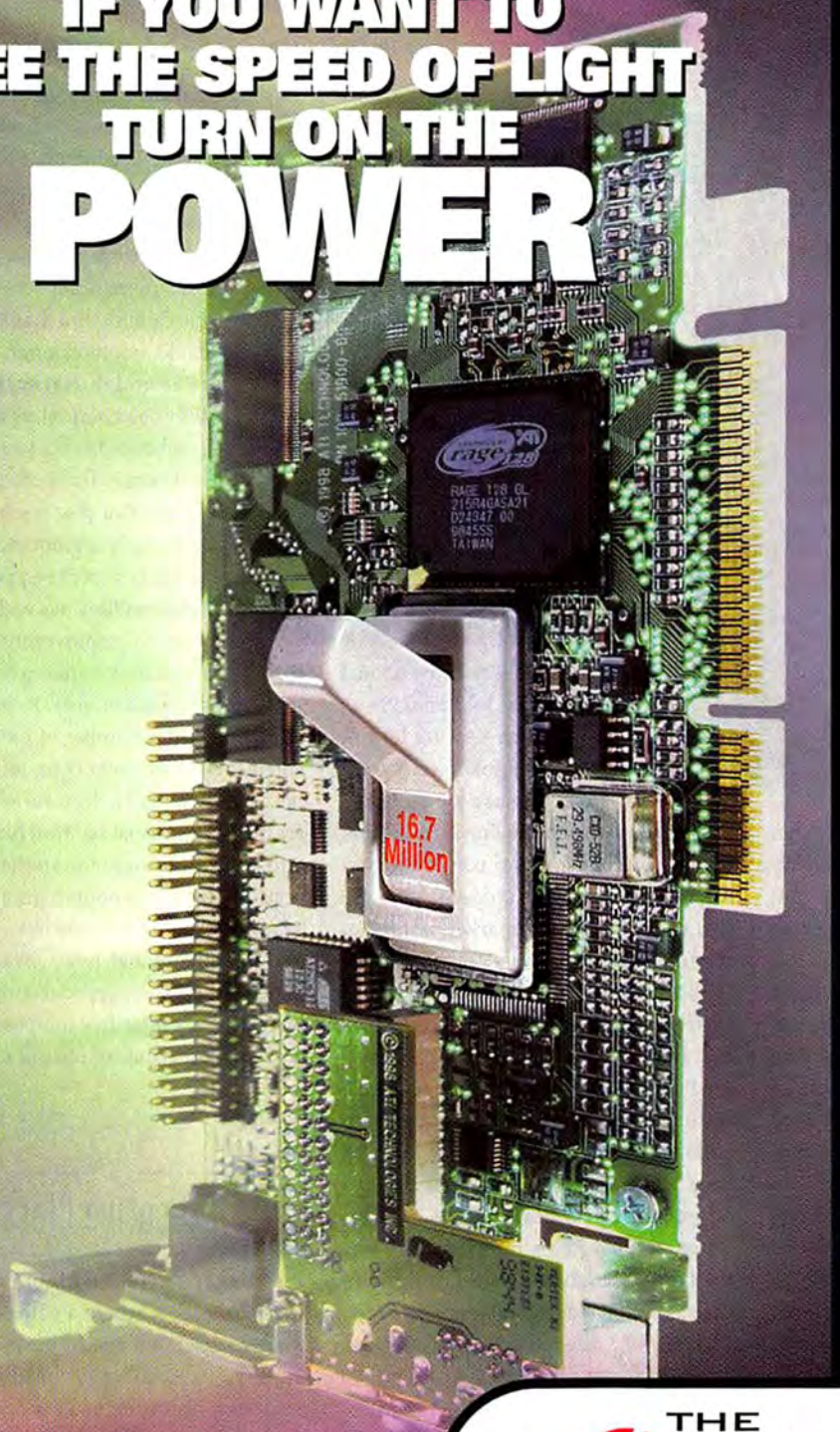
Interbiznet.com (www.interbiznet.com), John Sumser's Web site, includes a daily newswire for recruiters and a library of software tools, plus publications, seminars, on-site consulting services, presentations on recruiting strategies, and scads of other useful information—some (but not all) of which is free.

Advanced Internet Recruitment Strategies (www.airsdirectory.com) is a national training company for serious recruiters, offering seminars, corporate training, and publications designed to teach you "active search tools and strategies to find passive candidates, not just job-seekers."

Dice.com (www.dice.com/careerlinks/recruiter.html) provides a page of recruiter links that give you instant access to a grab bag of training tips and e-cruiting resources.

Fast Company (www.fastcompany.com) which styles itself "the handbook of the business revolution," and **Harvard Business Review** (www.hbsp.harvard.edu/products/hbr) both offer intriguing ideas and the latest word from the business guru du jour.

IF YOU WANT TO SEE THE SPEED OF LIGHT TURN ON THE POWER



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ATI RAGE FURY (RAGE 128 GL) 32MB AGP	
16-bit	693
32-bit	522
STB VELOCITY 4400 (RIVA TNT) 16MB AGP	
16-bit	492
32-bit	300
DIAMOND MONSTER FUSION (BANSHEE) 16MB AGP	
16-bit	440
32-bit	Not Supported
MATROX MYSTIQUE (G200) 16MB AGP	
16-bit	345
32-bit	193

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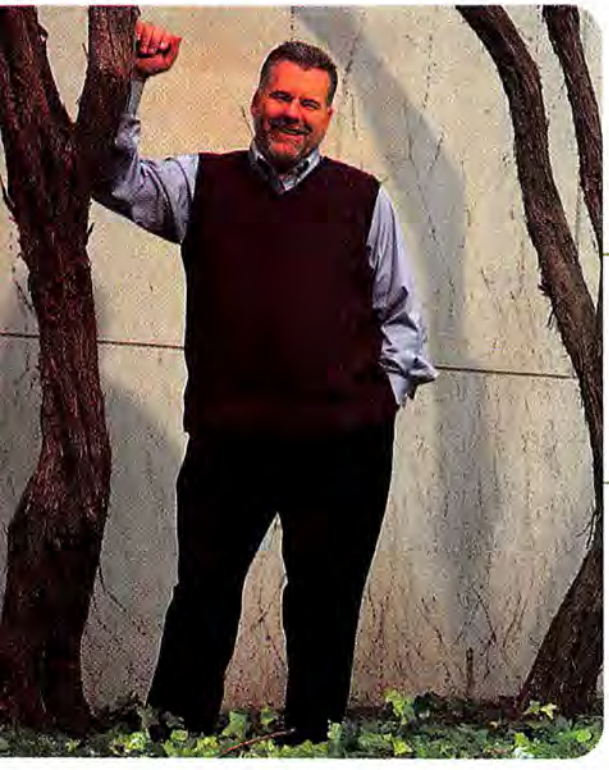


ties in healthcare, human resources, insurance, and more. Looking for local talent? Try **CareerPath.com** (www.careerpath.com). It links to the classified sections of more than 70 of the nation's top newspapers.

HotJobs.com (www.hotjobs.com) has a functional user interface that makes posting jobs, searching résumés, and tracking applicants a breeze. Recruiters can create customized multiple-choice tests to keep inexperienced job seekers from swamping them with formal applications. To encourage a confidential and noncompetitive hiring process, the site excludes headhunters, too. Monthly memberships cost $600, but if you don't need to search the 230,000-résumé database, you can pay for postings individually.

JobBankUSA (www.JobBankUSA.com), with a pool of only 90,000 résumés, is no Monster.com; and to search the database, you have to sign up for a year. Still, the fee charged for accessing the résumé database is relatively low ($1900 per year), and all of the recruiters we spoke with regard the site highly. When you arrange to post a job listing (at $125 per ad for 60 days of exposure), the posting is sent to a number of Usenet newsgroups and also appears on the JobBankUSA site. An alternative tool available at the site is the Stealth résumé spider. The spider, which runs on the AltaVista search engine, seeks out Web sites and user group listings containing résumés not findable by conventional search methods. JobBankUSA—like HotJobs.com—won't let you include a direct link to your company's Web site in a job posting.

> "If **Michael Jordan** had gotten laid off from the Bulls, he **wouldn't have had to look** in the newspaper to find a job."
>
> **Dr. John Sullivan, Coordinator, Human Resource Program, San Francisco State University College of Business**

JobWeb (www.jobweb.org) and **Jobtrak** (www.jobtrak.com) offer two of the best ways to reach college students who are just entering the job market. Aimed at recruiters and career services offices, JobWeb forgoes job listings and résumés. Instead, employers can post an organization profile—who they are, what types of graduates they hire, and where to send a résumé—and include a link to the company Web site. For its part, Jobtrak supplies access to 130,000 résumés and 850 college and career centers.

Monster.com (www.monster.com) has the biggest database around, with more than a million résumés. Recruiters pay by the job listing or purchase a 90-day, $4200 membership entitling them to post 15 listings and use the job seeker database. The interface is friendly, and the site has lots of features to make hirers' lives easier—including a recruiting forum and a correspondence manager that automatically sends unsuitable candidates a thanks-but-no-thanks rejection letter.

NationJob Network (www.nationjob.com) caters to recruiters who are too busy to sieve out the keepers from dozens of résumés. You post a job, and the site funnels appropriate résumés to you. Costs start at $95 per listing.

Yahoo Classifieds (www.classifieds.yahoo.com/employment.html) is the big board of choice among companies for which price is a priority. It carries only a fraction of the number of job postings you'll find on Monster.com, but you can post a job and search the résumé database for free. All the usual keyword filters apply, and you can browse for applicants and résumés by metropolitan area or state. **America's Job Bank** (www.jobsearch.org) and **HeadHunter.net** (www.headhunter.net) give for cash-strapped recruiters other options. They offer free job postings and access to thousands of résumés.

Executive Class

THE UPPER ECHELON of administrators is a job category where a national search makes sense. Since most businesses pay top dollar for head honchos, throwing in a relocation package with the new VP's already voluminous salary probably won't generate seismic unrest in the corner office. Two executive job search sites have good reputations among recruiters for making necessary connections between qualified executives and the companies that seek them worldwide:

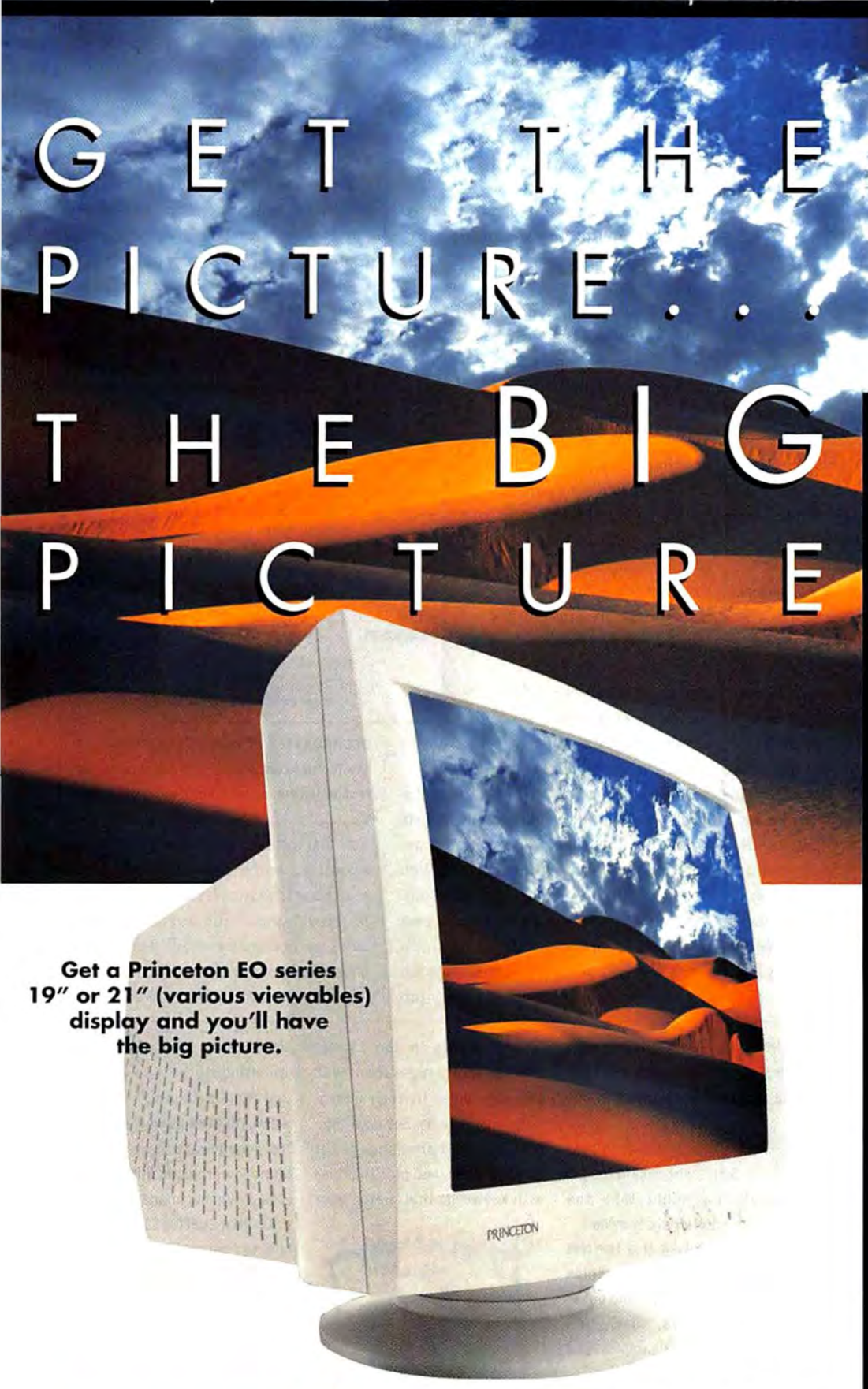
Exec-U-Net (www.execunet.com) offers recruiters free ▶

www.hotjobs.com

SCREEN TEST: HotJobs.com lets you put a multiple-choice test on your job postings to winnow out underqualified candidates.

PHOTOGRAPH: ANDY FREEBERG

GET THE PICTURE... THE BIG PICTURE



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JUST HOW TOUGH IS IT out there? Exec-U-Net offers a wealth of information on where the hot jobs are—and where they aren't.

High-Tech Connections

TO FIND TOP technical talent, you need to do your hunting on a specialized board. Three tech-centric sites came up in our conversations with practically every IT recruiter we interviewed:

ConsultLink (www.consultlink.com) specializes in connecting you with contractors and independent consultants. You can post a job opening for $50; if fewer than five qualified consultants respond, your ad is free. Alternatively, you can search the résumé database for two days for a flat fee of $150. Obtaining contact information for someone who interests you costs just $15. Or for $295 a month, you can buy a Basic Charter membership, which entitles you to unlimited search privileges and discounts on job announcements.

Dice.com (www.dice.com) aims exclusively at computer professionals. It lists more than 18,000 programmers, software engineers, systems administrators, Web developers, hardware engineers, and others. For $595 a month, recruiters can post open positions and scan a list of candidates and their skills, then contact the job seekers to request résumés. Every job opening listed on Dice.com is broadcast to Classified 2000 and Yahoo Classifieds.

Techies.com (www.techies.com) supports confidentiality features designed to attract passive candidates who don't want their current employers spotting their résumé on a public job board. Recruiters pay $6000 for a one-year subscription that includes unlimited job postings, a company profile page, and the option of searching the 65,000 candidate profiles. When you post a job, matching candidates are notified by e-mail. This popular board has two limitations: You can't link a job notice to your corporate Web site, ▶

www.techies.com

DESPERATELY SEEKING GEEKS? Sites like Techies.com offer easy access to skilled technicians in a number of major U.S. cities.

Recruiting Tips

NEED TO HIRE one of the top ten candidates in a given field? Or want to avoid the crowds on conventional employment sites and start finding *passive* (currently employed) job candidates? Here's how:

- **BE CREATIVE.** If you're in the market for a programmer who can build an esoteric Googleplex database, find an online e-magazine with an article on advanced Googleplex functions and buy a banner ad that pops up when someone accesses that article.
- **BUILD A TICKLER FILE**—a database of passive candidates—and check in with them periodically. A passive candidate who isn't in the job market now might take the plunge in another six months.
- **NEVER STOP HIRING.** Use the Net to build personal relationships with good candidates. Send out e-mail newsletters, marketing brochures, product samples, and reports on new technologies.
- **ESTABLISH PROFESSIONAL** relationships with select college students. Many of the 2 million college students in the United States maintain personal Web pages provided by their educational institutions. Set up a "spider" to find home pages, sift through them, and pick the ones with keywords that match your hiring needs; then add the most promising students to your passive talent database.

- **SELL THE TEAM** as well as the job. Top people want to work on cutting-edge projects, but they also seek a dynamic manager.
- **ASK NEW EMPLOYEES** to identify talented people at their previous company. If a new employee lists references, consider the references as potential hires.
- **USE YOUR COMPANY** Web site as a recruiting resource. Load it with useful information and software that will encourage candidates to keep checking back.

"Job boards can work wonderfully... if you can find sites that are more like your company."

Joanie Pacheco-Anderson, Human Resources Manager, Chronicle Books

and Techies.com's coverage is restricted at the moment to Austin, Boston, Chicago, Dallas, Denver, Minneapolis/St. Paul, Phoenix, Portland, and Seattle. A dozen more cities are slated for inclusion in the site's geographical range by year's end.

Bean Counters

YOU CAN OFTEN FIND high-level financial administrators through sites like Exec-U-Net, and some experienced accounting types may be lurking on the general-interest boards—but we found two tightly focused national sites that specialize in skilled financial hires:

Bloomberg.com (www.bloomberg.com) is a huge site devoted to providing real-time financial information; its job board (www.bloomberg.com/fun/jobs.html) offers bountiful waters for recruiters interested in trolling for financial employees. Before you can post a job opening, you have to register, which can be a complex undertaking. But once you gain entry, you can submit one job listing a week for free. Each listing remains on the site for eight weeks, unless it's filled sooner.

Financial Job Network (www.fjn.com) can help if you need a chief financial officer; a chief operating officer; a controller; an auditor; or staffers for your finance, actuary, or insurance department. The résumé search feature doesn't work yet, but FJN promises that it will soon. Meantime, you can post a job opening for eight weeks at a price of somewhere between $300 and $500. All responses and résumés go directly to you via e-mail, fax, or snail mail. However, you can't link your ad to your corporate Web site.

STRATEGIES FOR A TIGHT JOB MARKET

SO THE JOB BOARDS AREN'T working for you, and you're anxious to develop longer-term strategies? San Francisco State's John Sullivan recommends moving from coincidence hiring ("Oops, we need a database programmer! Where can we find one?") to continuous hiring. To accomplish this, you need to identify people you'd like to hire before you need them, before other companies find them, and before they know they want a new job. Once you spot a promising candidate, you can start building a personal relationship that will help incline him or her toward signing on with your company.

Fortunately, the Internet is full of resources to help you do just that. Searching for résumés is only the start. Surf the Web and read the user groups: When you run across someone whose ideas stand out, add him or her to your talent database. (See "Hire Education," page 166, and "Recruiting Tips," page 170.)

While the Internet is a critical part of e-cruiting, it's not the only part. Successful strategies often involve nonelectronic elements, too. Many of the best people, for example, are found through referrals: Ask new hires to name the most talented people at the company they just left, and treat their references as potential hires. If you hear someone give a great talk at a seminar or convention, get the speaker's name. Then use the Internet to establish a relationship.

One of the biggest benefits of continuous recruiting: You can assess candidates over time, and get to know their work before you offer them a full-time position. Sullivan recommends hiring promising people as short-term consultants, even if they're happily employed by someone else—and even if they're a little different. "A really creative tech person may come in with his nose pierced," he says, "and many interviewers will go, 'Gasp!' So you need to get your managers involved in doing assessments of people over time."

E-cruiting may not be easy, but it works. Like all recruiting, however, using the Web to find the right employee takes time and effort—especially in a world with a shrinking supply of talented candidates. So while the Web may not be the answer to your hiring woes, it does add another potent weapon to an increasingly multifaceted arsenal of recruiting tools. Which may not be so revolutionary after all.

HIGH FINANCE: Though primarily a financial news site, Bloomberg.com also lets employers post job listings for free.

Freelance writer Michael Goodwin is a regular contributor to PC World. ■

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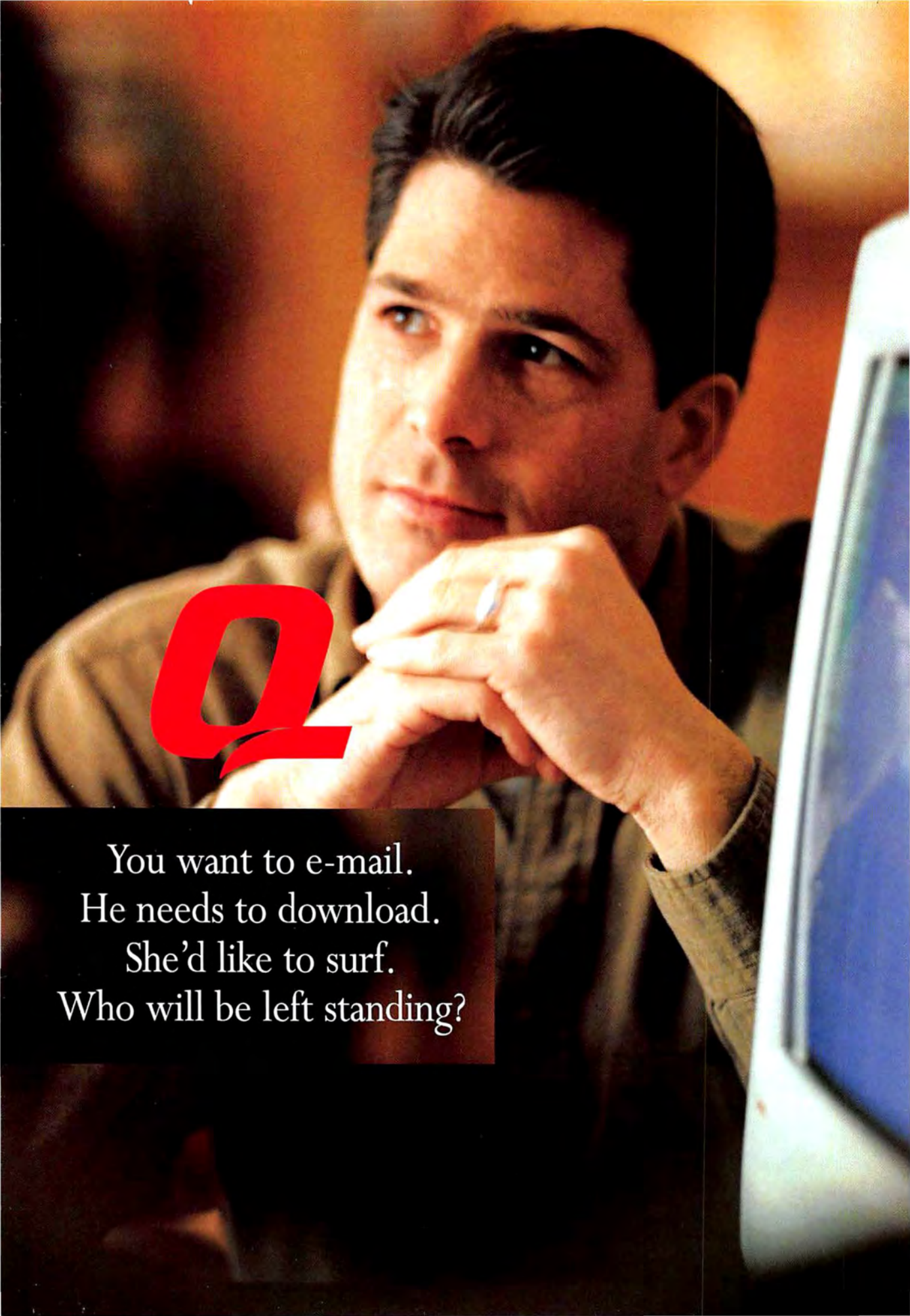
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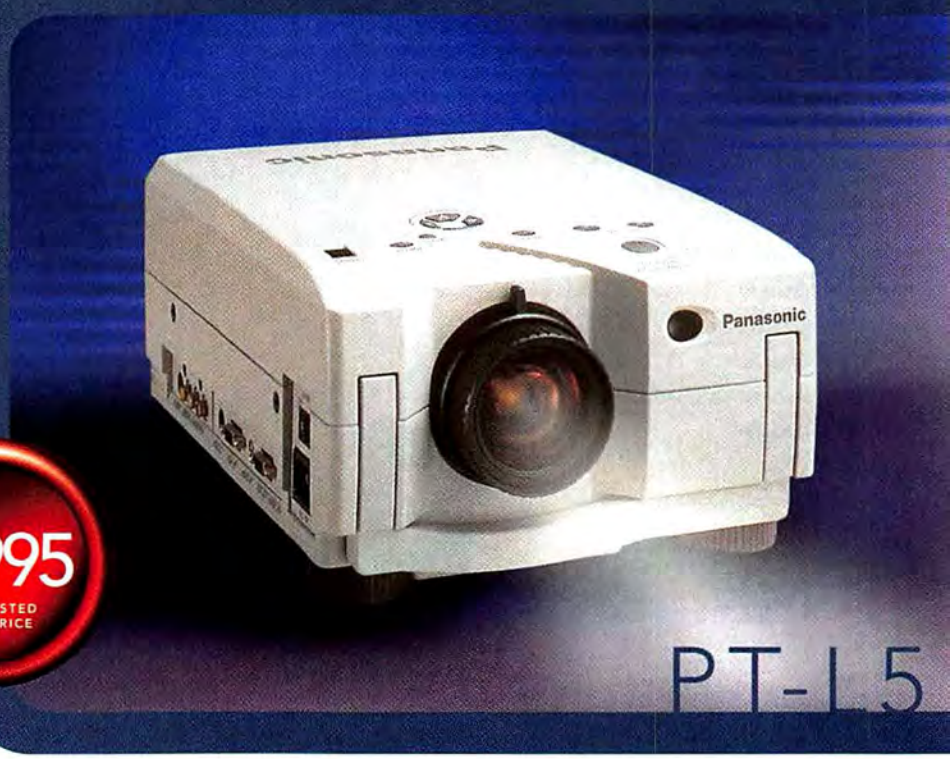

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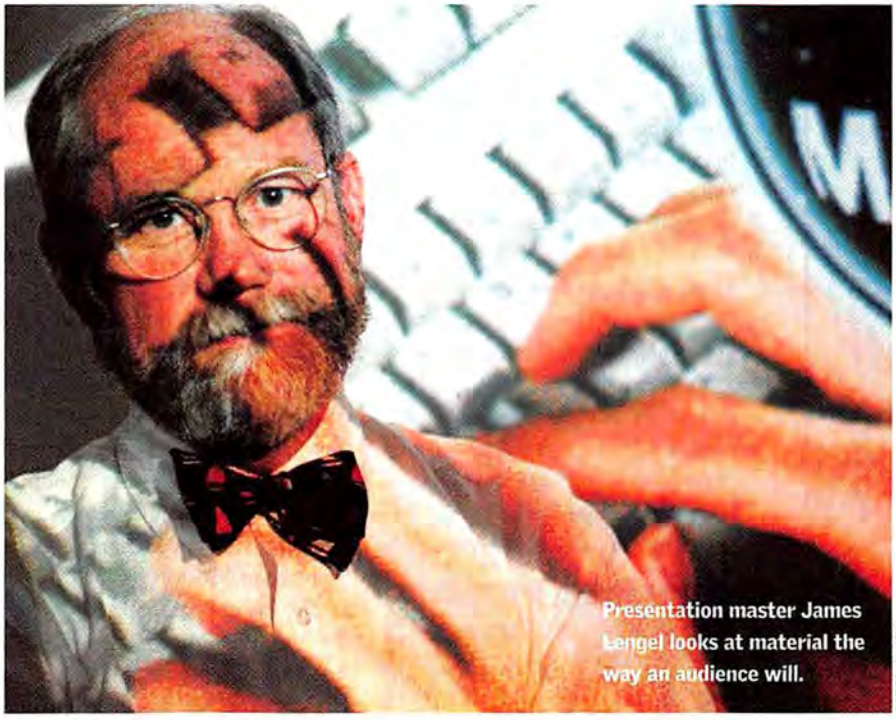
"Most people fail at presentations because they start where they should end."

Sounds odd, but that's the view of veteran presentation master James Lengel, assistant professor at Boston University's School of Public Communications. Lengel, formerly Vermont's Deputy Commissioner of Education and an in-house consultant at Apple Computer, can create an effective 45-minute multimedia presentation in less time than it takes to present it. He does so with Microsoft PowerPoint, plus content easily available from the Internet, CD clip art, and his own digital camera.

Anyone can, he says. You just need to know how to look at your material the way the audience will.



Presentation master James Lengel looks at material the way an audience will.

PETER SMITH

TIPS AND TECHNIQUES FOR CREATING WORLD-CLASS PRESENTATIONS WHEN YOU ARE THE CREATOR

Where people make a mistake is by creating too many slides, writing too much text, and turning their slide presentations into a bulleted summary of what they're saying while they're presenting.

For starters, Lengel believes that text is the last thing most people want to see at the beginning of a presentation. "You have to predispose them to intellectual persuasion by reaching them on an emotional level first. A good presentation starts with some drama—images and/or sounds that get the audience guessing and set a mood. Using images to surprise the audience gets their attention and draws them in. They want to know what you're doing, so when you tell them they'll listen."

"PRESENTERS SHOULD NOT BE AFRAID TO TAKE RISKS. AUDIENCES LIKE THE UNEXPECTED. DON'T BE AFRAID TO IMPROVISE, TO JUMP AROUND IN YOUR PRESENTATION—EVEN ASK QUESTIONS FROM TIME TO TIME." –JAMES LENGEL

Recently Lengel gave a presentation to a group of high-school educators on what's wrong with how the Internet is being used in the classroom. His first slide: the sound of a violent crash and a photograph of a frustrated man and a wrecked computer. As Lengel talked, the images became more "content-oriented"—a picture of a Web browser, a simulated on-line session, and eventually words about recommended actions. In all, he recommends about 20 slides for a 45-minute presentation, or about two slides per minute.

Presenters can find tips, downloadables, and case studies at the Epson-sponsored www.presentersonline.com.

Three Parts to Success

Good presentations have three parts, and also three different outlines: ideas, methods, and a spec. Ideas are the points you want to make; the methods are the ways you want to make them (e.g., images, simulation, text); and the spec is the list of physical elements needed to execute each of the methods—clip art, video, sound files, text blocks, etc. Lengel recommends collecting all of these elements in a single folder first before starting work in your presentation software package.

Sony's VPL-XC50U XGA LCD projector weighs 8.2 pounds, and features 600 lumens.

Indexed clip art libraries are best and can be found in stores and on the Web. "Photographs are better than drawings," Lengel says, "especially photographs of people. They'll engage your audience." Another good source for pictures and sounds is the Lycos advanced search engine. We typed in "Boston skyline," for example, and got back links to a dozen GIF and JPEG images from various Web sites.

Other sources: scanners and digital cameras. All of these sources let you make copies—either by dragging an item with the mouse or using a "copy" command, as in a browser. Once a file is in your spec folder, bring it into your presentation slides by clicking open the "Insert" menu and picking the appropriate object type. When an item is in a slide, you can move it around, resize it, and add surrounding text (select "Text Block" from the Insert menu). If the object is a sound or a video, open the "Slide Show" menu and select "Action Button." That lets you add a button you can click on during a presentation to play the sound or video. You can also add buttons that allow you to open your computer's browser and hyperlink to the Web (or any other content on your computer) in a separate window.

Another useful button to add to each slide is a "home" button which hyperlinks you back to a menu slide. That's useful if you ever want to jump around in your presentation, say, when someone asks a question. A menu slide is simply one which lists each of the other slides by title (you should give a title to each slide). Clicking an action button next to the title hyperlinks you to its slide. When you are finished with that slide, you can either continue on in sequence from that point or hyperlink back to the menu and go to any other slide.

"Presenters should not be afraid to take risks," Lengel says. "Audiences like the unexpected. Don't be afraid to improvise, to jump around in your presentation—even ask questions from time to time. Remember, the more interactive you make it, the better."

Written by Randall D. Cronk, a Boston-based freelance writer on information technology topics. His Web site is www.greatwriting.com.

An 8.2 pound projector from Sony.

Act surprised.

Okay, so Sony's been putting good things in small packages since the Walkman® personal stereo made history some 20 years ago. But the Ultra Personal™ projector is getting people to do more than just listen. With 600 ANSI lumens of brightness and XGA resolution, this lightweight projector boasts some of the most brilliant images to ever hit the road. Which means the Ultra Personal projector looks as impressive on screen as it does in the overhead bin. So you can make a little history of your own.

Ultra Personal VPL-XC50U / VPL-SC50U

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Portable

VPL-X1000U / VPL-S900U

Installation

VPL-X2000U

Ultra Personal
VPL-XC50U / VPL-SC50U
8.2 pounds
600 / 500 ANSI lumens
XGA / SVGA resolution

Innovation at work.™

SONY

TWO DECADES AGO A TI PHYSICIST SAW A LIGHT IN HIS MIRROR THAT LEAD TO A BREAKTHROUGH IN DIGITAL PROJECTION

THE FORCE REALLY IS WITH DLP

The year was 1977. Texas Instruments physicist Larry Hornbeck was driving alone in his truck when he looked up in his rearview mirror and noticed something interesting about the pattern of lights reflected there. That was the same year *Star Wars* was being introduced in movie theaters all across the U.S. Dr. Hornbeck did not know it then, but the lights he saw in his mirror that night set the stage for his own encounter with the Force at an undisclosed location 22 years later—this June 18, actually. That's the date the mega blockbuster *Star Wars: Episode 1—The Phantom Menace* will be publicly screened in theaters equipped with Texas Instruments' Digital Light Processing™ (DLP™) projectors—each with millions of microscopic mirrors called DMD™s or Digital Micromirror Devices™ by Texas Instruments. And if Hornbeck and George Lucas get their way, it won't be the last. That's because DLP projects images digitally—and like LucasFilm's THX, or other digital sound technology—ensures consistently true fidelity between what was originally recorded and what ultimately is experienced in the theater.

If press accounts are accurate, Lucas is adamant about digital projection playing a big role in future projects. He's not the only one in Hollywood under the influence of DLP. Last year Texas Instruments won an Emmy award for Outstanding Achievement in Engineering from the Academy of Television Arts and Sciences for DLP. And DLP is a hit with Corporate America, too—accounting for about 20 percent of the portable projector business—or about 500,000 to be sold this year—up from virtually zero three years ago, according to industry observers. Over 165,000 projectors enabled by DLP technology have been sold in two years. More than 25 of the top projector manufacturers incorporate DLP into their design and there are now over 50 DLP-based products in the marketplace.

So what's Hornbeck's connection to Lucas? And what did he see that fateful night in his truck's rearview mirror? DLP is Hornbeck's invention. The movement of the truck tilted the mirror just enough to make the headlights of the cars behind him appear to turn on and off. Hornbeck wondered if the same effect could be achieved by shining a light on microscopic mirrors attached to the backs of chips. Turn the chips on (binary "1") and the mirrors would tilt so that light is projected. Turn the chips off (binary "0") and the mirrors would tilt away so that

continued on page 8

The UltraLight DX1 projector from Proxima weighs 10.6 pounds, and features 1000 lumens, photo-realistic color, and smooth video at resolutions up to XGA (1024 x 768).

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CREATING DRAMATIC VISUAL EXPERIENCES THROUGH DIGITAL SOLUTIONS.

TEXAS INSTRUMENTS

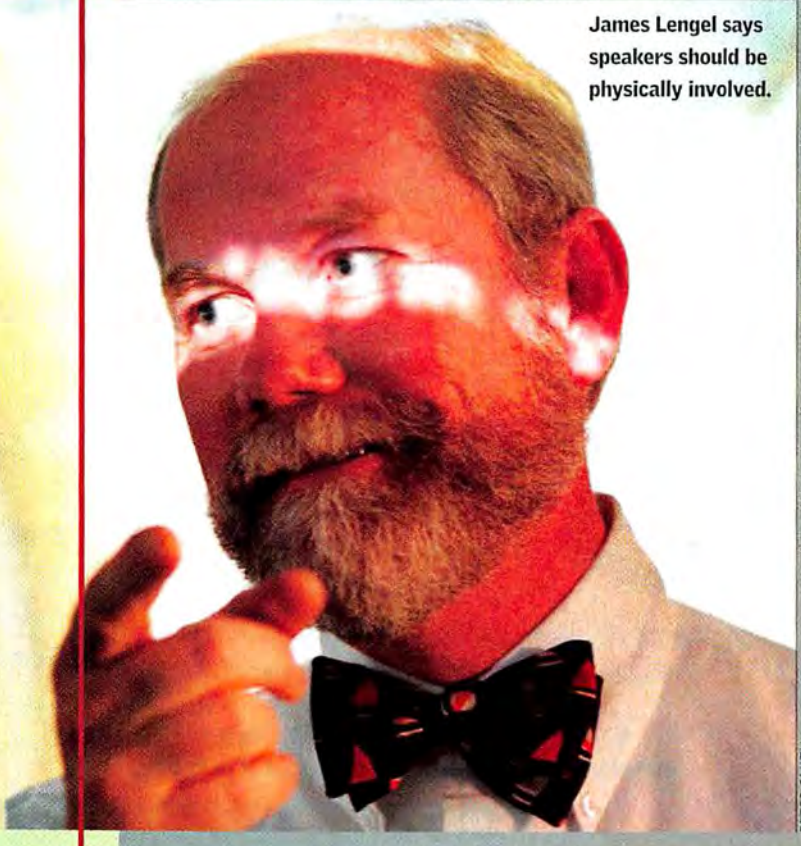
ONE OF THE BENEFITS OF DLP IS THAT THE ROOM CAN STAY LIGHTED, EVEN FOR LARGE AUDIENCES AND EVEN WHEN USING A PORTABLE PROJECTOR. THAT MEANS THE PRESENTER IS FREE TO MOVE AROUND AT WILL.

DLP Flexibility—Use it to Your Advantage

One of the advantages of Texas Instruments' Digital Light Processing™ (DLP™) technology is that it gives the speaker almost total control of the presentation. The lights can stay up. The projector can easily be positioned in different places around the room. And the presenter does not have to depend on the kindness of strangers to ensure the proper equipment is set up the way it should be ahead of time.

But none of this flexibility matters if the speaker doesn't know how to use it to advantage. Take the issue of lighting. One of the benefits of DLP is that the room can stay lighted, even for large audiences and even when using a portable projector. That means the presenter is free to move around at will—without crashing into things. That's something more speakers should do, according to James Lengel, assistant professor at Boston University's School of Public Communications. "The speaker is an actor, part of a presentation," says Lengel. "They need to be physically involved, maintaining eye contact and walking around the room. They shouldn't just speak. And they should never be sitting down."

Lengel recommends talking with your face to the audience, with your back to the "big" screen, and your laptop in front of you—but not to be frozen in place. "Try to position yourself facing your audience—as if you were talking most of the time during your presentation. But sometimes you want to walk to the back, so the audience is between you and the screen. You play with that—that's part of the experience. And when you do leave the front of the room, make sure you have something interesting up on the screen for them to look at. Most slides should be on the screen for about two minutes. That means you have to be able to get back up front in that amount of time. If it is a presentation for 20 to 30 people, you should be able to walk around the room in two to three minutes."



James Lengel says speakers should be physically involved.

PETER SMITH

Eye contact is critical, Lengel adds. "You want to stand up and capture their attention, to keep them with you. You talk to them, look at them in the face—you need to understand how they're taking it, whether what you're saying is going down."

Another advantage of DLP is portability—the ability to set up the room so that everyone has the optimum view—even if that means moving the projector a couple of times to make sure everyone can see. "The only way to test that," Lengel says, "is to sit in every seat. The projector should be squarely focused on the screen and everyone's view should be unobstructed. Not everyone sets up their presentation rooms that way. You may have to move something around to make it happen."

That's easy if you bring along your own portable projector, and if it is as light and bright as the current DLP models.

SUBSTANCE: 4.9 Pounds.

STYLE: Tons.

A notebook projector that's light on weight, heavy on style. The new InFocus® LP™330 "Dragonfly" with XGA resolution projects a truly stunning image, even before you turn it on. From the number-one name in projectors. It's your image. Project yourself.™

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FOR CORPORATE USERS, THE STANDARD OF COMPARISON ISN'T FILM, BUT LIQUID CRYSTAL DISPLAY (LCD) TECHNOLOGY. DLP'S ADVANTAGES ARE ITS BRIGHTNESS AND ABILITY TO PROJECT MOTION WITHOUT LAGGING OR "SMEARING."

continued from page 4

no light is projected. Color is possible by employing three chips, each projecting a different primary color—or by synchronizing the rotation of a color wheel passing in front of a single chip. Use enough mirrors, make them small enough, and pack them closely enough together, and you can project an image that corresponds exactly to whatever pattern of ones and zeros you want—whether that's a Jedi battle or a corporate Road Warrior's latest sales projections.

A Feat of Engineering

In either arena, DLP has become a force in its own right. In the movies, digital content may someday be distributed to theaters by satellite—potentially saving filmmakers the $1,500 to $2,000 cost of each print. Add to that the cost of distributing prints, each of which weighs about 60 pounds. That's a lot of money, considering that a major release requires some 5,000 prints in the U.S. alone. Even if movies were burned into optical disks, there would still be substantial savings. Other benefits: no effects from wear and tear, and no degradation in picture or sound quality caused by repeated movie showings.

For corporate users, the standard of comparison isn't film, but DLP's major digital rival—traditional liquid crystal display (LCD) technology. DLP's advantages are its brightness and ability to project motion without lagging or "smearing." DLP is a reflective technology—so more of the light from the projector's lamp ends up on the screen. LCD is transmissive—so that light from the lamp is partially blocked by the LCD panel's circuit elements and absorbed by the liquid crystal material. In addition, the LCD light source must be polarized, which also reduces brightness. Taken together, these barriers subtract as much as half the lamp light before it ever leaves the LCD projector. Another DLP advantage is "fill factor," a measure of how much image is lost in the spaces separating pixel elements. The mirrors that create the images in DLP are only separated by 1 µm gaps—meaning that 90% of the image is actually projected (instead of lost in the cracks). This compares to LCD's 70% fill factor, which results in lower perceived resolution and more of a "screen door" effect.

But if DLP is so great, why did it take until the second coming of *Star Wars* to make the big time? For one thing, DMDs are a remarkable feat of engineering—and those take time. Each DMD consists of thousands of tilting aluminum alloy mirrors that only measure 16 µm on each side. Behind the mirror are multiple layers of material—out of which are fashioned the mechanical assembly required to make the mirror tilt on command. Those include: a yoke to support the mirror, a "spring" or torsion hinge, a landing pad to stop the mirror at exactly a 10 degree tilt, a magnet to pull the mirror on its hinge, and various support posts to hold everything in place. Finally, at the bottom of all this is a complementary metal oxide semiconductor (CMOS) address circuit that holds the charge, that turns on one magnet, that tilts one mirror. Over three-quarters of a million of these assemblies are required to make a single XGA projector (the DMD chips used in the *Star Wars* screening contain 1.3 million)—and each one of them can be individually switched on or off in less than 20 µsec. Not exactly a truck mirror.

The LP425z from InFocus Systems shines at 900 lumens and weighs 7.4 pounds. It delivers true XGA (1024 x 768) resolution.

ViewSonic's PJL802+ ViewBook projector weighs 12.8 pounds and features 650 lumens and 200:1 high contrast ratio.

DMDs not only have to work, they have to work reliably—a potential issue with mechanical parts this small that must constantly move back and forth at such incredible speeds. Not so, says TI. To test hinge failure, TI subjected approximately 100 different DMDs to a simulated one-year operational period. Some devices have been tested for more than 1 trillion cycles, equivalent to 20 years of operation. An inspec-

Ten years of worry-free presentations.

DISTINCT DETAILS
XGA resolution provides the image detail and compatibility you need

BRILLIANT IMAGES
800 ANSI lumens make it easy to see the bright, vivid colors

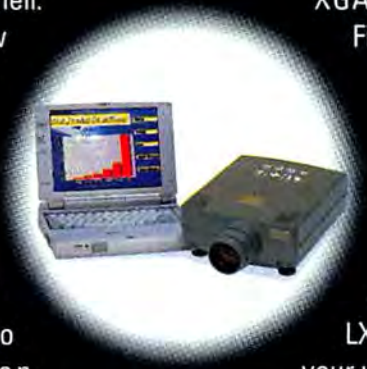
LIGHTWEIGHT CHAMPION
weighs just 8.1 pounds for go-anywhere presentations

CLOSE UP VIEWS
digital zoom lets you magnify image details

LOW COST OF OWNERSHIP
4,000-hour lamp saves costs and hassles

Proxima's UltraLight LX1. An enduring value.

The Proxima UltraLight™ LX1 in a nutshell: low price, high resolution, low maintenance, and incredibly high value. With an industry-leading 4,000-hour lamp life, you're set for about ten years* of presentations without once having to stop and change the lamp. And that long-lasting lamp puts out 800 ANSI lumens of brightness—powerful enough to present with the room lights on.



XGA (1024 x 768) resolution, with Proxima's Fit-to-View® digital scaling, means sharp images from any computer. The Proxima UltraLight LX1 even has a zoom lens for flexibility in set-up, and a digital zoom for close-up views of the smallest details. It's hard to believe this sleek, 8.1-pound package contains so much. So pack a Proxima UltraLight LX1 for your next presentation. And pack your worries away.

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"THERE ARE NO SLIDES TO FALL OUT OF CAROUSELS OR GET STUCK IN THE SLIDE PROJECTOR, AND THERE ARE NO OVERHEADS TO SHUFFLE DURING MY PRESENTATION." —GREG INGRAM, REGIONAL VP, SUNAMERICA ASSET MANAGEMENT CORP.

tion of the devices after these tests were completed revealed no broken hinges on any of the devices.

Abandon the Dark Side

For companies selling DLP projectors, two issues clearly dominate: brightness and portability. You don't have to dim the lights. And you don't have to know how to levitate large objects. Take the new InFocus LP330 from InFocus Systems Inc., Wilsonville, Ore. It's a package that weighs less than five pounds, whose largest dimension is under a foot, and which projects a 4-foot (1.2 m) size image at a distance of only 8 feet (2.4 m) with an intensity of 650 lumens. It's a projector you can easily put into the overhead compartment on an airplane and pack in the same carrying case as your laptop. The LP330 follows its slightly bigger brothers, the LP425z (7.4 pounds, 900 lumens) and LP435z (7.4 pounds, 1000 lumens), introduced in February. All three deliver true XGA (1024 x 768) resolution.

InFocus Systems' LP330 weighs less than 5 pounds, and projects a 4-foot (1.2 m) size image at a distance of only 8 feet (2.4 m) with an intensity of 650 lumens.

"When you use an InFocus projector, you are completely organized and immediately present yourself as professional," says Greg Ingram, a regional vice president for SunAmerica Asset Management Corp., based in New York City, one of the financial services industry's largest and most influential user. Ingram relies on the InFocus LP425 to deliver complex investment presentations to both small and large groups. "InFocus is saving me lots of time because I don't spend time making slides or copies. Also, there are no slides to fall out of carousels or get stuck in the slide projector, and there are no overheads to shuffle during my presentation."

Brighter but Lighter

Another company that has recently introduced DLP projectors in the sub-10 pound category is ViewSonic, Walnut, Calif., with its PJL830 and PJL1030 models. Both employ Zeiss optics to generate highly focused images with very high contrast. The Zeiss optics, plus ViewSonic's own proprietary circuitry for converting analog input signals into digital output, result in more consistent illumination and purer whites.

Also a member of the "brighter but lighter" crowd is PLUS Corporation of America, Allendale, N.J. The company's latest projectors are the 5.7 pound PLUS U2-1080 XGA and the 5.6 pound PLUS U2-870 SVGA. Each measures 2.28 inches in "thinness" and delivers 800 and 700 lumens of brightness, respectively. Both feature a 500:1 contrast ratio (full on/off), digital keystone correction, automatic adjustment set-up, manual and digital image zooming, new advanced compression technology, direct mouse control, freeze function, pick-mute function, on-screen pointer—plus a host of other features.

DLP technology is a key feature in the UltraLight DX1 projector from Proxima, based in San Diego. The 10.6 pound projector's 1000 lumens light up the room with photo-realistic color and smooth video at resolutions up to XGA (1024 x 768).

That kind of competition can keep an engineer awake at night—and customers happy. Whose lights are those in the mirror? It's your future and it's coming to you in digital. May the Force be with you as well.

Written by Randall D. Cronk

PLUS Corporation of America's PLUS U2-1080 XGA and PLUS U2-870 SVGA deliver 800 and 700 lumens, respectively.

Introducing the powerfully featured ultra-compact, ultra-light, and amazingly thin
PLUS® U2-1080 XGA (800 ANSI lumens) and
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TRUE XGA (1024 x 768) RESOLUTION
800 ANSI LUMENS OF BRIGHTNESS
5.7 POUNDS OF LIGHTNESS
2.28" (58 MM) THIN PROFILE
500:1 CONTRAST RATIO

ENHANCED PLUS OPTICAL ENGINE
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DIGITAL KEYSTONE CORRECTION
AUTOMATIC ADJUSTMENT SET UP
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FREEZE & PICK-MUTE
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WHEN PITCHING LARGE ACCOUNTS OR EXPLAINING COMPLEX TOPICS, INCREASING THE NUMBER OF PRESENTERS CAN FAVORABLY INFLUENCE THE MEETING'S OUTCOME.

DON'T BE A LONE RANGER

You're facing a room filled with upwards of a dozen people. It's a good bet that most people in the audience have something else on their minds. What's more, some participants have other places they'd rather be. Yet they wait for you to inform, captivate, and possibly entertain them.

So, why should you go it alone when you can reinforce your message by including other experts and add their expertise to yours? After all, even the Lone Ranger had Tonto for support.

Hired Hands

Although its been more than 100 years, some aspects of business haven't changed much since the days of the Old West. Modern day claim jumpers—your competitors—seek to acquire your market share instead of the gold mine. And now, just as then, you sometimes need extra "guns" to make sure your business rivals don't get the gold for which you're mining.

Before you assemble a presentation posse, and impose on your busy colleagues and bosses to contribute their time, decide if you should deliver the pitch yourself or share the stage.

Here's a brief guide to help you decide:

► Caring enough to send the best. Will the client's big guns attend the presentation? If so, you better roll out your own big artillery. Use the same strategy when deciding to include technical and financial experts on your team. If the client has invited their experts to attend, it's likely that they expect detailed and specific insights into the underlying technology or finances. By bringing your own experts, you can avoid the risk of having to respond with, "I'll have to get back to you on that," when faced with specific, highly focused questions.

Sony's high-output, high-res VPL-X1000U XGA projector will allow your team's experts to concentrate on the message, not the medium.

► Going live. Information is organic; it ages at the speed of light and fast-changing market conditions require constant watchfulness. It's not unusual for a merger, buy out, or market survey, announced just hours before your meeting, to impact the accuracy and timeliness of your presentation. If you and your colleagues deliver your presentation live, you can enjoy the luxury of finessing it in real time to reflect the impact of recent events. If you accept the proposition that a presentation is more than just delivering static data, you can increase its value and its importance to your client by keeping it current.

► Getting to know you. The days when you could relax yourself by imagining everyone in your audience wearing pajamas and then wow them with flying headlines and blinking text are ending. Today's time-pressed, techo-savvy clients want specific answers to their specific questions. Such clients expect more than static presentations; they want an interactive information exchange. That requires understanding your client's practices, processes, and problems. So, have your experts ready to respond to their experts in a common language.

For more guidelines, visit the Epson-sponsored Web site www.presentersonline.com/resources. Designed expressly to meet the needs of professional presenters, you'll find a wealth of first rate tips, clip art,

Get in focus with... ViewSonic® on top!

Power: A powerful presentation demands a powerful, digital projector like the ViewSonic PJL830. For example, 575 ANSI Lumens guarantees brilliant projection and 400:1 contrast ratio ensures the clearest text and crisp images. A dependable UHP lamp rated at 2,000 hours provides consistent performance and stays brighter longer. All at the standard 800 x 600 resolution.

Light Weight: Ultra-compact and weighing just 10 lbs., the PJL830 is the ultimate in portability.

Digital Light Processing: ViewSonic's first Digital MicroMirror Device (DLP) projector. This new technology facilitates brighter, richer, more uniform color images to help turn your presentation into a homerun. DLP technology is also featured in our higher resolution PJL1030.

Confidence: Buy your projector with confidence from the display company that's won over 500 industry awards. **At ViewSonic, we offer the #1 best selling monitors and flat panel displays in the U.S.A.***

Any Questions? ***For more information on the company that's won over 500 industry awards visit our website at: www.ViewSonic.com/pcworld***

Model	ViewSonic PJL830	InFocus LP425
Lamp Type	UHP	Metal Halide
Lamp Longevity	2,000 hours	1,000 hours
Zoom	Yes	No
Speaker	10 Watt	3 Watt
Remote Control	Included	Not Included

Competitive data as of 1/99.

(Notebook Sold Separately)

www.ViewSonic.com

DLP

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*Stanford Resources Inc. Quarterly Monitrak Report Q4 '98 and Display Search Quarterly Supply vs. Demand Study: LCD Monitors Q1 '99.

ASSEMBLING AN EFFECTIVE TEAM FOR A MAJOR PRESENTATION POSES A DAUNTING ORGANIZATIONAL TASK. FORTUNATELY, WITH NEWER LCD PROJECTORS, ONE FACTOR YOU NEED NOT WORRY ABOUT IS THE EQUIPMENT YOU USE.

sound bytes, and other resources here for both solitary and team presentations. Highly recommended.

Assembling the Posse

In her book, *Who Owns Information?: From Privacy to Public Access*, Anne Branscomb chronicles the transformation of data into information and ultimately into knowledge. She notes that "Information has taken on a new character. It has passed from being an instrument through which we acquire and manage other assets (data) to being a primary asset itself (knowledge)."

The 9.4-pound Epson PowerLite 7500C XGA projector packs 800 lumens and nearly 2.4 million pixels of brightness.

Because of information's heightened rank in the business hierarchy, assembling an effective team for a major presentation poses a daunting organizational task. You have to tiptoe through the delicate job of balancing each participant's knowledge and their speaking ability with their political status.

Fortunately, one factor you need not worry about is the equipment you use. Newer LCD projectors, such as Park Ridge, N.J.-based Sony Electronics Inc.'s high-output, high-resolution VPL-X1000U XGA projector, will allow your team's experts to concentrate on the message and not spend valuable time tinkering with the medium.

Here's some suggestions on structuring your presentation team:

Do your homework. Determine beforehand what the client wants to know, then balance that with what you want them to know. If you're not sure, ask. If this meeting rates high enough to bring your top brass, then it warrants putting in the time and effort to understand and answer the client's concerns. It can also prevent some embarrassment and hard gibes if you overestimated the opportunity or the need for all the sharpshooters you invited. Your research will also suggest what order to introduce your guests, balanced against political realities, and how long each of them should speak.

The one or two individuals who have the greatest familiarity with, and to, the client should open and run the meeting. These are probably the salespeople. The other participants of your presentation team will depend on the makeup of the audience and their interests. Hold the total number of presenters to five, including yourself.

While assembling your group and creating content will demand the bulk of your attention, don't ignore the details. If you address a large group, you will want a projector that can accept a microphone to project your CEO's words. Los Angeles-based Panasonic's PT-L557U, a 1500 lumen, 1.5 megapixel unit offers a stereo audio input port which supports a voice-over monologue during the unit's self-running mode and continuous play mode.

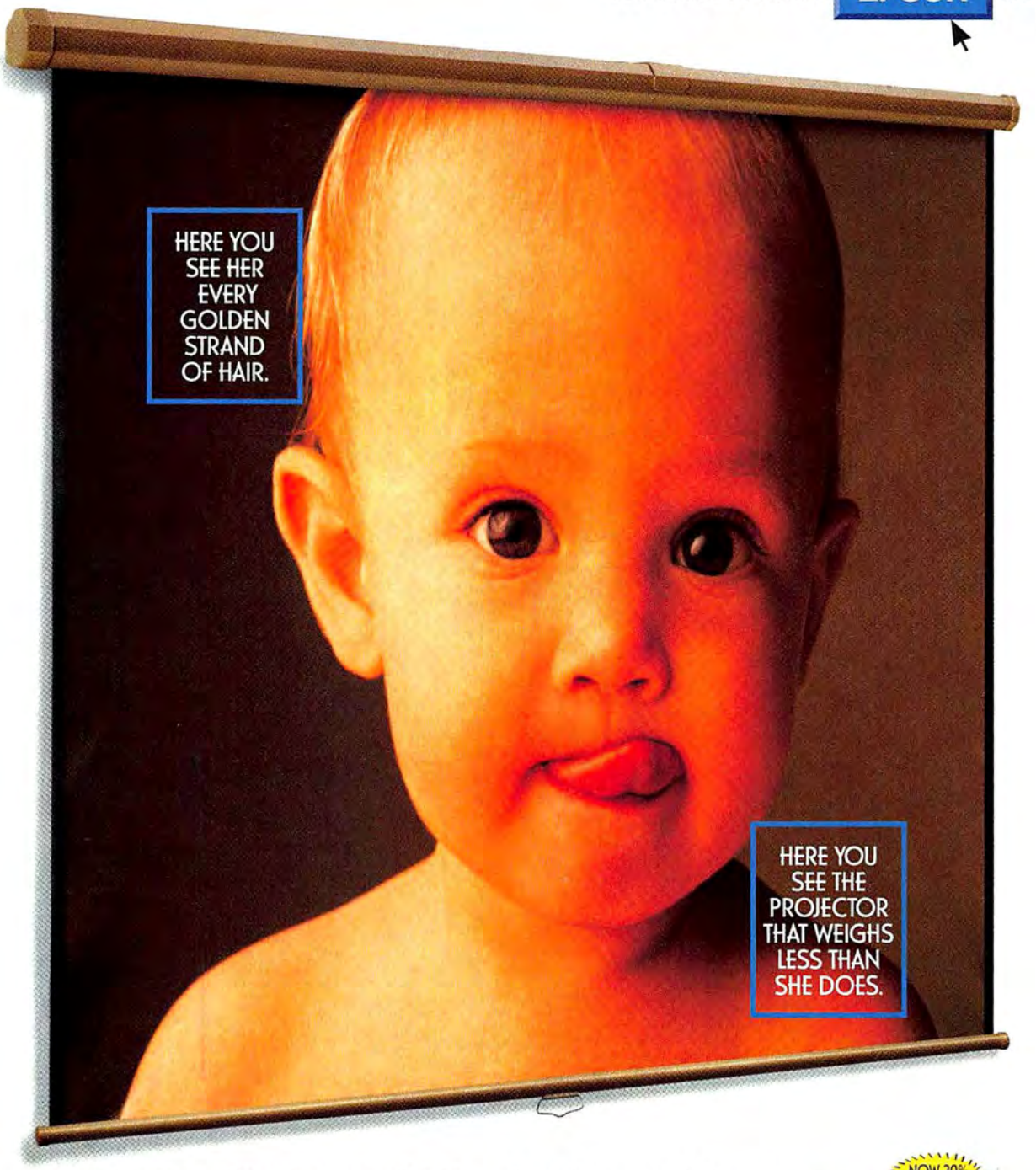
If weight is a factor, consider Walnut, Calif.-based ViewSonic's new shoulder-saving PJL802+ ViewBook projector. It weighs less than 13 pounds and produces rich, color saturated images at 200:1 contrast.

But lest you get swept up in the organizational details and technology, you need some way to remind yourself that the purpose of the meeting is to sell an idea or a product to a group of people. Most often, the audience will be a client, but at times you may speak to government groups, partners, or colleagues within your organization. One method to help insure that you fulfill your audiences' expectations is to see your team as storytellers. Instead of vintage works of fiction and conflict, however, your story focuses on reality and conflict. And like in the Old West, there's safety—and prosperity—in numbers.

Written by Howard Millman, who maintains, networks, and designs computer systems that help clients achieve the maximum return on their automation investment.

Panasonic's PT-L557U portable SVGA LCD projector is the most recent model in its line of ultra-bright lightweight projectors.

YOU'VE GOT TO SEE IT IN **EPSON** COLOR.



Just like her, this incredible projector can easily hold an audience. Because instead of having only one imaging processor like other ultraportables, the PowerLite® 5550C was born with three – for the brilliance of a large projector, without the bulk. In fact, at 800 ANSI lumens and only 9 1/2 pounds, this little baby will have everyone going ga-ga.

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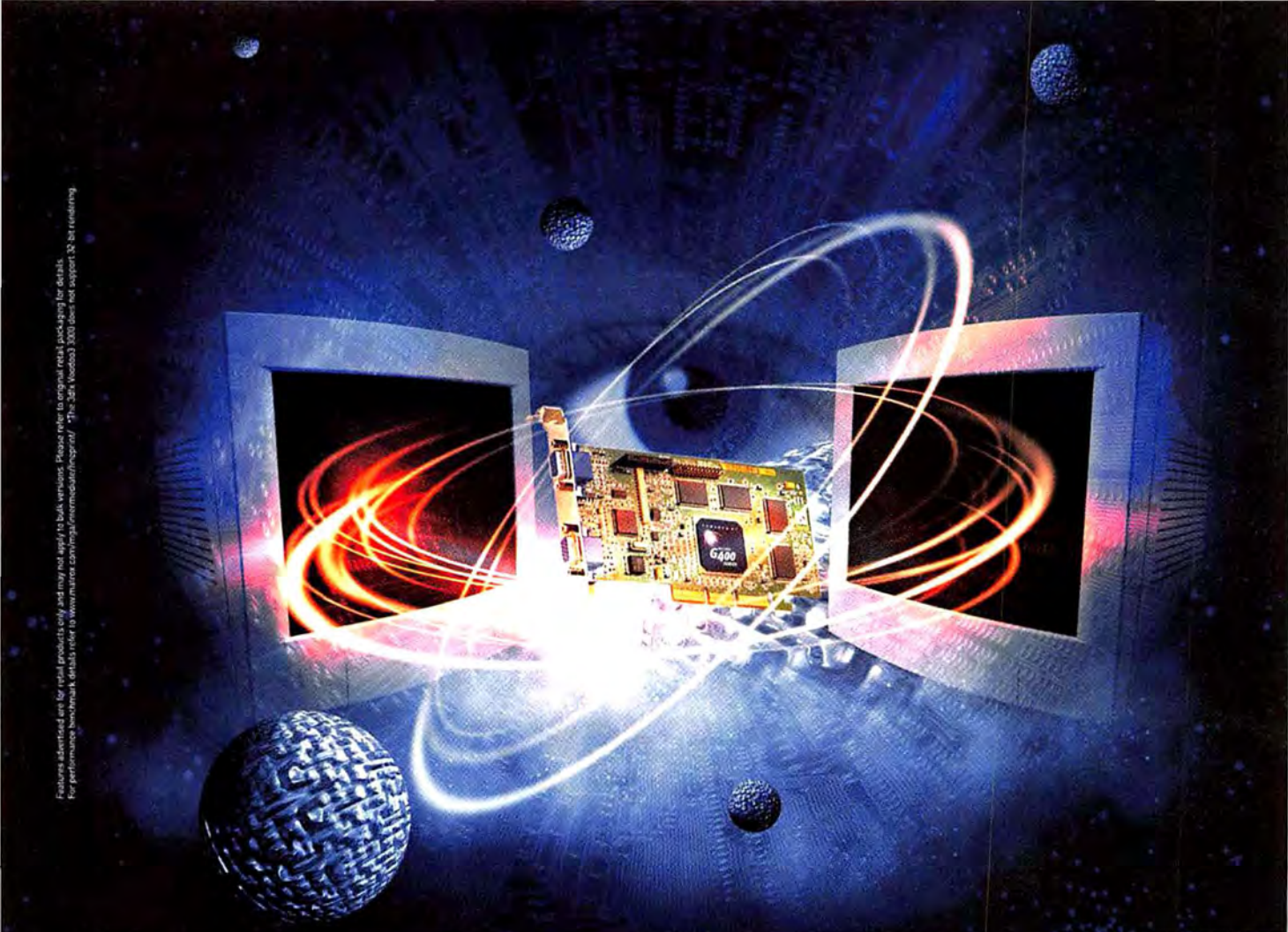

Features advertised are for retail products only and may not apply to bulk versions. Please refer to original retail packaging for details.
For performance benchmark details refer to www.matrox.com/mga/intermediate/fineprint/ *The 3dfx Voodoo3 3000 does not support 32-bit rendering.

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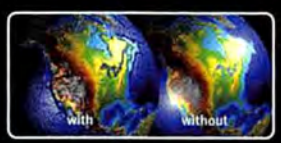

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PC WORLD

TOP 100

196 Power Desktops
206 Budget Desktops
212 Notebooks
216 Home PCs
219 Monitors
227 Graphics Boards
229 Modems

Speed on the Cheap

Edited by Michelle Campanale-Surkan

BRAND-NAME BARGAINS: Hewlett-Packard's Vectra VLi8 SFF (top) is the least expensive desktop PC on our power chart, and its OmniBook XE2 costs under $2000.

PHOTOGRAPHS: STAN MUSILEK; ICONS: JEFFREY PELO

IT'S NOT EVERY month we showcase top-notch values for businesses on both ends of the price spectrum. PCs on our Top 20 charts, with Pentium III-450 and -500 processors, just got more affordable. You'll find PIII-450 PCs for less than $2000, and a handful of PIII-500s for just a few hundred dollars more. On the budget side, many robust desktops cost less than $1500, while sub-$2000 notebooks from top-name vendors are starting to make a serious pitch for your business.

What's pushing prices down? At the high end, companies are making room for systems with the Pentium III-550 processor, which should debut in our August Top 20. According to Ken Bosley, North American product manager for Hewlett-Packard's Vectra line, "The Pentium III-550 will come in at a slight price premium. By August the price points of PIII-500 and PIII-450 PCs will fall, and low-end processors like the PII-400 will start to drop out of the market."

The Pentium III-550 is expected to offer an incremental speed increase over the PIII-500 (see *Top of the News*, page 48). What does that mean for business buyers? According to Mario Morales, International Data Corporation's director of semiconductor research, "Processors, and even some components, have exceeded the applications typically used in business. You don't need that much power for today's productivity applications, with the exception of speech recognition and video conferencing." In other words, businesses that don't require capabilities beyond the usual range—from word processing to Web surfing—can keep PC costs down by opting for bargain-basement PII-450 machines or lower-priced PIII-500 systems.

The best deals on the power chart this month are top-brand PCs powered by Intel's Pentium III-450 processor.

WHERE THE BUYS ARE

THE BEST DEALS on the power chart this month are top-brand PCs powered by Intel's Pentium III-450 processor. The midchart Micron Millennia Max 450, for example, includes a 6X DVD-ROM drive and a hardware decoder, but costs just $1999. At number 20, Hewlett-Packard's Vectra VLi8 SFF boasts the lowest price on the power chart: $1834. That's an especially low price for a network-managed PC. It's not very expandable, but it includes perks like an enhanced keyboard and a quiet-running, compact chassis.

Of the five new systems on the power chart, three sport the Pentium III-500. The top-rated of these, IDot.com's 500 P3BX, provides outstanding performance, excellent multimedia features and, at $2298, costs $300 less than the average machine on this month's power chart.

Toshiba's $2133 Equium 7100M, another new PIII-500 power system, costs $500 less than similarly configured peers. Its PC WorldBench score of 254 (running Windows NT) makes it the slowest PIII-500 we've reviewed, but it compensates for this shortcoming with a low price and nice design extras like an easy-open case.

BUSINESS-SAVVY BUDGET

AS THEY DID LAST MONTH, PCs based on Intel's Celeron CPU take three of the top five spots on the budget chart. In addition, two new Celeron-433s make the Top 20: Dell's $1420 Dimension V433c—a Best Buy—and the $1450 Compaq Prosignia Desktop 310, at number 20. Both have enough speed and features to please small or medium-size companies.

But if $1500 is still more than you're willing to shell

POP-TOP PC: The Toshiba Equium 7100M is designed for offices where expandability is a prime concern. Its top swivels off for fast access to components (inset).

WHO DO THE VOODOO? 3dfx debuts its Voodoo3 3000, an AGP board with kick (see this month's *Top 10 Graphics Boards*, page 227).

out for a new system, perhaps you should consider something in the sub-$1000 range. We rounded up 21 such computers for the review "How Low Can They Go: The Best PCs for Under $1000" (page 114) and were pleasantly surprised to find some great values.

NOTEBOOK DEALS

AS ON THE BUDGET desktops chart, Celeron-based systems fare well on this month's budget notebook list. We also had our first look at two business-friendly sub-$2000 Celeron-333 and -300 portables: HP's $1899 OmniBook XE2 and Compaq's $1799 Armada 1500c, respectively. Thanks in part to Intel's latest Celeron processor, the OmniBook offers a price and performance that beats those of some of its Pentium II-300–based competitors. (Check out this month's *Top 10 Notebook PCs*, on page 212, for the exact numbers.)

PRINTERS NOIR

PRINTERS GO black-and-white this month, and vacate their traditional Top 10 locus for a comprehensive roundup of laser models (see "Blazing Lasers," page 145). Answering the challenge from low-cost color ink jets, monochrome lasers provide a strong value for businesses, with benefits that include quicker print speeds, better text quality, more paper-handling options, and lower long-term costs. For small-business/home users, we recommend Brother's $299 HL-1040, a speedy little printer that offers very good text quality. Meanwhile, Lexmark's $1129 Optra S 1855 is our choice as the top laser for corporate users; it comes with quick printing speeds and numerous paper-handling options.

KEEPING UP APPEARANCES

THIS MONTH WE review 15-inch monitors, and they're cheaper than ever. The first-rate ViewSonic P655 sheds $60. This $185 professional model offers top-notch color quality. Alternatively, MaxTech's XT-5862 is just $139, but you'll sacrifice text quality if you buy this unit. Thanks to fierce competition, all of the monitors in our Top 10 cost less than $200 this month.

Michelle Campanale-Surkan is an associate editor for PC World. *Senior Associate Editors Vince Bielski and Karen Silver; Associate Editor Aoife McEvoy, Staff Editors Grace Aquino and Mick Lockey, Editorial Assistant Kalai Murugesan, and freelancers Jo-Anne Robb and Gordon Meyer contributed to the* Top 100. *Testing done by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeff Kuta, Nancy Miller, and Mike Salayko of the PC World Test Center. See page 12 for all contact information.*

LASERS NOT LOSERS: There are still many reasons to buy a monochrome laser printer. See our review for details.

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following section should answer most of them.

How do the charts work? The Top 20 and Top 10 charts are evolving lists of the best PCs, printers, monitors, graphics boards, and modems we've tested. System charts are divided by price. Power desktops cost $1800 or more; power notebooks cost $2300 or more. We compare new products to previously reviewed units, updating the charts to reflect price cuts and other changes.

Where do you get your prices? We estimate street prices based on vendor information and our own research, including surveys of retail outlets. We recheck all prices every month. Look for updated pricing information on all desktop PCs online.

What does the overall rating mean? This 100-point scale reflects results from our hands-on evaluations and performance tests. A score in the 90s is exceptional, while one in the 80s is among the best and one in the 70s above average.

What does the PC WorldBench 98 score mean? It's a measure of how fast a PC is in relation to our baseline machine, a Gateway PMMX-200 configured with 32MB of RAM, a 2GB hard drive, and 512KB of secondary cache. A PC that scores 200, for instance, is twice as fast as the baseline system.

Where do the scores for reliability, support quality, and support policies come from? Reliability and support quality scores are based on surveys of *PC World* readers and anonymous support calls made by *PC World* staff. The policies score is based on vendor support policies.

What do all those word scores mean? Word scores for performance and price are based on a product's rating in relation to other products in its category. For instance, we score the performance of Windows NT PCs separately from that of Windows 95 machines. (Based on our PC WorldBench 98 tests, Windows NT machines are faster on average than Win 95 PCs.)

Check out *PC World*'s Top 400 reviews online. Point your browser to PC World Online (www.pcworld.com/top400) to explore our Top 400, which provides comprehensive reviews and ratings for products in 16 different categories. You'll also find reviews not available in print.

PC WORLD

TOP 20 POWER DESKTOPS

	SYSTEM	Last month	Month tested	Street price (4/16/99)	CPU	Comments
1	Dell OptiPlex GX1p 500 800/388-8542 www.dell.com	1	June 99	$2615	Pentium III-500	Corporate workstation has speed, great features, and great design.
2	Dell Dimension XPS T500 800/388-8542 www.dell.com	3	Apr 99	$2688	Pentium III-500	$138 off fast small-biz PC with 4.8X DVD-ROM drive and Dell's top-rated reliability.
3	Gateway E-4200 500 800/315-2536 www.gateway.com	2	Apr 99	$2789	Pentium III-500	Corporate PC features top-notch performance and manageability.
4	Micron Millennia Max 500 888/634-8799 www.micronpc.com	4	Apr 99	$2899	Pentium III-500	Pricey, but fast; features include 22GB hard drive and 6X DVD-ROM drive.
5	CyberMax Enthusiast PIII-500 800/437-4596 www.cybermaxpc.com	6	May 99	$2099	Pentium III-500	$100 off already affordable, fast PC, but support quality must improve.
6	Quantex SM500 800/896-4898 www.quantex.com	5	May 99	$2299	Pentium III-500	$100 off quick, feature-rich multimedia PC with Zip drive, useful business software.
7	Sys Performance AX-500P3 800/613-9963 www.sys.com	8	May 99	$2299	Pentium III-500	The fastest NT 4.0 PC we've reviewed, but documentation is lackluster.
8	IDot.com 500P3BX 888/388-4368 www.idot.com	n/a	(NEW)	$2298	Pentium III-500	Fast SOHO PC comes with 4.8X DVD-ROM drive and 14.4GB hard drive.
9	NEC PowerMate 8100 888/632-8701 www.neccomputers.com	9	Jan 99	$2069	Pentium II-450	Inexpensive corporate PC includes network card and USB-enhanced monitor.
10	Premio Apollo BX 500 800/677-6477 www.premiopc.com	10	May 99	$2800	Pentium III-500	Pricey PC offers skimpy multimedia, but great speed and good support.
11	IBM PC 300PL 800/426-2968 www.ibm.com/ibmpc	14	Jan 99	$2139	Pentium II-450	$130 off quick, network-ready desktop; retail only; to order, use model #6862fxj.
12	Micron Millennia Max 450 888/634-8799 www.micronpc.com	n/a	(NEW)	$1999	Pentium III-450	Fast SOHO PC has 6X DVD-ROM drive with hardware decoder; cover hard to remove.
13	Toshiba Equium 7100M 800/867-4422 www.toshiba.com	n/a	(NEW)	$2133	Pentium III-500	Easy-to-service, inexpensive corporate PC comes with Zip drive.
14	CompUSA AmericanPro 500 888/226-6772 www.compusapc.com	11	Apr 99	$2649	Pentium III-500	Good sound, a Zip drive, and a 19-inch monitor adorn this speedy business PC.
15	Acma ZPower 7450 PII-450 800/786-6888 www.acma.com	12	Mar 99	$2368	Pentium II-450	$100 off quick PC with network card, DVD-ROM and Zip drives; limited expandability.
16	Polywell Poly 8450 B5 800/999-1278 www.polywell.com	15	Jan 99	$1925	Pentium II-450	Still the fastest Pentium II-450 system we've tested on Windows 98.
17	NexTrend NexStar-450 PWJ 877/833-8833 www.nextrendpc.com	n/a	Jan 99	$2369	Pentium II-450	$240 off swift system that packs Zip drive and hardware MPEG decoder.
18	MidWest Micro Business Solution XPP-500 800/728-8582 www.mwmicro.com	n/a	(NEW)	$2399	Pentium III-500	Zippy Win NT 4.0 PC has SuperDisk and 2X CD-RW drives, mediocre documentation.
19	Compaq Prosignia Desktop 330 800/345-1518 www.compaq.com	16	Feb 99	$1999	Pentium II-450	Affordable small-business PC includes network card and modem.
20	HP Vectra VLi8 SFF 800/322-4772 www.hp.com/desktops	n/a	(NEW)	$1834	Pentium III-450	Managed PIII-450 PC has enhanced keyboard; features could be better.

Best Buy See features chart, page 198; test report, page 200.

Find updated street prices online (www.pcworld.com/powerdesktops/late_prices).

n/a = not applicable

[1] A system's performance word score is relative to the scores of other PCs running the same operating system. For more details see "Your Guide to the Top 100" on page 195.

[2] For more information about all of the products listed in this table, select product info number 902 or visit www.pcworld.com/productinfo.

AS THE INDUSTRY MAKES way for upcoming Pentium III-550 PCs, prices on systems with slightly older CPUs are starting to drop. Several PIII-500 machines on the chart are $100 to $200 cheaper this month. New PIII-450 systems are coming in at bargain-basement prices. But these machines are about 7 percent slower than PIII-500s currently in the Top 20. Second-tier vendors continue to provide competition in the market for power PCs as they roll out cheaper PIII-500s. IDot.com, for example, debuted its speedy 500P3BX at number 8 for just $2298. At the same time, a top-name company—Hewlett-Packard—offers the most affordable power PC on the chart: Its Vectra VLi8, at number 20, sells for $1834.

SCORECARD

★ Overall rating	PC WorldBench 98/operating system	Performance [1]	Features and design	Vendor's system reliability	Price	Vendor's support quality/policies	Product info number [2]
95	284/Win NT 4.0	outstanding	very good	outstanding	average	good/outstanding	–
92	234/Win 98	outstanding	very good	outstanding	average	good/good	–
90	235/Win 98	outstanding	very good	good	expensive	good/outstanding	656
87	237/Win 98	outstanding	outstanding	good	expensive	fair/good	657
87	236/Win 98	outstanding	very good	fair [3]	inexpensive	good[4]/good	658
87	235/Win 98	outstanding	very good	good [3]	average	good [4]/good	659
83	287/Win NT 4.0	outstanding	very good	[3]	average	fair [4]/good	660
82	232/Win 98	outstanding	very good	[3]	average	fair [4]/good	661
79	218/Win 95	good	good	good [3]	inexpensive	fair[4]/good	662
77	233/Win 98	outstanding	very good	[3]	expensive	good [4]/fair	663
76	219/Win 98	good	good	good	inexpensive	good/good	–
76	216/Win 98	good	good	good	very inexpensive	fair/good	664
76	254/Win NT 4.0	good	good	[3]	inexpensive	good [4]/good	665
76	230/Win 98	outstanding	very good	[3]	average	fair [4]/good	666
75	218/Win 98	good	very good	[3]	average	good [4]/good	667
75	224/Win 98	very good	very good	[3]	very inexpensive	fair [4]/fair	668
75	218/Win 98	good	very good	[3]	average	fair [4]/outstanding	669
75	276/Win NT 4.0	very good	satisfactory	[3]	average	fair [4]/outstanding	670
75	210/Win 98	satisfactory	good	fair	very inexpensive	fair/good	671
74	268/Win NT 4.0	very good	satisfactory	fair	very inexpensive	good/fair	672
Scorecard weightings ▶		Performance 25 percent	Features 25 percent	Reliability 15 percent	Price 15 percent	Quality/policies 10 percent each	

[3] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service scores for its home PCs.

[4] Due to insufficient data from the Reliability and Service survey for the vendor's work PCs, this rating is derived from anonymous support-quality calls, from survey scores for the vendor's home PCs, or from both.

This Month's Best Buys

1 DELL OPTIPLEX GX1P 500

PRO: Great performance, easy-access case, top-notch company reliability and support policies

CON: PCI-based graphics, so-so monitor

If you're looking for a high-performance corporate workstation, put Dell's $2615 OptiPlex GX1p 500 on your shopping list. No other system here matches its combination of speed, features, vendor reliability, and support.

The GX1p 500 is a great choice for any firm with a large host of PCs that regularly need upgrading: The case's side panels lift off quickly, and you can easily pull out the card-slot tray for fast board-swapping.

Our test machine came with Microsoft's Natural Keyboard, which arranges the keys to promote ergonomically proper positioning of your hands and arms while typing. Though we found it comfortable to use and reasonably easy to adjust to, the layout will not please everybody; you should definitely test-drive a Natural Keyboard before deciding to buy one.

Besides a whopping 20GB hard drive, you also get a 100MB Zip drive. The system offers six open slots—plenty of room for additional adapters—but a scant two open drive bays. In keeping with the OptiPlex line's corporate focus, a network interface card comes standard on the GX1p; for $89 you can opt for an Aztech Rockwell V.90 modem instead.

Dell OptiPlex GX1p 500

The unit's only significant flaw is the 17-inch Dell 1028L monitor—it produced somewhat dark images and slightly fuzzy text. Upgrading to the superior 19-inch Dell UltraScan 1200HS costs $200.

Setting up the OptiPlex is straightforward. All the ports are color-coded, making it easy to hook up devices. Dell supplies surprisingly detailed documentation for this corporate PC: user guides for all the peripherals, an in-depth system installation manual, a big foldout chart, and a guide for assistance once you're up and running. Plus, Dell maintains around-the-clock technical support. Respondents to our most recent survey give the company outstanding marks for reliability; its service, while not perfect, still ranks among the best in the industry.

2 DELL DIMENSION XPS T500

PRO: 4.8X DVD-ROM drive with decoder card, outstanding company reliability, good support

CON: None major

Need a feature-rich, multimedia-capable system for your growing business? The $2688 Dell Dimension XPS T500 may be just the ticket. Dell cut the price by $138 but still equips this thin, off-white midsize tower for the office and tosses in a few extras for after-hours fun. The XPS T500, with its swift PIII-500 processor, earned a PC WorldBench 98 score of 234, just a couple of ticks ▶

PHOTOGRAPHS: KEN SMITH

TOP 20 POWER DESKTOPS — STANDARD FEATURES

	SYSTEM [1]	CPU	Operating system	RAM (MB)	Level 2 cache (KB)	Hard drive (GB)	Graphics adapter (AGP unless noted)	Video RAM (MB/type)	Monitor tube/viewable diagonal (inches)	56-kbps modem protocol
1	Dell OptiPlex GX1p 500*	Pentium III-500	Windows NT 4.0	128	512	20	STB NVidia TNT (PCI)	16/SDRAM	17/15.9	not included
2	Dell Dimension XPS T500*	Pentium III-500	Windows 98	128	512	22	STB NVidia TNT 3D	16/SDRAM	17/15.9	V.90
3	Gateway E-4200 500*	Pentium III-500	Windows 98	128	512	22	ATI Rage 128	16/SDRAM	19/18	not included
4	Micron Millennia Max 500*	Pentium III-500	Windows 98	128	512	22	Diamond Viper V550	16/SDRAM	19/17.9	V.90
5	CyberMax Enthusiast PIII-500*	Pentium III-500	Windows 98	128	512	13.6	STB Velocity 4400	16/SDRAM	19/17.9	V.90
6	Quantex SM500	Pentium III-500	Windows 98	128	512	13	STB Velocity 4400	16/SDRAM	19/17.9	V.90
7	Sys Performance AX-500P3	Pentium III-500	Windows NT 4.0	128	512	10.1	Matrox Millennium G200	8/SGRAM	19/17.9	not included
8	IDot.com 500P3BX	Pentium III-500	Windows 98	128	512	14.4	Creative Graphics Blaster RIVA TNT	16/SDRAM	17/15.8	V.90
9	NEC PowerMate 8100	Pentium II-450	Windows 95	64	512	14.4	Accel Graphics AccelStar 3D II	8/SDRAM	17/15	not included
10	Premio Apollo BX 500	Pentium III-500	Windows 98	128	512	14.4	Diamond Viper V550	16/SDRAM	19/18	V.90
11	IBM PC 300PL	Pentium II-450	Windows 98	64	512	9.1	Matrox Millennium G200	8/SGRAM	17/16	not included
12	Micron Millennia Max 450	Pentium III-450	Windows 98	64	512	13	Diamond Viper V550	16/SDRAM	17/15.9	V.90
13	Toshiba Equium 7100M	Pentium III-500	Windows NT 4.0	128	512	10	integrated ATI Rage Pro 2X	6/SGRAM	17/15.7	not included
14	CompUSA AmericanPro 500	Pentium III-500	Windows 98	128	512	14.4	STB Velocity 4400	16/SDRAM	19/17.6	V.90
15	Acma ZPower 7450 PII-450	Pentium II-450	Windows 98	128	512	14.4	Number Nine Revolution IV	16/SDRAM	17/16.1	V.90
16	Polywell Poly 8450 B5	Pentium II-450	Windows 98	128	512	10.1	Matrox Millennium G200	8/SGRAM	17/16	V.90
17	NexTrend NexStar-450 PWJ	Pentium II-450	Windows 98	128	512	14	STB Velocity 128zx	8/SGRAM	19/18.2	V.90
18	MidWest Micro Business XPP-500	Pentium III-500	Windows NT 4.0	128	512	10.1	ATI Xpert128	16/SDRAM	17/15.9	not included
19	Compaq Prosignia Desktop 330	Pentium II-450	Windows 98	128	512	16.8	STB Velocity 4400	16/SDRAM	17/16	V.90
20	HP Vectra VLi8 SFF	Pentium III-450	Windows NT 4.0	64	512	8.4	integrated Matrox MGA G-200	8/SDRAM	17/15.7	not included

* Best Buy

[1] Configuration as tested. Vendor may have since changed components.

[2] *PC World* defines vertically oriented cases as towers (taller than 20 inches), midtowers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontally oriented cases as desktop (5 inches or taller) or compact (shorter than 5 inches).

behind the fastest Windows 98 unit on the chart, Micron's Millennia Max 500.

Color-coded, labeled, and icon-marked ports—plus a good array of peripheral manuals and an illustrated, foldout setup guide—help you get up and running fast. And the XPS T500's sturdy, easy-open case and tidy interior make accessing the main memory a cinch when you're ready to add more. While many other companies offer flimsy and clacky keyboards, Dell's solid QuietKey keyboard felt very comfortable to type on.

Dell Dimension XPS T500

The system includes a CineMaster hardware DVD decoder card with a 4.8X DVD-ROM drive for smooth video. We played a movie at full screen size, running other programs in the background; the picture remained flawless. The giant 22GB hard disk and the standard Iomega Zip drive provide plenty of storage space. The 17-inch Dell UltraScan 1000HS monitor generates sharp text and rich colors, but most competing models in this price range come with 19-inch monitors. Upgrading to the 19-inch Dell UltraScan 1200HS costs $200.

Meanwhile, the Altec Lansing ACS295 speaker-subwoofer system, teamed with the top-tier Turtle Beach Montego II PCI audio card, delivers full-bodied sound.

PC World readers recently gave grades of outstanding and good, respectively, to Dell's system reliability and service.

3 GATEWAY E-4200 500

PRO: Great speed, good management features

CON: Expensive

Gateway's $2789 E-4200 Pentium III-500 remains one of the most expensive PIII-500 machines appearing on this month's power list. Nevertheless, this imposingly tall and wide midsize tower has a great deal to recommend it. In fact, the system easily qualifies as one of our top choices for consumers who are on the lookout for a power-packed, multimedia-equipped business workstation.

Besides bearing such corporate accoutrements as an ethernet card and DMI management software, the E-4200 500 delivers top-notch performance—as measured by the PC World Test Center—and

CD/DVD-ROM drive speed	Sound board	Case style [2]	Max. RAM (MB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
		EXPANDABILITY					CUSTOMER SUPPORT			
17X-40X	integrated Crystal Audio	midtower	768	2	1/1	6	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
4.8X DVD-ROM	Turtle Beach Montego II PCI	midtower	768	2	2/1	2	3/1	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
13X-32X	Sound Blaster AWE64D	midtower	384	2	3/2	2	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
6X DVD-ROM	Sound Blaster Live Value	midtower	384	2	2/1	3	varies [3]/1	24	Sat, Sun	BBS, CIS, WWW
4.8X DVD-ROM	Aztech PCI 338-A3D	midtower	384	1	3/3	4	3/1	24	Sat, Sun	BBS, WWW
6X DVD-ROM	Sound Blaster PCI64V	midtower	384	1	2/2	4	3/1	24	Sat, Sun	BBS, WWW
14X-40X	Sound Blaster AWE64	midtower	1024	3	3/2	4	varies [4]/5	24	Sat, Sun	WWW
4.8X DVD-ROM	Turtle Beach Montego II PCI	midtower	1024	3	3/0	3	varies [3]/1	24	Sat, Sun	WWW
17X-40X	integrated Crystal 4235	midtower	384	2	2/1	5	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
14X-32X	Sound Blaster Live	midtower	1024	3	3/2	4	3/3	10	none	BBS, WWW
14X-32X	integrated Crystal PnP	desktop	384	2	1/0	4	3/1	24	Sat, Sun	AOL, BBS, CIS, WWW
6X DVD-ROM	integrated Yamaha DS-XG	midtower	384	2	3/1	4	varies [3]/1	24	Sat, Sun	BBS, CIS, WWW
14X-32X	integrated Crystal Audio	midtower	256	1	1/1	6	3/3	24	Sat, Sun	CIS, WWW
5X DVD-ROM	Sound Blaster Live	midtower	768	2	2/1	3	varies [5]/1	24	Sat, Sun	WWW
4.8X DVD-ROM	Sound Blaster Live	midtower	384	2	1/0	1	3/1	24	Sat, Sun	BBS, WWW
4X DVD-ROM	Aztech PCI 338-A3D	midtower	1024	3	3/1	3	3/5	24	Sat, Sun	WWW
2X DVD-ROM	Sound Blaster PCI128	midtower	1024	2	1/1	3	3/3	24	Sat, Sun	none
2X CD-RW	Sound Blaster PCI128	midtower	384	2	3/1	3	varies [3]/3	24	Sat, Sun	BBS, WWW
12X-40X	Creative Ensoniq AudioPCI	midtower	384	2	1/1	2	3/1	24	Sat, Sun	AOL, BBS, CIS, Prodigy, WWW
14X-32X	integrated Sound Blaster PCI	desktop	512	1	0/0	2	3/1	12	none	AOL, BBS, CIS, WWW

[3] Five years on CPU and main RAM, three years on other parts.

[4] Six years on CPU and main RAM, three years on other parts.

[5] One year on monitor, three years on other parts.

an excellent audiovisual experience. This unit's PC WorldBench 98 score of 235 puts it in a virtual dead heat with the other three Best Buys that ran on Windows 98.

The system's ATI Rage 128 graphics card helps the 19-inch Gateway monitor display images vividly, and the Altec Lansing GCS100 speakers and subwoofer offer rich sound. Gateway supplies excellent documentation, and the company's record for reliability and service in support of its work PCs remains strong.

Gateway E-4200 500

More price-conscious PC users should consider the Pentium III-450 version of the E-4200. At $2550, it costs $239 less than its 500-MHz sibling. Moreover, it contains an equally large hard drive (22GB), and it chalked up a creditable PC WorldBench 98 score of 220.

4 MICRON MILLENNIA MAX 500

PRO: Blazing speed, multimedia components including a 6X DVD-ROM drive, good manual

CON: Most expensive PC on the chart

If you plan on wringing every last ounce of performance out of your next PC, check out Micron's Millennia Max 500. It sells for a hefty $2899, but it's the fastest Win 98 PC on the chart and has a wagonload of features, including a Zip drive; a crisp, bright 19-inch monitor; and one of the few 6X DVD-ROM drives we've seen. However, subscribers in our most recent Reliability and Service survey rated Micron's support quality as just fair.

Micron Millennia Max 500

The Max 500's multimedia capabilities impressed us. Our unit's Diamond Viper V550—although no longer the most up-to-date model—was the number three AGP card in our *Top 10 Graphics Boards* in March. The combination of the Monsoon MM-1000's massive subwoofer and satellite speakers produces rich, full-range tones.

Micron includes comprehensive documentation with the Max 500 and offers solid warranties covering labor for one year and parts for three years (main RAM and CPU are covered for five years). ▶

5 CYBERMAX ENTHUSIAST PIII-500

PRO: Terrific performance, competitive price, attractive features

CON: Case cover tricky to get on and off, tech support difficult to reach

With a $100 price cut, CyberMax's speedy small-office/home-office entry, the Enthusiast PIII-500, makes an even better bargain this month. This $2099 midsize tower charged to a second-place finish in test-suite performance among the Windows 98 systems on the chart and is priced exceptionally well for a full-featured Pentium III-500 computer.

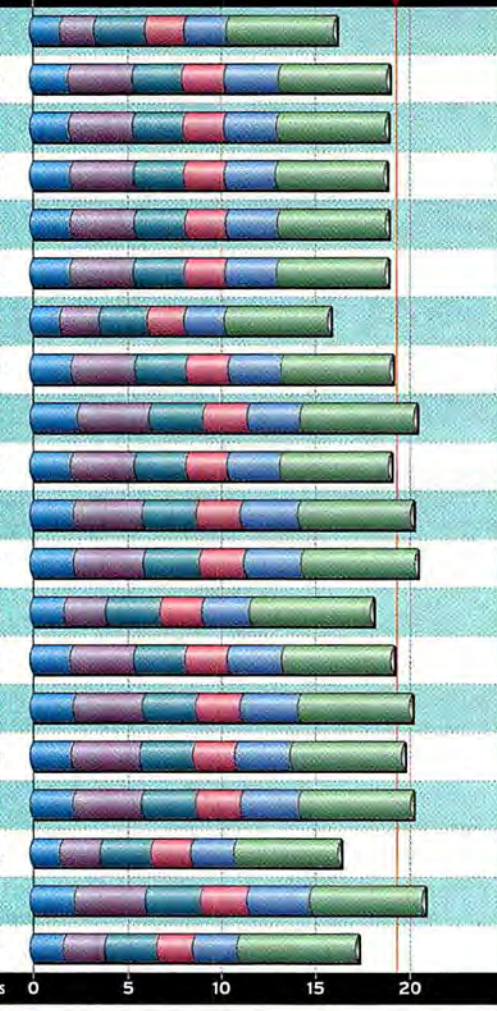
CyberMax Enthusiast

Its 236 score on PC WorldBench 98 puts the Enthusiast PIII-500 only a point below our fastest Windows 98 PC, Micron's Millennia Max 500. The bottom line: No one will be able to detect a whit of speed difference between these two PCs. The Enthusiast offers so much power that, even with several applications running in the background and without a dedicated MPEG decoder board, DVD movie images appear both vibrant and silky smooth. We played the movie *Twister* at full-screen size with no problem. And the included Altec Lansing ADA305 Digital PowerCube speakers and subwoofer's great sound made the tornado in the ▶

TOP 20 POWER DESKTOPS

TEST REPORT

	SYSTEM	CPU	Operating system	RAM (MB)	Level 2 cache (KB)	PC WorldBench 98 score
1	Dell OptiPlex GX1p 500*	Pentium III-500	Win NT 4.0	128	512	284
2	Dell Dimension XPS T500*	Pentium III-500	Win 98	128	512	234
3	Gateway E-4200 500*	Pentium III-500	Win 98	128	512	235
4	Micron Millennia Max 500*	Pentium III-500	Win 98	128	512	237
5	CyberMax Enthusiast PIII-500*	Pentium III-500	Win 98	128	512	236
6	Quantex SM500	Pentium III-500	Win 98	128	512	235
7	Sys Performance AX-500P3	Pentium III-500	Win NT 4.0	128	512	287
8	IDot.com 500P3BX	Pentium III-500	Win 98	128	512	232
9	NEC PowerMate 8100	Pentium II-450	Win 95	64	512	218
10	Premio Apollo BX 500	Pentium III-500	Win 98	128	512	233
11	IBM PC 300PL	Pentium II-450	Win 98	64	512	219
12	Micron Millennia Max 450	Pentium III-450	Win 98	64	512	216
13	Toshiba Equium 7100M	Pentium III-500	Win NT 4.0	128	512	254
14	CompUSA AmericanPro 500	Pentium III-500	Win 98	128	512	230
15	Acma ZPower 7450 PII-450	Pentium II-450	Win 98	128	512	218
16	Polywell Poly 8450 B5	Pentium II-450	Win 98	128	512	224
17	NexTrend NexStar-450 PWJ	Pentium II-450	Win 98	128	512	218
18	MidWest Micro Business XPP-500	Pentium III-500	Win NT 4.0	128	512	276
19	Compaq Prosignia Desktop 330	Pentium II-450	Win 98	128	512	210
20	HP Vectra VLi8 SFF	Pentium III-450	Win NT 4.0	64	512	268



*Best Buy

HOW WE TEST All systems are tested with PC WorldBench 98, *PC World*'s application-based benchmark. A higher PC WorldBench score is better. All PCs are tested with Windows 95, Windows 98, or Windows NT 4.0, and video resolution is set to 800 by 600 in 65,536 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench 98 score is a sum of the weighted, normalized result of each script: Word 97 (10 percent), Word Pro 97 (10 percent), Excel 97 (20 percent), 1-2-3 97 (20 percent), Paradox 8.0 (20 percent), and Picture Publisher 7.0 (20 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing). [1]Under Windows 98 with 128MB of RAM; also includes systems tested in this and previous months that do not currently rank among the Top 20.

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CyberMax also supplies a generous software bundle, including Corel's WordPerfect Suite 8 and such useful home and reference titles as Compton's World Atlas and Compton's Encyclopedia.

We had to fiddle a bit with the Enthusiast PIII-500's case cover to remove it, but the system's interior layout looked good, providing easy access to memory slots and sensibly organized cabling. CyberMax includes clear documentation with the PC and, like most companies in the Top 20, backs its systems with a long parts warranty and around-the-clock support.

Our one beef with CyberMax: its tech support. Staffers, although courteous and informative, tended to miss our tougher questions in our anonymous calls to technical support. Also, we waited up to 55 minutes and had to call three times before reaching a live person. In our recent Reliability and Service survey, *PC World* readers rated the reliability of CyberMax's home PCs and the quality of the company's support as good and fair, respectively.

New This Month

The following systems made our Power Desktops chart for the first time this month. For brief reviews of all previously tested machines on the chart, visit our Web page (www.pcworld.com/top400).

8 IDOT.COM 500P3BX

PRO: Inexpensive for a PIII-500, DVD-ROM drive with hardware decoder

CON: Support needs to be improved, case has cluttered interior

Priced almost $300 less than the average Pentium III system, IDot.com's $2298 500P3BX has a lot to offer small and home businesses. Like many other PCs on the chart, the system sports a DVD-ROM drive. But unlike most of its competitors, the 500P3BX comes with a robust hardware decoder for smooth video playback. More business-oriented features bundled with the system include Corel WordPerfect Suite 8 and a V.90 modem. And with a PC WorldBench 98 score of 232, The IDot.com can run productivity applications as quickly as similarly configured PIII-500s.

IDot.com 500P3BX

Unfortunately, mediocre support quality and a somewhat cluttered interior keep the 500P3BX out of Best Buy territory. Getting inside is simple, thanks to the easy-open case. But inside, power supply cables to the hard drive and MPEG-2 decoder card block the system memory's sockets; you'll have to remove them to ease the task of adding RAM. IDot.com's sturdy midsize tower has three free bays, which should serve you well when the need to expand arises. The system also comes with three open slots, one of which is a PCI slot that is difficult to access because the graphics card's heat sink and jumper pins are in the way.

The system's crisp, 17-inch monitor comes with Colorific software, which we used to calibrate colors and tweak 3D effects and lighting in our testing. The 4.8X DVD-ROM drive, with the included DVD decoder card, produced very little jitter and displayed smooth, crisp images, even when we had other programs running in the background.

A handy foldout setup guide gets you up and running fast, and well-written manuals make the system easy to use from the get-go. The manuals, especially, are a boon because you might not get through to a live person when you call tech support. In our anonymous calls to IDot.com's support line, we waited 20 minutes on three separate occasions without ever getting a response. The company offers a five-year warranty on the CPU and main memory, a three-year warranty on all other hardware, and a one-year labor warranty.

12 MICRON MILLENNIA MAX 450

PRO: Well-priced, swift performance, excellent-quality DVD-ROM drive and graphics board

CON: Stiff chassis makes the cover a little tough to remove, readers rate vendor reliability as fair

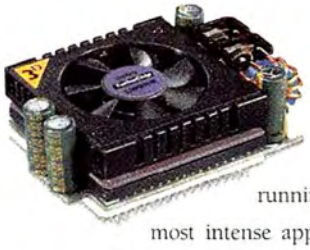
The Micron Millennia Max 450 grabs your attention right from the start. At $1999, it costs about $200 less than the average Pentium III-450 machine. You don't sacrifice performance and features at that price, either: The Millennia Max 450 earned a dead-on average (for a PIII-450 system) PC WorldBench 98 score of 216 and comes loaded with some impressive components, making it a good choice for anyone who is seeking power on a budget.

Those desirable components include Diamond Multimedia's Viper V550 graphics card, which boasts excellent business and good 3D performance, and a crisp 17-inch monitor. In addition, the 6X DVD-ROM drive delivers impressive video playback despite using a software-based MPEG decoder. Even when we maximized the image and ran other programs in the background, we couldn't find fault with the quality. The 13GB hard drive is about average for a PIII-450 system and should provide plenty of storage space for most people's needs.

Getting inside the Millennia Max is straightforward. We simply turned a thumbscrew, pressed a tab, and removed the side. Our unit's stiff cover took some tugging to pull off, but once inside we found the interior well-designed for tinkering. All the cables are tied and tucked away so that you can easily access the four free card slots and two free DIMM sockets. Reaching the four available drive bays is a different matter, however, since you'll have to push away bunches of cables.

Micron Millennia Max 450

The system manual that comes with the Millennia Max includes comprehensive information and illustrations. Should you need further help, Micron's technical support lines are open around the clock. In our most recent round of anonymous calls, we found that the quality of the service has improved: The tech support reps gave us more information than we asked for, and they answered our calls consistently in under 9 minutes. In our recent Reliability and Service survey, *PC World* readers rated the reliability of Micron's work PCs and its support quality as fair. ▶



EXPERIENCE EXTREME 3D GRAPHICS and system performance increases of up to 280%*. The Kingston® TurboChip® 366 incorporates AMD's 366MHz K6-2 processor with 3DNow!™ technology offering computing on a new dimension for Pentium® systems running at 166Mhz or higher. TurboChip 366 equips your system with the power to take on your most intense applications. You can achieve ultimate performance for only $249 MSRP. A chip for chip replacement, TurboChip 366 adds life to your system and keeps your upgrade costs to a minimum. Plus, Kingston offers a lifetime warranty and free technical support. Call your Kingston sales representative for more details at (800) 533-8680 or visit our Web site at **www.kingston.com/tc**. To purchase TurboChip 366 online, visit us at **buycomp.com** and type in **Kingston TurboChip**. Get ready for an out of this world experience.

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Circle 133 on card or go to www.pcworld.com/productinfo

13 TOSHIBA EQUIUM 7100M

PRO: Affordable PIII-500, easy-open case, Zip drive, PC Card reader

CON: Features more suited to a PII-450

Despite being the second least expensive PIII-500 system we've reviewed for the *Top 20 Power Desktops*, the $2133 Equium 7100M from Toshiba lands low on the chart, due mainly to the relative mediocrity of its feature set. But if you don't need a 19-inch monitor, massive hard disk, or DVD-ROM drive, you may find the Equium to your liking.

On the plus side, the system does feature some nice extras like an integrated network card, a Zip drive, and a PC Card reader. A suspend button conveniently located on top lets you put your system in sleep mode when it's not in use. This tall midsize tower houses two free expansion bays and a whopping six free slots.

Toshiba Equium 7100M

The top of the case swings out of the way for easy access to RAM, and the inside top of the case displays handy upgrade instructions. The 17-inch Toshiba TekBright 700P monitor is adequate but not outstanding: Its controls take some time to master, and images became a bit blurry in the corners. The system comes with a three-year warranty on parts and labor as well as around-the-clock telephone support.

18 MIDWEST MICRO BUSINESS SOLUTION XPP-500

PRO: Inexpensive for a PIII-500, zippy performance, top-quality support policies, top warranty

CON: Uninspiring features and documentation

Targeted at small to medium-size networked businesses, MidWest Micro's $2399 Business Solution XPP-500 is less expensive than the average Pentium III-500 system on the chart and includes both a SuperDisk drive and a CD-Rewritable drive. However, its PC WorldBench 98 score of 276 running Windows NT 4.0 is average for its processor class.

MidWest Micro Business

MidWest Micro throws in other features businesses will appreciate—a 3Com Fast EtherLink XL card (but no modem), and Microsoft's Office Small Business Edition, Intellimouse, and Natural Keyboard. The back of the case has helpful icon-labeled ports and a reset button—handy for hard-rebooting your machine without unplugging it.

Not all of its features are up to par. Whereas most of its chartmaking peers include 14.4GB or greater hard drives, the Business Solution XPP-500 offers a comparatively small 10.1GB hard drive. And though most PIII-500 systems on the chart come with 19-inch screens, MidWest Micro bundles a 17-inch model.

The company's tech support staff is on hand around the clock. A top-notch warranty covers the CPU and main RAM for five years (other parts for three years) and labor for three years. In our anonymous calls, the techs gave us helpful advice. That's a good thing, since the small system manual, though easy to read, covers just the basics.

20 HP VECTRA VLI8 SFF

PRO: Fast, affordable, comes with enhanced keyboard, network-ready

CON: Unimpressive set of features, limited expandability, support policies and system reliability only fair

If you're looking for a small, affordable, network-ready PC for your business, Hewlett-Packard's Vectra VLi8 SFF may fit the bill. This PIII-450 PC is not only the least expensive system on the power chart at $1834, it's also a screamer. With a PC WorldBench 98 score of 268 running Windows NT 4.0, it proved faster than many costlier competitors such as Quantex's $2229 QP6-450 SB-4, a system that earned a WorldBench score of 234 and failed to make the chart.

HP kept its costs low by including integrated graphics and sound—Matrox's MGA G-200 with 8MB of SDRAM and Sound Blaster PCI Audio. And while about half of its power chart competitors offer a 14.4GB or greater hard drive or a DVD-ROM drive, HP provides a comparatively small 8.4GB disk and a 14X–32X CD-ROM drive. Expandability is rather limited, with no free bays and just two open slots. On the upside, HP bundles 3Com's capable integrated Fast Etherlink 10/100 Base-T LAN adapter and throws in corporate-friendly management capabilities like Wake On LAN, case lock, and intruder alert.

Although what's offered in the way of multimedia and expandability leaves us a little cold, we were also impressed by some of the extras that the VLi8 SFF does have, such as the enhanced keyboard with sleep keys, volume control, programmable function keys, and microphone and headphone jacks.

HP Vectra VLi8 SFF

Even with all these goodies, the keyboard was quiet and felt sturdy. In fact, the entire system ran so quietly that we could hardly tell it was turned on. Color-coded ports on the back help to make the PC simple to set up right out of the box. The easy-to-read user manual includes charts and illustrations.

Unfortunately, the company's reliability rating and support policies are another matter. Unlike most other vendors whose PCs made the chart, HP offers just 12 hours of tech support per day on weekdays only. Furthermore, support is free for just the first year. Luckily, we were able to reach reps right away when we called and found their advice consistently helpful. In our latest Reliability and Service survey, our readers gave HP's support quality a good rating but rated the reliability of HP's systems as just fair. ▶

BEYOND THE TOP 20

online

We evaluated the following systems along with the others, but they didn't score high enough to reach the *Top 20 Power Desktops* chart. For write-ups, visit PC World Online (www.pcworld.com/t20pcs).

- **Axis Orion 100A DVD 500**
- **Compaq Deskpro EP6450**
- **Quantex SB450**
- **Quantex ZX450**
- **Tagram ThunderBolt H2810**
- **Xi Computer 500 MTower SP**

When it comes to speed, this printer PUSHES the ENVELOPE.

Also the letter, legal, and 11x17 sheet.

PC WORLD TOP 10 PageWorks 8L, 3/99

PC WORLD TOP 10 PageWorks 8L, 1/99

PC Computing ★★★★★ Color PageWorks PS, 5/98

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PAGEWORKS™ 25
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There's no question, it's a fast-paced world. And it's only getting faster. Whether we're waiting for our food or waiting for our printer, we want it, and we want it now. Slow and steady no longer wins the race–we're talking fast, fast, fast.

Well, finally, there's a laser printer designed to keep up the pace, the Minolta PageWorks™ 25 printer. In fact, at a blistering 25 pages per minute, this thing sets its own pace, leaving all the other sub-$1,500 printers totally in the dust.

Okay, so it's fast, but what else, you might be asking. Well, the Minolta PageWorks 25 printer is also the most expandable printer in the sub-$1,500 category, easily upgradable from a 750-sheet paper capacity to 3,750 sheets. It features 11"x17" paper handling and even has 5- or 10-bin mailbin capabilities. Oh, and did we mention power? With its 90MHz Power PC processor with QuickPrint®, the Minolta PageWorks 25 printer pushes the envelope even further. For more information or a free CD-ROM, call 1-888-264-6658, or visit us at: **www.minoltaprinters.com**

MINOLTA

PC WORLD TOP 20 BUDGET DESKTOPS

	SYSTEM	Last month	Month tested	Street price (4/16/99)	CPU	Comments
1	Quantex M400C 800/896-4898 www.quantex.com	1	June 99	$1499	Celeron-400	Near-PII-400 speed, Zip drive, DVD-ROM drive, and 19-inch monitor for under $1500.
2	Gateway GP6-400 800/315-2536 www.gateway.com	2	Mar 99	$1718	Pentium II-400	Quick small-business PC with network card and sharp monitor has 13GB hard disk.
3	Gateway E-1200 366 800/315-2536 www.gateway.com	3	May 99	$1114	Celeron-366	Network-ready corporate desktop workstation is very affordable.
4	Dell Dimension V433c 800/388-8542 www.dell.com	n/a	NEW	$1420	Celeron-433	Speedy SOHO system comes with CD-RW drive and excellent manuals; small monitor.
5	Micro Express MicroFlex-34A 800/989-9900 www.microexpress.net	n/a	NEW	$1599	AMD K6-III-400	Peppy small/home office PC offers 18GB hard drive; weak documentation.
6	Sys TaskMaster Z366C 800/613-9963 www.sys.com	6	Apr 99	$1259	Celeron-366	$40 less this month; has great expandability and solid support policies.
7	Axis Systems Orion 100C DVD 800/378-9014 www.axissys.com	10	Apr 99	$1648	Pentium II-450	$50 off strong-performing multimedia PC; attractive price for PII-450 system.
8	CyberMax Entrepreneur C-400 800/437-4596 www.cybermaxpc.com	4	June 99	$1199	Celeron-400	Lowest-priced Celeron-400-based unit on chart has Zip drive and room to expand.
9	Micro Express MicroFlex-PII/450LC 800/989-9900 www.microexpress.net	n/a	June 99	$1599	Pentium II-450	Fine performance on this NT-based midtower workstation; above-average support policies.
10	MidWest Micro Office MWO-433C 800/728-8582 www.mwmicro.com	13	June 99	$1199	Celeron-433	Small-office system with $100 price cut has LS-120 drive and fair support.
11	Xi Computer 400A MTower 800/432-0486 www.xicomputer.com	7	June 99	$1479	Celeron-400	Small-business system is the fastest Celeron-400 we've tested; modest $20 price cut.
12	IDot.com 366LXA 888/388-4368 www.idot.com	11	May 99	$1098	Celeron-366	Basic PC sheds $28; mediocre support quality; no software bundle.
13	CyberMax Enthusiast PII-450 800/437-4596 www.cybermaxpc.com	n/a	May 99	$1749	Pentium II-450	$250 off fast SOHO PC with big monitor; now ships with STB Velocity 4400 card.
14	Axis Systems Metropolis NX5-333C 800/378-9014 www.axissys.com	15	Mar 99	$968	Celeron-333	Only sub-$1000 machine on the chart gets $30 trimmed from its price.
15	Sys TaskMaster 350K2 800/613-9963 www.sys.com	n/a	Jan 99	$1299	AMD K6-2-350	Company cuts $100 off expandable PC equipped with 40X CD-ROM drive.
16	CyberMax Enthusiast KII 350 800/437-4596 www.cybermaxpc.com	n/a	Feb 99	$1099	AMD K6-2-350	Great price but subpar performance, even for a K6-2-350 PC, and poor monitor quality.
17	Premio Shadowhawk 400C 800/677-6477 www.premiopc.com	n/a	NEW	$1599	Celeron-400	Home and small-office PC is fast and expandable; support hours are short.
18	IDot.com 400K6-2 888/388-4368 www.idot.com	18	June 99	$1274	AMD K6-2-400	Affordable but basic SOHO system offers decent performance; no software bundle.
19	IBM PC 300 GL, Small Business Series 800/426-2968 www.ibm.com/ibmpc	19	May 99	$1709	Pentium II-400	$66 off small-business minitower with network card; sluggish for a PII-400 PC.
20	Compaq Prosignia Desktop 310 800/345-1518 www.compaq.com	n/a	NEW	$1450	Celeron-433	Fast small-biz PC includes Zip drive; service and system reliability undistinguished.

Best Buy See features chart, page 208; test report, page 210. Find updated street prices online (www.pcworld.com/budgetdesktops/late_prices).

n/a = not applicable

[1] A system's performance word score is relative to the scores of other PCs running the same operating system. For more details see "Your Guide to the Top 100" on page 195.

[2] For more information about all of the products listed in this table, select product info number 903 or visit www.pcworld.com/productinfo.

IT'S STILL A CELERON SHOW THIS MONTH, with three of the four chart newcomers sporting some flavor of Intel's bargain-friendly processor. Breaking with recent trends, PC prices on the budget Top 20 this month rose about $15 over last month. Look closely, though, and you'll still find a bumper crop of deals. The number three finisher, Gateway's corporate-oriented E-1200 366, is the least-expensive Best Buy at just $1114. Two models new to the chart—one from Dell (the Celeron-433–based Dimension V433c), the other from Micro Express (the MicroFlex-34A powered by AMD's K6-III-400)—are also Best Buys, filling the number four and number five spots. Both speedy systems sell for less than $1600.

SCORECARD

★ Overall rating	PC WorldBench 98/operating system	Features and design	Price	Performance [1]	Vendor's system reliability	Vendor's support quality/policies	Product info number [2]
85	198/Win 98	very good	average	good	good [3]	good [3]/good	673
84	203/Win 98	good	expensive	very good	good	good/outstanding	674
83	177/Win 98	satisfactory	inexpensive	satisfactory	good	good/outstanding	675
82	196/Win 98	satisfactory	average	good	outstanding	good/good	–
82	217/Win 98	very good	average	outstanding	[4]	fair/outstanding	676
82	193/Win 98	good	inexpensive	good	[4]	fair/good	677
82	210/Win 98	good	average	very good	[4]	good [3]/outstanding	678
82	188/Win 98	good	inexpensive	good	good [3]	fair/good	679
82	256/Win NT 4.0	good	average	very good	[4]	fair/outstanding	680
80	190/Win 98	satisfactory	inexpensive	good	[4]	fair/outstanding	681
80	199/Win 98	very good	average	good	[4]	fair/good	682
80	185/Win 98	good	very inexpensive	satisfactory	[4]	fair/good	683
79	205/Win 98	very good	expensive	very good	good [3]	fair [3]/good	684
77	198/Win NT 4.0	satisfactory	very inexpensive	satisfactory	[4]	good/outstanding	685
76	181/Win 98	good	inexpensive	satisfactory	[4]	fair/good	686
76	161/Win 98	good	very inexpensive	satisfactory	good [3]	fair [3]/good	687
73	196/Win 98	good	average	good	[4]	good/fair	688
73	184/Win 98	satisfactory	inexpensive	satisfactory	[4]	fair/good	689
73	185/Win 98	satisfactory	expensive	satisfactory	good	good/good	–
72	194/Win 98	satisfactory	average	good	fair	fair/good	690
Scorecard weightings ▶		Features 25 percent	Price 22 percent	Performance 18 percent	Reliability 15 percent	Quality/policies 10 percent each	

[3] The rating is derived from the vendor's Reliability and Service survey scores for its home PCs.

[4] Insufficient data to give a reliability score.

This Month's Best Buys

1 QUANTEX M400C

PRO: Fast and well appointed for a budget PC

CON: None major

PC hunters looking for a budget small-office/home-office system will be hard-pressed to do better than Quantex's Celeron-400 machine. Renamed after debuting last month as the QP6/400 M-1c, this $1499 midsize tower is fast and bears features commonly found on much more expensive systems. The M400c's PC WorldBench 98 score of 198 means that only seven computers on the chart can match or beat its speed on applications—and most of those systems cost hundreds of dollars more.

Controls on the spacious Quantex XP190N 19-inch monitor are intuitive and easy to use. The unstinting software bundle includes Corel WordPerfect Suite 8 and reference titles such as Compton's World Atlas and American Heritage Talking Dictionary. The system also comes with an Iomega Zip drive and a 4.8X DVD-ROM drive with software decoder.

A simple-to-follow system manual and illustrated foldout setup guide accompany the M400c, but if you need to call tech support for help, the support policies are fairly standard. You can reach technicians 24 hours a day, and the company backs its system with a three-year parts and one-year labor warranty. In our anonymous calls to tech support, reps were easy to reach and responded courteously, but didn't always give accurate answers to our tough or intermediate-level questions. Respondents in our latest Reliability and Service survey gave Quantex's home PCs good ratings in both of these categories.

Quantex M400c

2 GATEWAY GP6-400

PRO: Fast and feature-rich, thorough documentation, company has strong system reliability and support record

CON: Pricey for a budget system

Once of interest only to corporations, networked PCs are becoming increasingly popular in small and home offices—where the GP6-400 makes an excellent fit. Though fairly expensive at $1718, this system delivers speed, features, and expandability.

In our PC WorldBench 98 tests, the GP6-400 achieved a score of 203—well above average for a PII-400 system with 64MB of RAM. Instead of a modem, the machine includes a 3Com Fast EtherLink adapter and a Zip drive. Gateway backs it all with a three-year parts and labor warranty and strong support policies.

Gateway GP6-400

The GP6-400 is simple to upgrade. We easily opened its case by hand-turning ▶

PHOTOGRAPHS: KEN SMITH

TOP 20 BUDGET DESKTOPS

STANDARD FEATURES

	SYSTEM [1]	CPU	Operating system	RAM (MB)	Level 2 cache (KB)	Hard drive (GB)	Graphics adapter (AGP)	Video RAM (MB/type)	Monitor tube/ viewable diagonal (inches)	56-kbps modem protocol
1	Quantex M400C*	Celeron-400	Windows 98	128	128	13	STB Velocity 4400	16/SGRAM	19/17.7	V.90
2	Gateway GP6-400*	Pentium II-400	Windows 98	64	512	13	Ensoniq 3D Blaster Banshee	16/SGRAM	17/16	not included
3	Gateway E-1200 366*	Celeron-366	Windows 98	64	128	8.4	integrated ATI 3D Rage IIC	4/SGRAM	17/15.8	not included
4	Dell Dimension V433c*	Celeron-433	Windows 98	64	128	6.4	integrated ATI Rage Pro Turbo	8/SDRAM	17 [3]/16.1	not included
5	Micro Express MicroFlex-34A*	AMD K6-III-400	Windows 98	128	1024	18	Diamond Monster Fusion	16/SGRAM	19/18	V.90
6	Sys TaskMaster Z366C	Celeron-366	Windows 98	64	128	6.4	Diamond Monster Fusion	16/SGRAM	17/15.7	V.90
7	Axis Systems Orion 100C DVD	Pentium II-450	Windows 98	128	512	10.1	Intel 740	8/SDRAM	17/15.8	V.90
8	CyberMax Entrepreneur C-400	Celeron-400	Windows 98	64	128	6.2	Joy Tech Apollo 7400	8/SDRAM	17/15.7	V.90
9	Micro Express MicroFlex-PII/450LC	Pentium II-450	Windows NT 4.0	128	512	10	Diamond Monster Fusion	16/SGRAM	19/17.7	V.90
10	MidWest Micro Office MW0-433C	Celeron-433	Windows 98	64	128	8.4	integrated ATI 3D Rage Pro	8/SDRAM	17/16	V.90
11	Xi Computer 400A MTower	Celeron-400	Windows 98	128	128	14	Matrox Mystique G200	8/SDRAM	17/16	V.90
12	IDot.com 366LXA	Celeron-366	Windows 98	64	128	6.4	Card Expert Intel 740	8/SDRAM	17/16	V.90
13	CyberMax Enthusiast PII-450	Pentium II-450	Windows 98	128	512	13.6	Number Nine Revolution IV	16/SDRAM	19/17.9	V.90
14	Axis Systems Metropolis NX5-333C	Celeron-333	Windows NT 4.0	64	128	4.3	Intel 740	8/SDRAM	17/15.7	not included
15	Sys TaskMaster 350K2	AMD K6-2-350	Windows 98	64	512	10.1	Matrox Millennium G200	8/SGRAM	17/15.8	V.90
16	CyberMax Enthusiast KII 350	AMD K6-2-350	Windows 98	64	512	8.4	Mpact II	8/RDRAM	17/15.8	V.90
17	Premio Shadowhawk 400C	Celeron-400	Windows 98	128	128	8.4	Matrox Millennium G200	8/SGRAM	17/15.9	V.90
18	IDot.com 400K6-2	AMD K6-2-400	Windows 98	64	1024	10.1	Card Expert Intel 740	8/SDRAM	17/15.9	V.90
19	IBM PC 300 GL, Small Business	Pentium II-400	Windows 98	64	512	8.4	integrated S3 Trio 3D	4/SGRAM	17/15.8	V.90
20	Compaq Prosignia Desktop 310	Celeron-433	Windows 98	64	128	9.1	STB NVidia TNTv	16/SGRAM	17/16	V.90

* Best Buy

[1] Configuration as tested. Vendor may have since changed components.

[2] *PC World* defines vertically oriented cases as towers (taller than 20 inches), midtowers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontally oriented cases as desktop (5 inches or taller) or compact (shorter than 5 inches).

two thumbscrews; inside we found four free expansion slots (one shared ISA/PCI and three PCI) and four open drive bays, even with the Zip drive in place.

Although the GP6-400's Ensoniq 3D Blaster Banshee graphics adapter can't support resolutions as high as those the ATI 3D Rage Pro can, its top setting of 1280 by 1024 looks respectable on Gateway's 17-inch EV700 monitor. The GP6-400 ships with a 13GB hard disk, capacious for a budget PC. Finally, the software bundle of McAfee AntiVirus and Microsoft's Office 97 Small Business Edition with Bookshelf offers resources that any small business will welcome.

In our recent reader survey, Gateway's work PCs received good rankings for both reliability and service. In our anonymous calls to tech support, we reached representatives within five minutes, and they were generally helpful and polite.

3 GATEWAY E-1200 366

PRO: Very inexpensive, easy to manage and use

CON: So-so performance, smallish hard drive, limited expandability

This Celeron-366–based corporate desktop system emphasizes ease of use and service. Its $1114 price is outstanding for any PC, much less for a network-ready model that comes equipped with an ethernet adapter.

But make sure your office's computing needs are modest. As its PC WorldBench 98 score of 177 indicates, the E-1200 is slow even for its processor class, and some of its features are merely adequate. For instance, the 8.4GB hard drive is a bit skimpy compared to those of other PCs these days, and while most budget systems now offer 8MB or 16MB of video RAM, the integrated ATI 3D Rage IIC adapter on this Gateway has just 4MB of SGRAM. Still, if your work consists mostly of spreadsheet, database, and word processing applications, then the E-1200 366 makes an ideal choice.

Gateway E-1200 366

You can get inside the system in seconds—just twist a screw a few times with your hand, and then press two buttons to release the cover. A clean and tidy layout awaits you inside. In addition, all ports on the back of

		EXPANDABILITY					CUSTOMER SUPPORT			
CD/DVD-ROM drive speed	Sound board	Case style [2]	Max. RAM (MB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
4.8X DVD-ROM	Sound Blaster PCI64	midtower	384	1	2/3	4	3/1	24	Sat, Sun	BBS, WWW
13X-32X	integrated Sound Blaster Audio	midtower	384	2	2/2	4	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
13X-32X	integrated Crystal Audio	compact	256	1	1/1	2	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
2X CD-RW	integrated Yamaha YMF724F-V	midtower	384	2	3/1	3	3/1	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
14X-32X	Sound Blaster PCI128	midtower	384	2	4/0	4	4/4	24	Sat, Sun	WWW
14X-32X	Sound Blaster AWE64	midtower	1024	3	3/2	4	varies [4]/5	24	Sat, Sun	WWW
4.8X DVD-ROM	Yamaha 724	midtower	384	2	3/0	4	3/3	24	Sat, Sun	WWW
20X-40X	Sound Blaster PCI128	tower	384	2	2/3	3	3/1	24	Sat, Sun	BBS, WWW
14X-32X	Sound Blaster PCI128	midtower	768	1	3/0	4	4/4	24	Sat, Sun	WWW
17X-40X	integrated Yamaha 740 PCI	midtower	768	2	3/1	2	varies [5]/3	24	Sat, Sun	BBS, WWW
4X DVD-ROM	Sound Blaster PCI128	midtower	384	2	3/2	4	3/3	24	Sat, Sun	WWW
17X-40X	Turtle Beach Montego II PCI	midtower	384	2	3/0	4	varies [5]/1	24	Sat, Sun	WWW
20X-40X	Sound Blaster AWE64	midtower	384	1	3/3	4	3/1	24	Sat, Sun	BBS, WWW
17X-40X	Yamaha 724	midtower	384	2	3/0	4	3/3	24	Sat, Sun	WWW
17X-40X	Sound Blaster AWE64	midtower	768	2	3/2	4	varies [4]/5	24	Sat, Sun	WWW
4.8X DVD-ROM	Aureal A3D 64V	midtower	256	1	3/3	4	3/1	24	Sat, Sun	BBS, WWW
14X-40X	Sound Blaster AWE 64D	midtower	1024	3	3/2	4	3/3	10	none	BBS, WWW
17X-40X	Turtle Beach Montego II PCI	midtower	768	2	3/0	4	varies [5]/1	24	Sat, Sun	WWW
14X-32X	integrated ESS Solo-1 PCI Audio	minitower	384	2	0/0	2	3/1	24	Sat, Sun	AOL, BBS, CIS, WWW
17X-40X	Sound Blaster PCI64V	midtower	256	1	0/1	3	3/1	24	Sat, Sun	AOL, BBS, CIS, Prodigy, WWW

[2] Vendor now sells this system with a 15-inch monitor.

[4] Six years on CPU and main RAM, three years on other parts.

[5] Five years on CPU and main RAM, three years on other parts.

the PC are labeled and color-coded for quick and easy connections.

The system's documentation exceeded our expectations, too. Besides an illustrated, foldout setup guide, Gateway includes a clearly written system manual, a troubleshooting guide, and a booklet for new users. If you can't find the answer you need in these documents, try the company's 24-hour support line. Its representatives answered our anonymous calls within 5 minutes and responded courteously and accurately to all of our questions—even the tricky ones.

Gateway backs its computers with a three-year parts and labor warranty. Respondents to our recent reader survey rated Gateway's work PCs as good in both system reliability and service.

4 DELL DIMENSION V433C

PRO: Quick Celeron machine, excellent manuals, company known for great reliability and support, CD-RW drive

CON: Smallish hard drive and monitor, integrated graphics limits graphics card upgrades

You're not demanding. You ask for only three things in a computer: It should cover all the basics, have a modest price, and offer good support in case something goes wrong. The $1420 Dell Dimension V433c meets all three of those criteria—and with one exception it leaves off the latest and greatest gizmos. That exception is a Sony CD-Rewritable drive—one of the handier types of removable media. The V433c's PC WorldBench 98 score of 196 makes it the fastest Celeron-433 machine we've tested. To top off the package, Dell gets high marks for service and reliability in our reader surveys.

Dell Dimension V433c

Pretty it's not. But the Dimension V433c's plain-looking beige chassis is functional, with easy-to-use controls and color-coded connectors. Beyond the CD-RW drive, the system's features are thinner than most of its chart competitors: a skimpy 6.4GB hard drive (the smallest of any Celeron-433 PC that's come through our lab), and a small but crisp 15-inch monitor. Color-coded Harman/Kardon HK195 speakers deliver clear sound. The system we received included an ethernet network inter- ▶

face card instead of a modem, making this configuration better suited for small- to medium-size networked businesses.

If you decide to upgrade, you won't find the process too painful. To open the case, turn a thumbscrew, press tabs on the top and bottom of the chassis, and pull off the side panel. Once inside, you'll discover that adding boards takes little time or effort. The system has three free card slots—not a lot for a system with integrated sound and graphics. You'll have to push some cabling out of the way to upgrade the system's memory or to add a drive to one of four empty drive bays.

Our readers consistently rank Dell highly in our Reliability and Service surveys. If you do run into trouble, Dell's excellent manuals will provide you with the first line of help, and you can call Dell's toll-free tech support lines any time, day or night. If your experience mirrors ours in our anonymous calls to tech support, you'll encounter a high quality of service.

5 MICRO EXPRESS MICROFLEX-34A

PRO: Excellent performance, massive hard drive, sturdy case

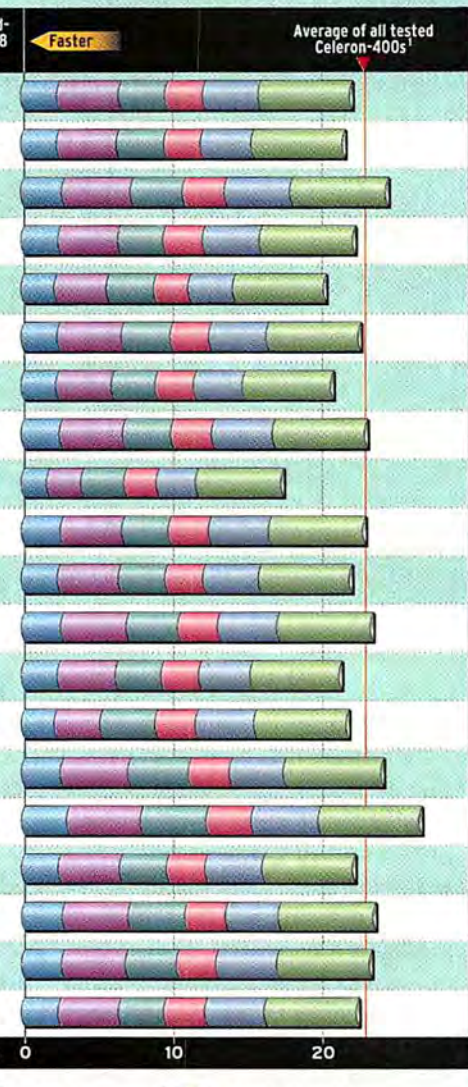
CON: Monitor quality could be better, no overall system manual, sketchy support

The first AMD K6-III-400 PC we've tested for the Top 20, Micro Express's MicroFlex-34A makes a good impression. Its PC WorldBench 98 score of 217 puts it slightly ahead of the average Pentium II-450 machine, helped

TOP 20 BUDGET DESKTOPS

TEST REPORT

	SYSTEM	CPU	Operating system	RAM (MB)	Level 2 cache (KB)	PC WorldBench 98 score
1	Quantex M400c*	Celeron-400	Win 98	128	128	198
2	Gateway GP6-400*	Pentium II-400	Win 98	64	512	203
3	Gateway E-1200 366*	Celeron-366	Win 98	64	128	177
4	Dell Dimension V433c*	Celeron-433	Win 98	64	128	196
5	Micro Express MicroFlex-34A*	AMD K6-III-400	Win 98	128	256	217
6	Sys TaskMaster Z366C	Celeron-366	Win 98	64	128	193
7	Axis Systems Orion 100C DVD	Pentium II-450	Win 98	128	512	210
8	CyberMax Entrepreneur C-400	Celeron-400	Win 98	64	128	188
9	Micro Express MicroFlex-PII/450LC	Pentium II-450	Win NT 4.0	128	512	256
10	MidWest Micro Office MWO-433C	Celeron-433	Win 98	64	128	190
11	Xi Computer 400A MTower SP	Celeron-400	Win 98	128	128	199
12	IDot.com 366LXA	Celeron-366	Win 98	64	128	185
13	CyberMax Enthusiast PII-450	Pentium II-450	Win 98	128	512	205
14	Axis Systems Metropolis NX5-333C	Celeron-333	Win NT 4.0	64	128	198
15	Sys TaskMaster 350K2	AMD K6-2-350	Win 98	64	512	181
16	CyberMax Enthusiast KII 350	AMD K6-2-350	Win 98	64	512	161
17	Premio Shadowhawk 400C	Celeron-400	Win 98	128	128	196
18	IDot.com 400K6-2	AMD K6-2-400	Win 98	64	1024	184
19	IBM 300 GL Small Business Series	Pentium II-400	Win 98	64	512	185
20	Compaq Prosignia Desktop 310	Celeron-433	Win 98	64	128	194



*Best Buy

TEST PC WORLD CENTER **HOW WE TEST** All systems are tested with PC WorldBench 98, *PC World*'s application-based benchmark. A higher PC WorldBench score is better. All PCs are tested with Windows 95, Windows 98, or Windows NT 4.0, and video resolution is set to 800 by 600 in 65,536 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench 98 score is a sum of the weighted, normalized result of each script: Word 97 (10 percent), Word Pro 97 (10 percent), Excel 97 (20 percent), 1-2-3 97 (20 percent), Paradox 8.0 (20 percent), and Picture Publisher 7.0 (20 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing). [1]Under Windows 98 with 128MB of RAM; also includes systems tested in this and previous months that do not currently rank among the Top 20.

in part by its 1MB of level 3 cache. And its price of $1599 is about average among PII-450 systems.

This generic small-business computer may be called the MicroFlex-34A, but the wide and sturdy machine's nifty design—a light-gray front panel that overlays a dark-gray corrugated surface—has absolutely no flex. The system also boasts a whopping 18GB hard drive, the largest among all PCs in the budget chart.

Though it includes features that a small or home business would appreciate—a V.90 modem, a 19-inch monitor, and an AGP graphics card, for instance—not all of the components qualify as the latest and greatest. The video card, a Diamond Monster Fusion AGP board, will do a fine job for most business work, but you can find better boards for running 3D applications. The MicroFlex-34A's 14X–32X CD-ROM drive works well for the office, but most comparable Pentium II-450 machines come with a DVD-ROM drive. But consider it a trade-off for the quick processor—by forgoing extras like DVD, Micro Express keeps its price low.

MicroFlex-34A

If you have a screwdriver handy, the MicroFlex-34A's case opens easily: Removing one small screw lifts off the case. Beneath it, you'll find a handy illustration showing how to pull off the side of the chassis. Inside, everything is spit-and-polish tidy: Cables are neatly tied off and leave plenty of room to access the four free card slots, two free DIMM sockets, and four free drive bays.

The MicroFlex-34A comes with an array of component manuals but no overall system guide. If you run into trouble with your machine, you can call technical support on a toll-free line around the clock. The company also provides a four-year warranty on parts and labor and offers free on-site service for one year. Micro Express's support techs responded accurately but often tersely to questions in our anonymous calls.

Premio Shadowhawk 400C

New This Month

The following systems made our Budget Desktops chart for the first time this month. For brief reviews of all previously tested machines on the chart, visit PC World Online (www.pcworld.com/top400).

17 PREMIO SHADOWHAWK 400C

PRO: Speedy performance, good expandability

CON: Price could be a bit more competitive, case somewhat tricky to close, lean support hours

If your home decor tends to Gen-X style—black walls, black refrigerator, black shower curtains—Premio's sleek-looking Shadowhawk 400C will fit right in. Destined for the ebony-veneer desks of trendy home and small-office users, this $1599 machine offers excellent performance. It turned in a PC WorldBench 98 score of 196, making it the second-fastest Celeron-400 we've tested.

If you could care less about color coordination, the Shadowhawk 400C fades to only a moderately good value. Its price is the highest of the four Celeron-400 systems on the budget chart, and its feature set doesn't exceed the staples for a small business: a 14X–40X CD-ROM drive, a 17-inch monitor, and the standard business software suite—Microsoft Office Small Business Edition.

Inside, the system offers copious expandability, with two internal and three externally accessible free bays, as well as four open slots. Closing the case up requires a bit more effort than it should—you must carefully align the side panel with several points on the chassis before it will slide back on.

Premio delivers a mixed bag of service and support. In our anonymous support calls, the company's reps offered good advice in a timely manner—sometimes in less than a minute. And Premio backs its systems with a three-year parts, three-year labor warranty—competitive with what other vendors offer. We would like to see longer support hours, though. Premio's 10 hours per day, Monday through Friday, won't suffice for always-on-call small-business workers.

20 COMPAQ PROSIGNIA DESKTOP 310

PRO: Fast, easy-open case, Zip drive

CON: Limited expansion capabilities, lackluster reliability and service scores

Compaq's Prosignia Desktop 310 is a different machine this month, with a Celeron CPU upgraded from 366MHz to 433MHz and a PC WorldBench 98 score of 194, higher than the average Celeron-433. But it carries an unremarkable price tag of $1450 and merely satisfactory features. Compaq receives just fair grades for the quality of its reliability and support.

Prosignia Desktop 310

The Prosignia's high points are a solid business software bundle (including Office 97 Small Business Edition), a Zip drive for backups, and an easy-open case.

Unfortunately, easy access to the unit's expansion bays doesn't translate into extensive upgrade opportunities—a single internal drive bay is available, along with three open expansion slots.

Compaq's support policies are typical for the industry: a three-year parts and one-year labor warranty, plus free on-site labor for one year. But in *PC World*'s most recent Reliability and Service poll, our readers rated Compaq as just fair in both categories. Service, however, may be on the upswing if our recent experience with making anonymous calls is any indication. Compaq's technical support reps responded courteously and fairly quickly, and they gave us consistently correct answers to our questions.

BEYOND THE TOP 20

online

We evaluated the following systems along with the others, but they didn't score high enough to reach the *Top 20 Budget Desktops* chart. For write-ups, visit PC World Online (www.pcworld.com/t20pcs).

- **Acer AcerPower 6000-C333A**
- **Acma EXP 6433**
- **LLS Celeron 400**
- **Polywell Poly C433b**
- **Sys Technology TaskMaster ZP-400c**
- **Tiger Direct K6-3-400**

PC WORLD

TOP 10 NOTEBOOK PCs

	POWER NOTEBOOK	Last month	Month tested	Street price (4/16/99)	CPU	Comments
1	Dell Latitude CPi A366XT 800/388-8542 www.dell.com	1	May 99	$3098	Pentium II-366	$100 off thin corporate laptop from vendor with great reliability; no modem.
2	Gateway Solo 5150LS 800/315-2536 www.gateway.com	2	Apr 99	$3159	Pentium II-366	Desktop replacement sports a big 14.1-inch screen and a DVD-ROM drive.
3	Dell Inspiron 7000 A366LT 800/388-8542 www.dell.com	3	Apr 99	$3295	Pentium II-366	$234 price cut on very heavy notebook with 15-inch screen and DVD-ROM drive.
4	Gateway Solo 9150LS 800/315-2536 www.gateway.com	n/a	NEW	$3574	Pentium II-366	Comparable to number-three Dell Inspiron, but a tad lighter and more expensive.
5	IBM ThinkPad 560Z 80U 800/426-2968 www.ibm.com	4	Feb 99	$2899	Pentium II-300	Light notebook for travel offers good battery life; no CD-ROM drive included.
	BUDGET NOTEBOOK					
1	Dell Inspiron 3500 C300XT 800/388-8542 www.dell.com	1	Apr 99	$2029	Celeron-300	$70 off only notebook on budget chart that accepts two batteries at once; speedy.
2	Gateway Solo 2500SE 800/315-2536 www.gateway.com	2	June 99	$2144	Pentium II-300PE	Fantastic battery life sets this zippy portable apart from the rest.
3	HP OmniBook XE2 800/752-0900 www.hp.com	n/a	NEW	$1899	Celeron-333	The first Celeron-333 notebook we've tested is the fastest on budget chart.
4	AMS Tech Roadster 15CTA 800/886-2671 www.amstech.com	4	Jan 99	$1295	AMD K6-2-300	Least expensive notebook here is a fine choice for most basic tasks.
5	Compaq Armada 1500c 800/345-1518 www.compaq.com	n/a	NEW	$1799	Celeron-300	A not-too-fancy desktop replacement unit with top-notch audio.

Best Buy See features chart, page 214.

n/a = not applicable

[1]Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.

[2]For more about products here, select the number on the product information card or visit www.pcworld.com/productinfo.

BUYING A NOTEBOOK from a vendor's Web site can be nerve-racking. Sure, you have the advantage of being able to configure the notebook almost any way you want it, but you must fork over thousands of dollars for a product you can't see or touch first. At least one direct-sales company, however, now lets you kick the tires before deciding. The Gateway Country stores (go to www.gateway.com for locations) let customers try out display models before placing a custom order. In another new twist, superstores such as Circuit City have kiosks where shoppers can select a custom configuration. You pay at the counter and receive your customized brand-name system in less than a week.

CompUSA offers this benefit as well, but only for notebooks that are made by its CompUSA PC division. (The company's AmeriNote AN366L-SE, which we reviewed this month, came close to making our chart.) Eventually, says Rob Howe, vice president and general manager of CompUSA PC, the CompUSA stores may also allow shoppers to custom-configure competing brands.

This Month's Best Buys

POWER NOTEBOOKS

1 DELL LATITUDE CPI A366XT

PRO: Relatively thin and light, speedy performance, top-notch reliability and support

CON: Shorter-than-average battery life, no internal modem, few multimedia extras

This 7-pound corporate notebook combines a thin, stylish case with Pentium II-366 performance and good support policies to claim our power Best Buy for the third month in a row.

A PC WorldBench 98 score of 184 places the $3098 A366XT, now $100 cheaper, among the fastest notebooks we've tested. It's also versatile, accommodating a range of thin devices in its modular bay. In lieu of the included 10X–24X CD-ROM drive, a floppy drive, or a weight-saving empty module, the bay can hold a second battery ($169), a second hard drive up to 6.4GB ($499), or an LS-120 removable media drive ($199). All of these devices, as well as the optional docking stations ($349 and $649), can be shared across the Latitude CPi notebook line, according to Dell.

The Dell Latitude CPi has a thin, 1.6-inch profile.

With a nicely designed dark-gray case and stylized touchpad and mouse buttons, the A366XT exudes understated business chic. A wrist rest slightly thicker than the notebook keeps hands floating comfort-

SCORECARD

★ Overall rating	PC WorldBench 98 score/performance	Price	Vendor's system reliability	Features and design	Vendor's support quality/policies	Battery life (hours:min)/rating	Traveling weight [1]	Product info number [2]
87	184/very good	average	outstanding	good	good/good	2:15/satisfactory	light	–
86	186/very good	average	good	very good	good/good	2:50/good	average	692
85	191/outstanding	expensive	outstanding	very good	good/fair	3:24/good	unacceptable	–
84	188/very good	very expensive	good	very good	good/good	3:17/good	very heavy	693
84	159/good	average	good	good	good/fair	3:10/good	light	–
Power scorecard weightings ▶	Performance 22 percent	Price 14 percent	Reliability 22 percent	Features 16 percent	Support 10 percent	Battery life 8 percent	Weight 8 percent	
89	160/outstanding	average	outstanding	very good	good/good	2:45/satisfactory	average	–
88	165/outstanding	expensive	good	very good	good/good	5:08/outstanding	average	694
85	166/outstanding	average	good	very good	good [3]/poor	2:36/satisfactory	average	695
82	122/satisfactory	very inexpensive	[4]	good	good [3]/fair	2:35/satisfactory	average	696
81	150/very good	average	fair	good	fair/fair	2:16/satisfactory	average	697
Budget scorecard weightings ▶	Performance 14 percent	Price 22 percent	Reliability 22 percent	Features 16 percent	Support 10 percent	Battery life 8 percent	Weight 8 percent	All products: 904

[3] Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.

[4] Insufficient data to give a rating.

ably over the well-arranged keyboard. The A366XT's battery, CD-ROM drive, and floppy drive slide out easily. You can access the RAM module without fuss from the bottom of the unit, but you'll need to use a screwdriver to remove the 6.4GB hard drive. If you often work with spreadsheets while on the road, you can squeeze a little more viewable area out of the A366XT's 13.3-inch screen by setting the resolution to 1280 by 1024 and enabling the pan mode.

Intended strictly for corporate buyers, the A366XT lacks some multimedia extras that high-end notebooks now routinely provide, such as advanced video options. Dell does offer a DVD-ROM drive add-on for the Latitude CPi line.

One option you may definitely need is a second battery, since this model has a barely satisfactory battery life of 2 hours and 15 minutes.

Dell's support policies for its Latitude line, one of the industry's best, include 24-hour toll-free support lines, a three-year parts and labor warranty, and three years of free on-site service. The only shortcoming: Dell includes printed documentation on buyer request only.

According to our latest reader survey, this vendor makes the most reliable notebooks in the industry. Lately, the quality of the company's technical support has picked up, too. In our last round of anonymous calls, we got through to technicians much more quickly than usual and received good advice.

PHOTOGRAPHS: KEN SMITH

BUDGET NOTEBOOKS

1 DELL INSPIRON 3500 C300XT

PRO: Fast; modular bay accepts range of devices; AGP graphics bus for peppy presentations

CON: Awkwardly placed AC adapter jack

Dell's Inspiron 3500 C300XT proves that high-quality business notebooks don't have to cost upward of three grand.

Our budget Best Buy for the second month in a row, the C300XT barely beats out its neck-and-neck competitor, the Gateway Solo 2500SE, by offering lighter weight, a bigger screen, and a better reliability score. The two models performed similarly in our WorldBench tests, with the Solo enjoying a slight edge due to its larger onboard secondary cache.

Inspiron 3500 C300XT

Compared with its larger sibling on the power chart—the 10.4-pound, $3295 Inspiron 7000 A366LT—the C300XT makes a better choice for the average business traveler or budget buyer. And although the larger Inspiron has a longer battery life, the C300XT lasted for a tolerable 2 hours and 45 minutes in our tests.

Also, the C300XT's modular bay accepts the same type of devices as the 7000 A366LT does, including the bundled floppy drive and CD-ROM drive. Among the several available add-ons are a second battery ($119), a DVD-ROM drive ($229), and an Iomega Zip drive ($139).

The C3000XT is well designed, ▶

TOP 10 NOTEBOOK PCs

STANDARD FEATURES

	POWER NOTEBOOK	CPU	Traveling weight (pounds)[1]	RAM (MB)	Hard drive (GB)	Color screen type	Screen diagonal (inches)	Screen resolution	Maximum screen colors	Battery type	Pointing device
1	Dell Latitude CPi A366XT*	Pentium II-366	7	64	6.4	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
2	Gateway Solo 5150LS	Pentium II-366	7.7	64	6.4	active	14.1	1024 x 768	16.8 million	lithium ion	touchpad
3	Dell Inspiron 7000 A366LT	Pentium II-366	10.4	64	10	active	15	1024 x 768	16.8 million	lithium ion	touchpad
4	Gateway Solo 9150LS	Pentium II-366	9.8	128	10	active	15	1024 x 768	16.8 million	lithium ion	touchpad
5	IBM ThinkPad 560Z BOU	Pentium II-300	5.8	64	6.4	active	12.1	800 x 600	16.8 million	lithium ion	eraserhead
	BUDGET NOTEBOOK										
1	Dell Inspiron 3500 C300XT*	Celeron-300	7.3	64	4.3	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
2	Gateway Solo 2500SE	Pentium II-300PE	8	64	4	active	12.1	800 x 600	262,144	lithium ion	touchpad
3	HP OmniBook XE2	Celeron-333	7.5	64	4	active	12.1	800 x 600	16.8 million	lithium ion	touchpad
4	AMS Tech Roadster 15CTA	AMD K6-2-300	7.9	32	2.1	active	12.1	800 x 600	16.8 million	NiMH	touchpad
5	Compaq Armada 1500c	Celeron-300	7.8	32	4	active	12.1	800 x 600	16.8 million	NiMH	touchpad

*Best Buy ● Yes ○ No [1]Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.

overall. However, the placement of the AC adapter connection, with all the audio jacks on the right side instead of separately in the back, struck us as awkward. The notebook boasts a comfortable keyboard and a mouse with programmable buttons. Dell's beautifully designed manuals and generous support policies, including around-the-clock toll-free phone lines and a three-year parts and labor warranty, complete the package.

Beware the small mouse buttons on this Gateway.

New This Month

POWER NOTEBOOKS

4 GATEWAY SOLO 9150LS

PRO: Speedy; good battery life; good audio comes with Dolby sound option; two USB ports; bundled business applications

CON: Very heavy, very expensive

Weighing nearly 10 pounds and equipped with an enormous 15-inch screen, the Gateway Solo 9150LS could be mistaken for a small desktop PC. The same could be said for the Dell Inspiron 7000 A366LT (also on the power chart) and an increasing number of new notebooks whose motto seems to be "Live Large or Die."

At $3574 the 9150LS is the priciest notebook here, but you get cutting-edge features, including an LS-120 drive, a DVD-ROM drive, a 10GB hard drive, and a throng of multimedia jacks.

A built-in combination MIDI and joystick port caters to gamers and musicians. And the notebook provides not only a TV-out jack, but also a port to bring video into the system for editing. The audio produced by the laptop's built-in stereo speakers sounds fine, better than that generated by the Inspiron 7000. DVD movies looked just as good on the 9150LS as on other Pentium II-366 notebooks we've tested, with smooth action and mostly high-quality images. The 9150LS thus makes a fine choice for those who need a desktop replacement that can double as an entertainment or image-editing center.

Overall, the Solo 9150LS boasts a nice case design. The well-laid-out keyboard feels good, if a bit springy. If you prefer mouse buttons to a touchpad, however, you might find the pint-size set on this notebook too small for comfort. One other minor complaint: All the audio and video jacks are crammed onto the back of the case over the parallel and serial connections, instead of in more convenient locations like the front or the side.

Removing the hard drive for safekeeping doesn't require tools, only some finagling: You have to first pop out the stacked LS-120 and DVD-ROM drives from the modular bay, then open a flap door on the front. The bay also accommodates a second battery ($150).

BUDGET NOTEBOOKS

3 HP OMNIBOOK XE2

PRO: Affordable, doubles as an audio CD player

CON: Small screen, limited free technical support, shorter-than-average battery life

If you get more work done when listening to Mozart, the thin, reasonably priced OmniBook XE2—based on Intel's new mobile Celeron-333 chip—may improve your productivity. Buttons on the front let you play audio CDs and control the volume without turning on the notebook or raising the screen. And the audio on our test unit sounded pleasingly full-bodied.

For the business-minded, the OmniBook XE2 offers impressive performance for the price, and its compact package houses a fairly nice configuration. The model includes built-in, fixed CD-ROM

		EXPANDABILITY					CUSTOMER SUPPORT			
CD/DVD-ROM drive speed	56-kbps modem protocol	Maximum RAM (MB)	Modular expansion bays	Bay for second battery	Optional docking station	Infrared port	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
10X-24X	not included	256	1	●	●	●	3/3	24	Sat, Sun	AOL, BBS, CIS, WWW
2X DVD-ROM	V.90	288	1	○	●	●	3/3	24	Sat, Sun	AOL, BBS, CIS, WWW
2X DVD-ROM	V.90	192	2	●	●	●	3/3	24	Sat, Sun	BBS, WWW
2X DVD-ROM	V.90	384	1	●	●	●	3/3	24	Sat, Sun	AOL, BBS, CIS, WWW
not included	V.90	128	0	○	○	●	1/1	24	Sat, Sun	AOL, BBS, WWW
10X-24X	V.90	256	1	●	●	●	3/3	24	Sat, Sun	BBS, WWW
8X-20X	V.90	288	0	○	●	●	3/3	24	Sat, Sun	AOL, BBS, CIS, WWW
12X-24X	V.90	256	0	○	●	●	1/1	24	Sat, Sun	AOL, BBS, CIS
10X-24X	V.90	96	0	○	○	●	3 [2]/3	11 [3]	none	BBS, CIS, WWW
12X-24X	V.90	160	1	●	●	○	1/1	24	Sat, Sun	AOL, BBS, CIS, WWW

[2] One year on screen and battery.

[3] Toll-free support ends after three years.

and floppy drives, yet it weighs only 7.5 pounds and measures just 1.4 inches high. The trade-off: a budget-size 12.1-inch screen, which looks fine but tops out at a resolution of 800 by 600 pixels.

Extra wide key tops make typing on the XE2 especially easy, though the action feels a little too springy. The big mouse buttons prove comfortable, and the included Synaptics utility lets you reprogram them to launch applications. The easy-to-access hard drive can be locked in place with an optional security screw.

The XE2 performs about 7 percent faster than last month's third-place budget notebook, the now-discontinued, virtually identical OmniBook XE based on the Pentium II-266PE chip. Unfortunately, battery life takes a hit in the Celeron-333 version—the XE2's battery lasted just over 2.5 hours, or about half an hour less than its predecessor.

HP's OmniBook XE2 has audio control buttons.

HP's score for notebook reliability rose from fair to good in our latest reader survey. But support policies could be better. Most notebook vendors offer unlimited free technical support, but HP cuts the umbilical cord after three years—a drawback for those who hang on to their notebooks for more than a couple of years. The quality of support slipped a little this month, too. In our latest round of anonymous calls, technicians gave several incorrect answers and didn't seem as eager to help as usual.

5 COMPAQ ARMADA 1500C

PRO: Excellent audio, four programmable buttons, decent performance

CON: Battery life barely makes the grade, removing hard drive is difficult

If you're in the market for a sub-$2000 notebook with the best built-in audio available—or just hate manually opening the same programs every day—take a close look at the $1799 Armada 1500c, a budget member of Compaq's desktop replacement line of portables.

Like the higher-end Armada 1750 and Prosignia 140 and 160 notebooks, the 1500c boasts Compaq's superior stereo sound. Another plus: The CD-ROM drive is fixed, but you can swap the floppy drive for a second lithium-ion battery ($186) or a second hard drive ($1260 for 6.4GB).

Some components you might want to upgrade are unusually hard to reach. Both the hard drive and RAM modules sit under the keyboard, which won't lift open until you remove the floppy drive, the battery, and three screws on the bottom.

As shortcuts or for several users, you can launch different sets of apps by programming four buttons at the top of the keyboard with an infinite number of named schemes, Compaq says.

Compaq Armada 1500c

We get consistently good help from Compaq's around-the-clock toll-free service in our anonymous calls. But in our survey, Compaq users complain more about problems with notebook reliability than do users of most other brands.

—Carla Thornton

Contributing editor Carla Thornton writes regularly about notebooks. ■

BEYOND THE TOP 10

online

We tested three other portables this month, but they didn't score high enough to make the *Top 10 Notebook PCs* chart. For reviews, visit PC World Online (www.pcworld.com/top400).

- **CompUSA PC AmeriNote AN366L-SE**
- **IBM ThinkPad 600E PII-366**
- **TwinHead Slimnote GX**

PC WORLD

TOP 10 HOME PCs

	POWER SYSTEM	Last month	Month tested	Street price (4/16/99)	Comments
1	Dell Dimension XPS T500 800/388-8542 www.dell.com	1	Apr 99	$2049	PRO: Fastest home system to date, Zip drive, only vendor to earn outstanding support rating for its home machines. CON: Limited software package.
2	Gateway Performance 500 800/315-2536 www.gateway.com	2	Apr 99	$2357	PRO: Very fast, outstanding sound system, 19-inch monitor, $142 less than last month. CON: Pricier than the Dell, mediocre software package.
3	Compaq Presario 5600i-500 800/345-1518 www.compaq.com	3	May 99	$2358	PRO: Excellent performance, $312 price drop, built-in home networking and DSL capabilities, easy access to USB and IEEE 1394 ports, Zip drive. CON: Bordering on expensive.
4	Sony VAIO PCV-E518DS 888/476-6972 www.sony.com/pc	4	May 99	$3498	PRO: Software and hardware extras for digital imaging and multimedia, $200 mail-in rebate. CON: Most expensive system on chart, mediocre-sounding built-in speakers, poor upgradability.
5	HP Pavilion 8490 800/724-6631 www.hp-at-home.com	n/a	(NEW)	$2948	PRO: Tons of hard disk storage, HP CD-Writer Plus 8100, DVD-ROM drive, practical keyboard, mic built into monitor. CON: Very pricey, lacking in graphics capability, spartan software package.
	BUDGET SYSTEM				
1	Dell Dimension V400c 800/388-8542 www.dell.com	1	May 99	$1309	PRO: Impressive performance, top support rating. CON: Slightly pricey for a budget PC, limited expandability, skimpy software package.
2	Quantex M333c 800/896-4898 www.quantex.com	2	Feb 99	$899	PRO: Very low price (recently cut by $50), good performance. CON: Connectors not clearly labeled for setup, aging Celeron machine.
3	Gateway Essential 400c 800/315-2536 www.gateway.com	4	June 99	$1532	PRO: Great speed, high-quality monitor, easily expandable, recent $55 price drop, comes with Epson color printer. CON: Middling rating for vendor system reliability.
4	Micron Millennia C433 888/634-8799 www.micronpc.com	3	June 99	$1575	PRO: Fastest budget machine yet, excellent 3D performance, price includes subwoofer. CON: Most expensive budget unit here.
5	IBM Aptiva E Series 240 800/426-7235 ext. 4340 www.pc.ibm.com	5	June 99	$1198	PRO: Great price includes microphone headset, faster than most other systems with the same processor. CON: Limited expandability, mediocre support rating.

Best Buy n/a = not applicable

[1] For more about products here, select the number on the product information card or visit www.pcworld.com/productinfo.

IT TAKES A LOT more than marketing hype and an obscenely low price to elbow past the offerings of time-tested computer makers like Dell and Gateway. This month we finally get our hands on a couple of those dirt-cheap machines from Microworkz that you've probably heard so much about lately. But guess what? The chart barely registers a tremor—and the only new computer to debut on our Top 10 is a power system that comes from good ol' Hewlett-Packard.

In fact, the budget list is a rerun of last month's, except that the Micron and Gateway systems have traded places (Gateway unseats Micron at number three after shedding $55). Celeron PCs dominate the mix, and Dell's Dimension V400c retains the top spot.

On the power side, Pentium III-500 systems continue to reign supreme. For the fourth month in a row, Dell's Dimension XPS T500 is number one, thanks to its terrific speed and the company's superior support rating. HP's brand-new Pavilion 8490 slips in at number five—the only system of the six new PCs we tested to crack the chart this month. And it has been a while since an HP Pavilion graced our home PC chart—the last time was way back in November 1998.

HP Pavilion 8490

HP COMEBACK

THE PAVILION 8490 is the first Pentium III home PC we've seen from Hewlett-Packard. In the recent past, HP systems missed the chart for two reasons: They tended to cost more than similarly configured machines (by mail-order competitors, for instance), and they usually performed a lot slower. Another shortcoming: The company has earned only Fair ratings for both reliability and service in our two most recent surveys. But with the Pavilion 8490, we see a slight improvement in performance and substantially more value for the money.

At first blush, the $2948 price tag seems unduly high, compared to other power PCs listed this month. But the price becomes easier to stomach when you consider the package includes a built-in HP CD-Writer Plus 8100 (in addition to a DVD-ROM drive) and a vast 19GB hard drive. The 8490 posted a PC WorldBench 98 score of 218—that's a hair faster than the fourth-place Sony VAIO (which costs $550 more), though at the low end of the PIII-500 range. Still, it offers plenty of power for demanding home-office duties.

Setup was a snap, from unpacking onward. Every item was color-coded and clearly marked. The bundled keyboard comes with complete CD controls, programmable buttons, and an easy-to-use speaker volume control knob—not a button. The Polk Audio speakers showed

SCORECARD

★ Overall rating	PC WorldBench 98 score/rating	Price	Setup/ ease of use	Graphics	Reliability/ support	Features	Product info number[1]
103	231/outstanding	inexpensive	outstanding/ very good	outstanding	good/ outstanding	Pentium III-500, 128MB of SDRAM, 12GB hard drive, 4.8X DVD-ROM drive, V.90 56-kbps modem, 17-inch monitor, Turtle Beach Montego sound card.	–
99	229/outstanding	average	outstanding/ very good	outstanding	fair/ good	Pentium III-500, 64MB of RAM, 13.6GB hard drive, 4.8X DVD-ROM drive, V.90 56-kbps modem, 19-inch monitor, Boston Acoustics BA635 speakers.	698
95	226/outstanding	average	outstanding/ very good	outstanding	fair/ fair	Pentium III-500, 128MB of SDRAM, 14.4GB hard drive, 2X DVD-ROM drive, V.90/DSL modem, 19-inch monitor, built-in ethernet, JBL speakers.	699
93	217/good	very expensive	outstanding/ good	outstanding	good/ good	Pentium III-500, 128MB of SDRAM, 17GB hard drive, Sony CD-R/RW drive, V.90 56-kbps modem, 17-inch monitor.	700
92	218/good	very expensive	outstanding/ outstanding	good	fair/ fair	Pentium III-500, 128MB of SDRAM, 19GB hard drive, 2X DVD-ROM drive, V.90 56-kbps modem, 17-inch monitor, Polk Audio speakers.	701
Power scorecard weightings ▶	Performance 20 percent	Price 10 percent	Setup/ease 5 percent	Graphics 10 percent	R & S 40 percent	Features 15 percent	
93	190/outstanding	expensive	outstanding/ outstanding	good	good/ outstanding	Celeron-400, 64MB of SDRAM, 8.4GB hard drive, 4.8X DVD-ROM drive, V.90 56-kbps modem, 17-inch monitor, Harman/Kardon HK195 speakers.	–
91	169/very good	very inexpensive	good/ good	good	good/ good	Celeron-333, 64MB of SDRAM, 4GB hard drive, 12X-32X CD-ROM drive, V.90 56-kbps modem, 15-inch monitor.	702
89	193/outstanding	expensive	outstanding/ very good	good	fair/ good	Celeron-400, 64MB of SDRAM, 10GB hard drive, 4.8X DVD-ROM drive, V.90 56-kbps modem, 17-inch monitor, Boston Acoustics BA635 speakers.	703
87	206/outstanding	expensive	good/ very good	very good	good/ good	Celeron-433, 64MB of SDRAM, 13GB hard drive, 4.8X DVD-ROM drive, V.90 56-kbps modem, 17-inch monitor, Advent AV009 speakers and subwoofer.	704
87	173/very good	inexpensive	very good/ good	good	good/ fair	AMD K6-2-350, 64MB of SDRAM, 6.4GB hard drive, 14X-32X CD-ROM drive, V.90 56-kbps modem, 15-inch monitor, IBM Infinity speakers.	–
Budget scorecard weightings ▶	Performance 15 percent	Price 25 percent	Setup/ease 10 percent	Graphics 5 percent	R & S 40 percent	Features 5 percent	All products: 905

good range for a set of garden-variety computer speakers. Two PCI slots and one memory socket allow adequate expandability, though the fan cover blocks the memory socket.

The 17-inch Pavilion M70 monitor displayed crisp text but run-of-the-mill color quality. If you're a graphics guru, you'll be disappointed in the 8490's multimedia capabilities—the integrated ATI 3D Rage Pro Turbo AGP chip and 8MB of RAM posted graphics scores that trailed the average of the other PCs on this month's power list.

MICROWORKZ: BARGAIN BASEMENT

ON THE BUDGET side, we tested five new systems, but all were stymied by slow performance and other hardware drawbacks. Still, one of these machines does deserve a closer look: Microworkz's ZPC.

The ZPC's base configuration includes the Cyrix MII-300 processor, 32MB of RAM, a 2MB PCI graphics card, and a 14-inch monitor. (Note: By the time you read this, the ZPC will come with a Cyrix MII-333 CPU.) The bargain-basement price? An astounding $499. For basic tasks like home finance, word processing, Web surfing, and e-mail, the ZPC minitower will work just fine.

Microworkz ZPC

But beyond those functions, you're toast. The ZPC is slow—its PC WorldBench 98 score of 137 is more typical of a PII-233 system. And its graphics scores ranked among the lowest we've seen. The machine we tested had integrated SiS AGP graphics and 8MB of memory, tacking on $50 to the ZPC's base price.

If you want to add RAM or an upgrade card, you'll have to twist your hands uncomfortably to work around the cramped and cluttered interior design. The ZPC's Proview MF550 monitor displayed text poorly, and colors looked washed out. Furthermore, Windows 98 didn't recognize the monitor on installation and set a refresh rate that produced an annoying amount of flicker. Anyone planning to log more than an hour a day in front of the PC will want a bigger, better monitor.

Predictably, given the price, no bundled software or any detailed setup documentation comes with the machine. Also, we've received complaints from readers experiencing long shipping delays with Microworkz (see this month's *On Your Side*). If you're interested in buying from this vendor, expect to wait. —*Kirk Steers*

Oakland, California, writer Kirk Steers is a contributing editor for PC World. ■

BEYOND THE TOP 10

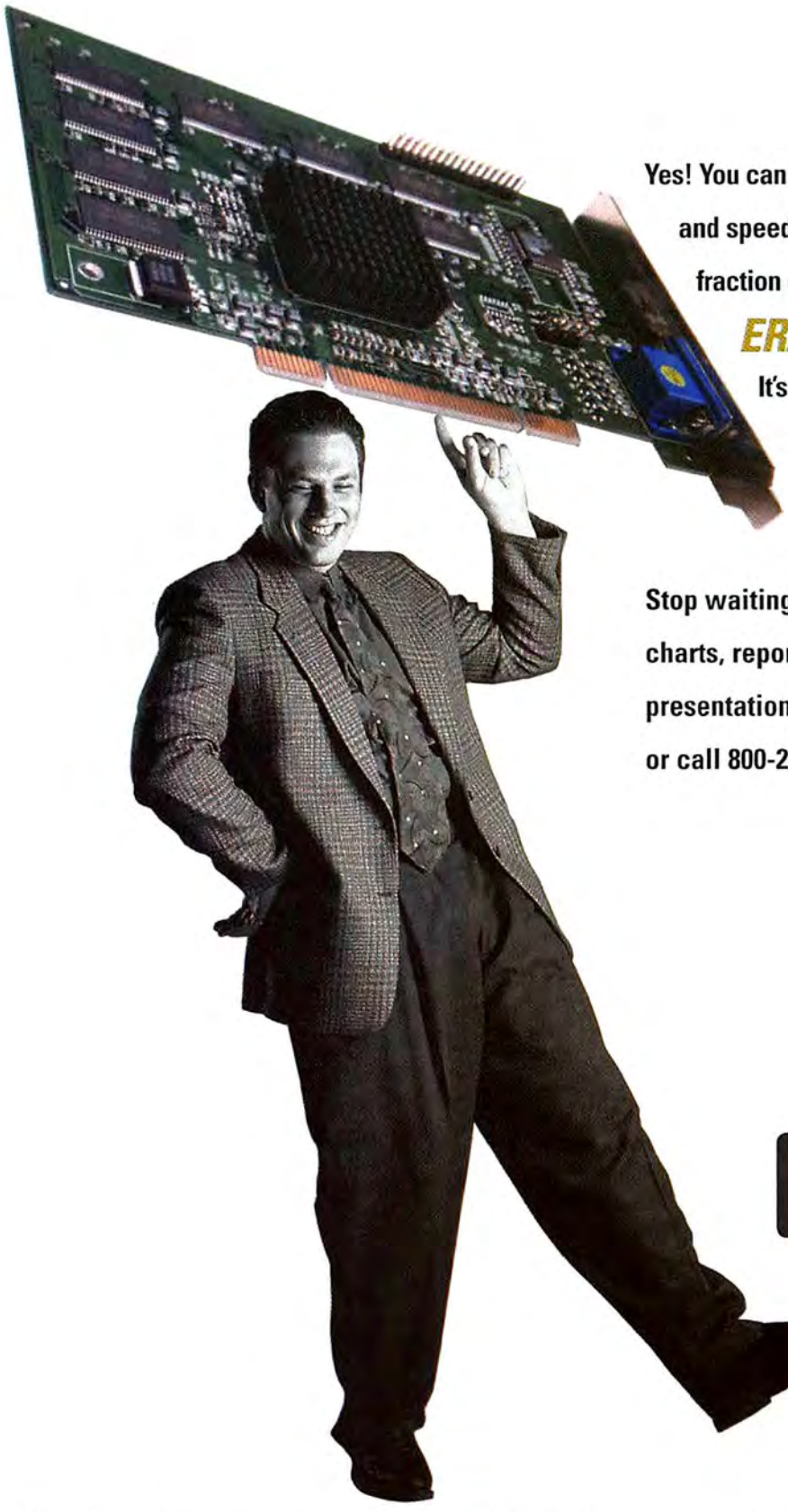
online

We also evaluated the following systems this month, but they did not score high enough to make the *Top 10 Home PCs* list. For write-ups, see PC World Online (www.pcworld.com/t10homepcs).

- **Compaq Presario 5204**
- **IDot.com 400LXA**
- **Kingdom Pinnacle 400**
- **Microworkz TheWorkz**

PHOTOGRAPHS: KEN SMITH

ABOVE ALL, ELSA.



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PC WORLD

TOP 10 MONITORS

	15-INCH MONITOR	Month tested	Street price (4/15/99)	Overall rating	Quality of text/graphics	Comments	Product info number
1	ViewSonic P655 800/888-8583 www.viewsonic.com	Nov 98	$185	81	very good/ excellent	**FEATURES:** 14-inch viewable area, .27mm dot pitch tube, up to 110-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 16-hour daily (excluding Sunday) toll-free support. **SUMMARY:** $60 price cut and expanded support hours vault this low-cost professional model past the competition. Top-notch color.	718
2	CLR VisionPro 15 800/611-1555 www.clrusa.com	Nov 98	$149	80	very good/ very good	**FEATURES:** 13.4-inch viewable area, .28mm dot pitch tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Sharp text, realistic graphics, and $10 price cut help keep this business model a Best Buy. Icons lack numeric gauges for adjustments.	719
3	Princeton EO500 800/747-6249 www.prgr.com	Nov 98	$187	79	very good/ very good	**FEATURES:** 13.6-inch viewable area, .28mm dot pitch tube, up to 110-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 9-hour weekday toll-free support[3]. **SUMMARY:** Evenly saturated colors and sharp text favor business uses, but reduced support hours and and others' price cuts drop it two notches.	720
4	Samsung SyncMaster 500b 800/933-4110 www.sosimple.com	Nov 98	$179	79	very good/ very good	**FEATURES:** 13.6-inch viewable area, .28mm dot pitch tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 24-hour toll-free support. **SUMMARY:** $20 price cut this month; model has handsome style and very good picture quality, but icons for on-screen controls are cryptic, and control buttons are hard to press.	721
5	MAG InnoVision XJ500T 800/827-3998 www.maginnovision.com	Nov 98	$189	78	good/ very good	**FEATURES:** 13.9-inch viewable area, .25mm stripe pitch Trinitron tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Competitive price, enticing graphics, and easy-to-adjust on-screen controls. Text isn't as sharp as on higher-ranking models.	722
6	KDS Avitron AV-5T 800/237-9988 www.kds.com	NEW	$199	78	very good/ very good	**FEATURES:** 13.9-inch viewable area, .25mm stripe pitch Trinitron tube, up to 112-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 11-hour weekday toll-free support. **SUMMARY:** Sharp colors and high refresh rate move this model onto the chart; longer tech support hours would increase its value.	723
7	Panasonic PanaSync Pro 50 800/742-8086 www.panasonic.com/alive	Mar 99	$199	78	good/ very good	**FEATURES:** 14-inch viewable area, .27mm dot pitch tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 24-hour toll free support. **SUMMARY:** Crisply rendered graphics and large viewable area compensate for lackluster text and control buttons that are hard to press.	724
8	AcerView 56c 800/379-2237 www.acerperipherals.com	Nov 98	$189	78	very good/ very good	**FEATURES:** 13.8-inch viewable area, .28mm dot pitch tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** $20 price drop brings cost into average range. On-screen menu icons are hard to decipher; you must press Save before settings take effect.	725
9	Sampo AlphaScan 511 877/467-2676 www.sampotech.com	Mar 99	$159	77	very good/ good	**FEATURES:** 13.9-inch viewable area, .28mm dot pitch tube, up to 75-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 10-hour weekday toll-free support. **SUMMARY:** Modest price ($10 less this month) and clear, focused text compensate for somewhat weak graphics, short tech support hours, and low refresh rate.	726
10	MaxTech XT-5862 800/936-7629 www.maxtech.com	Nov 98	$139	77	good/ very good	**FEATURES:** 13.9-inch viewable area, .28mm dot pitch tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 8-hour weekday toll-free support. **SUMMARY:** Cheapest monitor here suffers from fuzzy text, short support hours, and poorly defined on-screen controls. A good deal if price is top priority.	727

Best Buy — For reviews of products that didn't make the chart, visit www.pcworld.com/t10monitors. All products: 906

TEST PC WORLD CENTER **HOW WE TEST** Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on price (30 percent), features and ease of use (25 percent), text and graphics quality (20 percent each), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

[1] Highest refresh rate at 1024 by 768 resolution. [2] Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play.
[3] Automated after 5 p.m. PST and on weekends.

BROTHER, CAN YOU SPARE $180? That's about what you'll pay for a 15-inch monitor with very good image quality—about half last year's price. Only one new model makes the chart—KDS's Avitron AV-5T at number six. Princeton's EO500 drops to third, while ViewSonic's P655 nabs a Best Buy, thanks to a deep price cut and extended support hours. Models from ADI, Compaq, Mitsubishi, NEC, and Panasonic fail to enter the chart. ■

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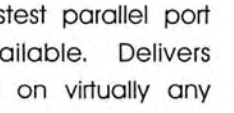

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PC WORLD

TOP 10 GRAPHICS BOARDS

	PCI BOARD	Month tested	Street price (5/1/99)	Overall rating	Mixed-media business rating	3D rating	Features rating	Comments	Product info number
1	Creative Labs 3D Blaster Banshee 800/998-1000 www.soundblaster.com	Mar 99	$100	93	good	excellent	good	**FEATURES:** 16MB of SDRAM, 250-MHz RAMDAC, 3dfx Voodoo Banshee chip, no bundled applications. **SUMMARY:** A fine upgrade for business users and avid gamers alike. Speedy and includes a utility for color-calibrating your PC, monitor, and printer.	728
2	Matrox Millennium G200 SD PCI 800/361-1408 www.matrox.com/mga	Feb 99	$119	87	good	good	good	**FEATURES:** 8MB of SGRAM, 250-MHz RAMDAC, MGA-G200 chip, bundled 3D modeling tool, image editing application, and 3D game. **SUMMARY:** A good buy thanks to high-level performance and such extras as 3D modeling and photo editing tools.	729
3	Elsa Erazor II 800/272-3572 www.elsa.com	Jun 99	$110	87	good	good	good	**FEATURES:** 16MB of SGRAM, 250-MHz RAMDAC, NVidia RIVA TNT chip, no included software. **SUMMARY:** This board performs well in 3D tasks and comes with toll-free support, but it lacks bundled games and applications.	730
4	Creative Labs Graphics Blaster RIVA TNT 800/998-1000 www.soundblaster.com	Apr 99	$100	86	good	average	good	**FEATURES:** 16MB of SDRAM, 250-MHz RAMDAC, NVidia RIVA TNT chip, no bundled applications. **SUMMARY:** Provides solid performance and includes a useful color-calibration tool. But this PCI version runs 3D apps slower than its AGP sibling.	731
5	Diamond Viper V550 800/468-5846 www.diamondmm.com	Dec 98	$130	85	good	good	good	**FEATURES:** 16MB of SDRAM; 250-MHz RAMDAC; NVidia RIVA TNT chip; bundled 3D games, graphics plug-ins, and tools for VRML authoring and photo editing. **SUMMARY:** Strong performer with good software bundle is still pricey after $70 reduction.	732
	AGP BOARD								
1	Creative Labs Graphics Blaster RIVA TNT 800/998-1000 www.soundblaster.com	Feb 99	$100	92	good	excellent	good	**FEATURES:** 16MB of SDRAM, 250-MHz RAMDAC, NVidia RIVA TNT chip, no bundled software. **SUMMARY:** Good 3D quality and fast performance make it a nice choice for business and home users. Includes top-notch color-calibration utility.	733
2	Matrox Millennium G200 800/361-1408 www.matrox.com/mga	Oct 98	$129	91	excellent	good	excellent	**FEATURES:** 8MB of SGRAM, 250-MHz RAMDAC, MGA-G200 chip, bundled 3D modeling tool and image editing application. **SUMMARY:** Great option for business users thanks to its terrific speed in PowerPoint and AVI video playback.	734
3	Hercules Terminator Beast Supercharged 800/532-0600 www.hercules.com	Jun 99	$89	91	good	excellent	good	**FEATURES:** 8MB of SGRAM, 250-MHz RAMDAC, S3 Savage3D chip, no bundled software. **SUMMARY:** The least-expensive board on the chart provides fine speed and lustrous 3D images, but is backed by skimpy support policies.	735
4	3dfx Voodoo3 3000 888/234-4334 www.3dfx.com	NEW	$180	91	excellent	good	excellent	**FEATURES:** 16MB of SDRAM, 350-MHz RAMDAC, 3dfx Voodoo3 chip, bundled 3D games. **SUMMARY:** Swift performance and handy features (such as connections for viewing games on a TV and capturing video from a VCR) help outweigh high price.	736
5	Elsa Erazor II 800/272-3572 www.elsa.com	Mar 99	$99	88	good	good	good	**FEATURES:** 8MB of SGRAM, 250-MHz RAMDAC, NVidia RIVA TNT chip, no bundled software. **SUMMARY:** This model costs $30 less than its 16MB AGP sibling and performs just as well. Unfortunately, it lacks extras like bundled games.	737

Best Buy online For reviews of products that didn't make the chart, visit www.pcworld.com/t10graphics. All products: 907

TEST PC WORLD CENTER **HOW WE TEST** We test boards under Windows 95. Business tests include PC WorldBench 98, a PowerPoint test, and a Macromedia Director script. Our 3D score is based on four games, each evaluated on frame rate and image quality. For AGP cards we add a texturing test using Caligari's TrueSpace3. We tested PCI boards in a Micron Millennia Mme PC with a Pentium MMX-233 and 32MB of RAM. We tested AGP boards in an NEC Direction 333 with a PII-333 and 64MB of RAM. Overall rating is based on performance (PCI 50 percent, AGP 55 percent), features (25 percent), price (PCI 15 percent, AGP 10 percent), and support policies (10 percent). For all scores, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

3DFX'S NEW VOODOO3 3000 debuts on the AGP side of this month's chart. It's the costliest board in the Top 10, but you get fast 3D performance and fabulous features such as a video-out connector for viewing games on a TV. The 3000's lower-priced sibling, the $130 Voodoo3 2000, performs well but lacks bundled software and TV features. Meanwhile, Creative Labs hangs on to the numero uno spots on both the PCI and AGP lists. ■

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PC WORLD

TOP 10 MODEMS

	INTERNAL V.90 MODEM	Month tested	Street price (5/7/99)	Overall rating	56-kbps downloads/ 33.6-kbps transfers (min:sec per MB)	Comments	Product info number
1	MaxTech XPV56P NetPacer V.90 56K Internal Voice Modem 800/936-7629 www.maxtech.com	June 99	$38	81	4:04/6:01	**FEATURES:** Supports K56flex, PCI card, Lucent chip set, V.80 videoconferencing, voice mail, speakerphone, Caller ID, SuperVoice software. **SUMMARY:** Feature-packed modem offers adequate performance and a five-year warranty at a stunningly low price. The bundled SuperVoice software could stand some improvement.	603
2	Zoom FaxModem 56K PCI Dualmode 800/631-3116 www.zoomtel.com	Jan 99	$64	79	4:16/5:40	**FEATURES:** Supports K56flex, PCI card, Rockwell chip set, MNP-10EC error control, V.80 videoconferencing, distinctive ring, voice mail, Communicate software. **SUMMARY:** Voice features and long support hours make this affordable modem a good choice for SOHO users, but its 56-kbps downloads are the slowest here.	604
3	Diamond Multimedia SupraExpress 56i Sp 800/468-5846 www.diamondmm.com	Jan 99	$80	79	3:41/5:41	**FEATURES:** Supports K56flex, 16-bit ISA card, Rockwell chip set, V.80 videoconferencing, distinctive ring, voice mail, speakerphone, Caller ID, FaxTalk Communicator software. **SUMMARY:** Excellent candidate for home offices performs well and has lots of features. Support is available 14 hours daily except on Sundays.	605
4	Viking V.90 56K ISA Modem 800/338-2361 www.vikingcomponents.com	Feb 99	$60	78	3:23/5:41	**FEATURES:** Supports K56flex, 16-bit ISA card, Rockwell chip set, voice mail, speakerphone, QuickLink III software. **SUMMARY:** A fine value thanks in part to the modem's topflight 56-kbps performance and Viking's offering of around-the-clock technical support. The supplied manual, however, is rather sparse.	606
5	Amquest Host PCI 56K Dual Mode Voice/Speakerphone 877/663-3648 www.amquestmodem.com	Feb 99	$49	78	3:35/5:39	**FEATURES:** Supports K56flex, PCI card, Rockwell chip set, MNP-10EC, V.80 videoconferencing, voice mail, speakerphone, VoiceView, ASVD, DSVD, Caller ID, Amquest @fax.com software. **SUMMARY:** Second-cheapest modem on chart performs well and comes packed with voice features, but we found it a bit difficult to install.	607
6	3Com U.S. Robotics 56K Faxmodem 800/342-5877 www.3com.com	retested this month	$120	77	3:40/5:47	**FEATURES:** Supports x2, 16-bit ISA card, USR/TI chip set, distinctive ring, second phone jack, Caller ID, RapidComm software. **SUMMARY:** When retested with updated firmware, this modem's performance remains relatively unchanged. It has peppy 56-kbps downloads and excellent documentation, but you pay a premium.	608
7	IBM V.90 PCI Data Fax Modem 800/426-2968 www.ibm.com/options	NEW	$89	77	3:53/6:10	**FEATURES:** Supports K56flex, PCI card, Lucent chip set; no bundled software. **SUMMARY:** First PCI card we've tested that uses its own controller instead of the PC's CPU. Though it's fast at 56-kbps transfers, it delivered the slowest 33.6-kbps transfers here. Backed by 24/7 support but comes with minimal features.	–
	PC CARD V.90 MODEM						
1	3Com Megahertz 56K Cellular Modem PC Card 800/638-3266 www.3com.com/mobile	Mar 99	$199	83	3:38/5:54	**FEATURES:** Supports x2, 3Com/TI chip set, direct cellular connection, voice mail, speakerphone, Caller ID, digital line voltage protection, Xjack pop-out phone jack, RapidComm software. **SUMMARY:** Costs plenty, but it's fast, comes with crystal-clear setup instructions, digital voltage protection, and a retractable phone jack.	609
2	IBM 56K PC Card Modem 800/426-2968 www.ibm.com/options	Mar 99	$160	82	4:01/6:06	**FEATURES:** Supports x2, USR/TI chip set, direct cellular connection, Caller ID, digital line voltage protection and alert, Xjack pop-out phone jack, QuickLink III software. **SUMMARY:** A little poky at 56-kbps downloads but provides both a built-in phone jack and digital voltage protection. Tech support is available around the clock.	–
3	Psion Dacom Gold Card Global 56K PC Card Modem + FAX 888/322-6601 www.psiondacom.com	NEW	$165	77	4:10/5:39	**FEATURES:** Supports K56flex, Rockwell chip set, MNP-10 error control, callback, manual volume control, direct cellular connection, EasySwitch country switching software. **SUMMARY:** Can be used abroad and with some GSM cell phones, suiting it for business travel. But its 56-kbps speed trails that of other PC Card modems here.	610

Best Buy — For reviews of products that didn't make the chart, visit www.pcworld.com/t10modems. — All products: 908

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MAXTECH PREVAILS on our internal modems list. Its XPV56P NetPacer costs just $38 and performs well at 56 kbps. At number seven, IBM's new V.90 PCI Data Fax Modem offers speedy 56-kbps downloads and comes with terrific support policies. On our PC Card list, 3Com's Megahertz 56K Cellular Modem retains its top position, while Psion Dacom's new Gold Card, featuring such extras as worldwide connectivity, debuts in third place. ■

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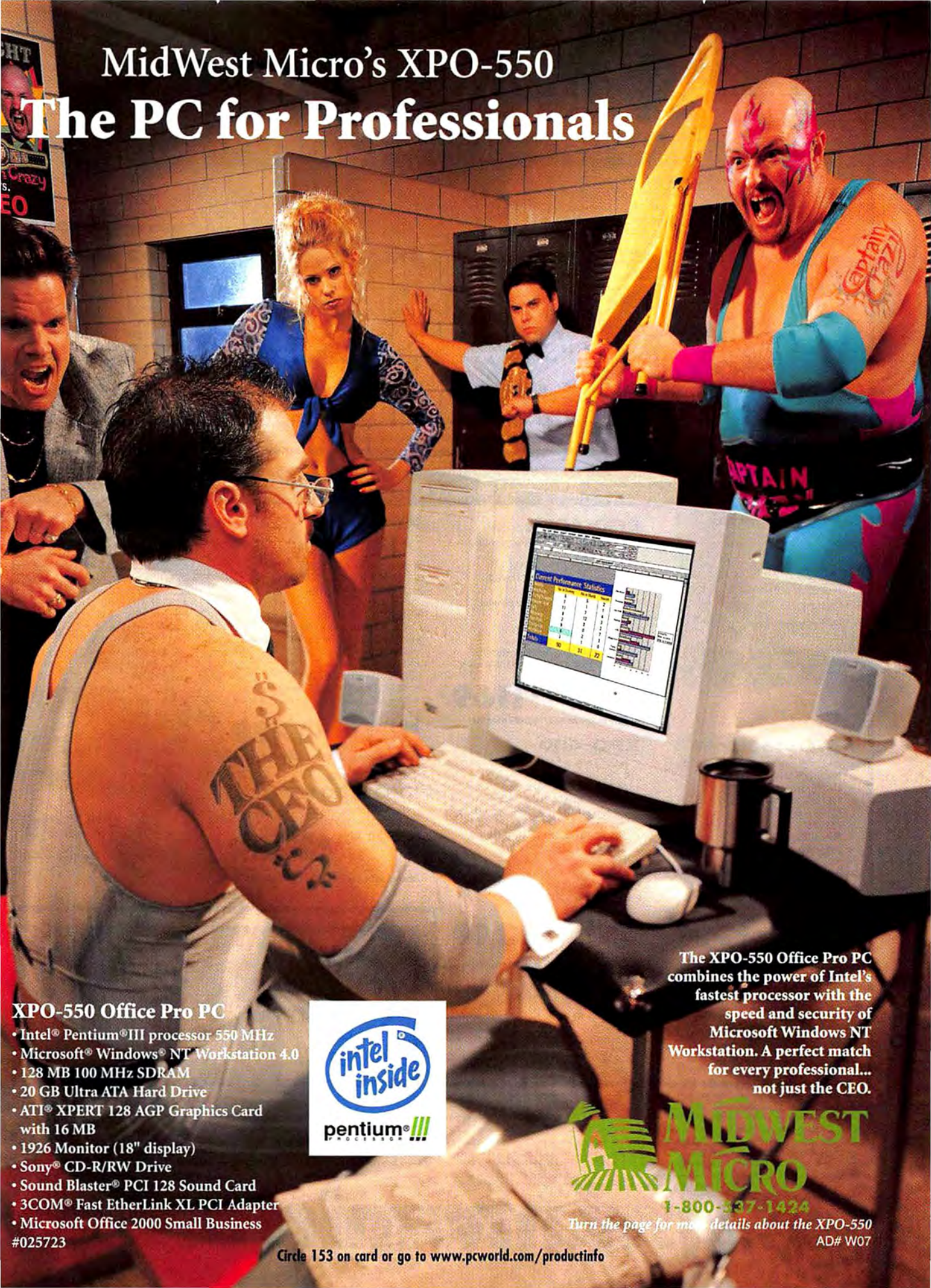
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[1]Microsoft Office Small Business Edition includes Word, Excel, Outlook, Publisher, Expedia Streets & Small Business Financial Manager.

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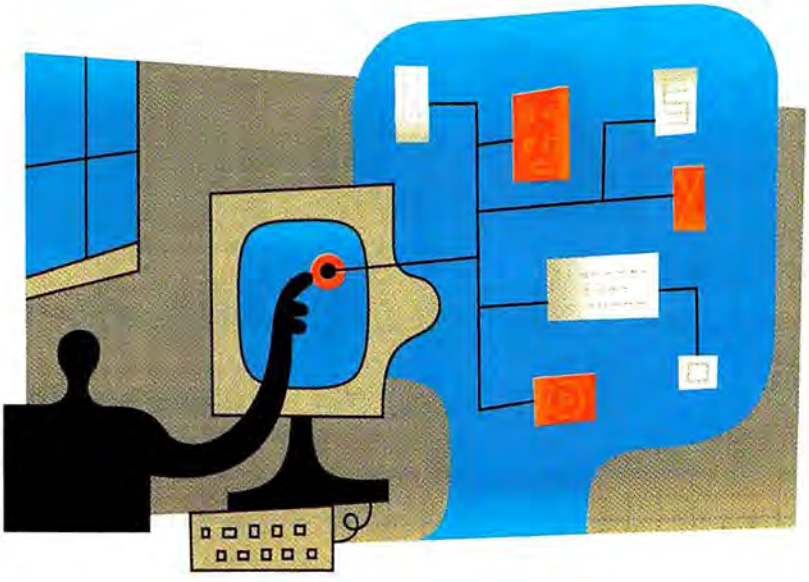

WINDOWS TIPS SCOTT DUNN

Open a Single File Type in Multiple Apps

WHEN YOU DOUBLE-CLICK a file in Explorer to open it, by default, Explorer launches the one application associated with it. But what if you want to open that file with another program? If a text file is too big, for example, Notepad won't load it, though WordPad will. Don't be bullied by Windows' single-app default. Set up Windows so that by right-clicking a file, you can open it with an alternative application.

Windows 9x. Open Explorer and choose *View•Options* (Win 95) or *View•Folder Options* (Win 98). Click the *File Types* tab and select the type of file you'd like to open in multiple programs. Click *Edit*. Under the Actions list, click *New* to open the New Action dialog box. In the box, type the command you want to appear in the context menu. If you occasionally want to open .txt files in WordPad, for instance, type something like **Edit in WordPad**.

In the box labeled 'Application used to perform action', type the full path name for the program you want to use to edit this file type (or click *Browse* and then click the app when you find it). Add quotation marks around the path name if the path contains any spaces or long names. With some applications (like WordPad), you may also need to add a space followed by **"%1"** after the path name. In the WordPad example, the application line should look something like **"c:\program files\accessories\wordpad.exe" "%1"**. Click *OK* once and *Close* twice.

From now on, whenever you need to open a file in your alternate app, you can simply right-click the file icon and choose your new command. If you want one letter in the command to be designated as a keyboard shortcut, put an ampersand in front of that letter when you type the command in the context menu. So if you type **Edit in &WordPad**, you can select a text file in Explorer, press **<Shift>-<F10>** to display the context menu, and then type **W** to launch the file in WordPad. Use a letter that isn't already underscored on the menu.

Windows 3.x. Start File Manager and select a file whose extension you occasionally want to open with an alternate app. Next, start Recorder; if you keep your everyday macros in a special file, open it. Choose *Macro•Record*. Type a name for your macro and designate a shortcut key. Make sure Playback is set to Same Application, Speed is set to Fast, and Enable Shortcut Keys is checked. Under Record Mouse, choose *Ignore Mouse*.

Click *Start*. If File Manager is not the active window, use the mouse (so this step won't be recorded) to activate it. Press **<Alt>-FR** to open the Run dialog box with the selected file listed on the command line. Press **<Home>** to move the cursor to the beginning of the Command Line box. Type the name of your application file (and the path, if necessary), followed by a space. For example, to use Write to open any selected file, type **write.exe** and a space. The Command Line box should now display your application name, a space, and

ILLUSTRATION: DOUG ROSS

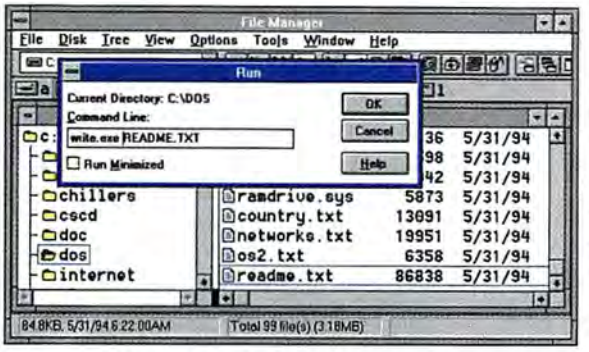

FIGURE 1: CREATE MULTIPLE ASSOCIATIONS for a single file type in Win 3.*x* by using Recorder to modify the Run box command line.

the name of the file you selected in File Manager (see **FIGURE 1**). Press **<Enter>**.

The file should open in your designated application. Click the flashing Recorder icon, or hold down **<Alt>** and press **<Tab>** until Recorder is selected. (Since selecting Recorder interrupts the macro, these keystrokes won't be recorded.) Leave Save Macro selected and click *OK*.

Finally, restore the Recorder window and choose *File•Save* to save your file. From now on, whenever you need to open a file in your alternate app, just make sure that Recorder is running with your macros file open, select the file you need in File Manager, and press the shortcut key you assigned. Voilà!

PUT PHONE DIALER TO WORK

MANY PEOPLE have dismissed Windows' Phone Dialer as practically useless. That may be because (except for eight measly speed-dial buttons) this accessory has no customizable directory for storing names, addresses, and phone numbers for multiple contacts. But with a little work, you can use its Call Log as a dialing directory or a basic address book. And you'll find that making calls from this directory requires a lot fewer clicks than trying to place calls via Microsoft Exchange, Outlook 97, or Outlook Express. The trick lies in editing the source file for Call Log, calllog.txt, located in your Windows folder.

Here's what to do: First, open the calllog.txt file. If you've never used Phone Dialer, you must make at least one call with Phone Dialer to create a calllog.txt file. Because this file is tab delimited, you needn't use a text editor that converts tabs into spaces. Notepad will do just fine.

The log always adds new calls to the top of the list, so to keep your dialing directory entries separate, you'll want them to appear at the bottom. But because everything you type into calllog.txt shows up in the opposite, top-to-bottom order in Call Log, you'll have to add your entries in reverse alphabetical order if you want them to appear alphabetically in Call Log. You can start by typing hyphens or other characters to separate your entries from the calling list; don't just add multiple carriage returns, because Call Log will ignore these.

When adding entries, you're restricted to the widths of the various Call Log columns. For instance, because the first column is so narrow, you might want to use it for title abbreviations—Ms., Dr., Lt., and so on. Then press **<Tab>** to move to the next column. The second column is the widest; when Call Log is maximized, you should have room for a name, an address, and maybe more (depending on your screen resolution). You must use the third column for the phone number if you want to use this list for dialing. You can skip the 1 for long-distance numbers; Phone Dialer adds it automatically. Fill out the remaining three entries with short items, such as dates. Be sure to press **<Tab>** to separate entries. When you're done, save the file and exit.

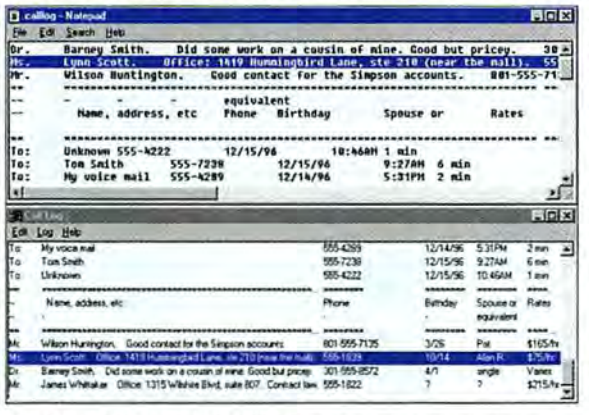

FIGURE 2: CREATE YOUR OWN dialing directory (bottom) by making a few changes to calllog.txt, Call Log's source file.

To use your dialing directory, choose *Start•Accessories•Phone Dialer* (*Start•Accessories•Communications•Phone Dialer* in Windows 98). If you don't see Call Log, choose *Tools•Show Log* (see **FIGURE 2**).

Double-click Call Log's title bar to make it as large as possible, displaying what you typed in. Press **<End>** to jump to the end of the list where you added your custom entries. To call one of your new listings, simply double-click its line. If you want the Call Log to open automatically the next time you start Phone Dialer, leave its window open when you exit Phone Dialer. ▶

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TROUNCING THE TYRANNY OF TINY TEXT

A FAMILY MEMBER is losing his sight. Because many of the Web pages he reads rely on extrasmall print, I've been copying each page to my hard drive and then using Notepad to alter the HTML by adding the "BIG" tags. Unfortunately, if a Web page's coding is extralong, Notepad can't load it. Do you know of settings (preferably ones that can be switched on and off quickly) that I can use to enlarge every Web page's text? Or can a software package do this? (I'm already using the "Windows Standard - Extra Large" cursor set.)

Name withheld by request

SEVERAL SOLUTIONS are available for those of us who find ourselves squinting harder at the screen with each passing year. Here's a quick rundown:

Try a tool. First, check out the Accessibility Settings Wizard from *Start•Programs•Accessories•Accessibility*. This wizard lets you select from numerous settings for easier-to-read displays. Another option is to choose Windows 98's Magnifier from the Accessibility menu. It lets you enlarge any portion of the screen: Set a level from 1 to 9, drag to move or resize the magnification level, and click *OK*. The Magnifier window shows a blown-up version of whatever is under your pointer. When you're done, right-click the magnified area to go back to the nonmagnified setting, or choose *Exit*.

After exiting Magnifier, you may need to rearrange any desktop icons it displaced. To avoid displacement, resize Magnifier to a floating window rather than letting it snap to a screen edge. (To do this, position the pointer inside the Magnifier window and drag to the middle of your screen.) If you're using another Windows version, you can obtain similar features and more customization from Lens, a $5 shareware utility available on FileWorld. Also, check out Microsoft's Accessibility site (www.microsoft.com/enable) and this month's "Windows Toolbox."

Resize system fonts, part 1. If your visual needs stretch beyond surfing the Web, the fastest way to make Windows (its icons, menus, address bar, and so on) more readable is to right-click the desktop, choose *Properties*, and click the *Appearance* tab. From the Scheme drop-down list, choose *Windows Standard (large)* or *Windows Standard (extra large)*. Adjust the other color and font settings as desired, and choose *Save As* to save the scheme to a custom name. Naming the scheme enables you to apply those settings quickly in the future. Click *OK*. This technique won't help you read most Web pages, but it's significant in the big picture.

Resize system fonts, part 2. To enlarge system fonts—such as those used by most Web pages—open the Desktop Properties sheet as before, and click the *Settings* tab. Look for a drop-down list labeled Font Size; you may need to click the *Advanced* button, depending on your video driver and Windows version. Choose *Large Fonts* to increase the font size to 125 percent of normal. Or choose *Other* or click *Custom*, and type in a percentage. Though this should improve readability overall, it could mess up the appearance of some programs. And you'll have to follow the prompts to restart your PC each time you change these settings.

FIGURE 3: NO OPERA GLASSES are needed with the Opera browser; just choose a zoom level from the handy menu.

The resolution solution. A lower screen resolution will make *everything* (not just fonts) on your screen bigger and more legible. The easiest way to change resolutions without restarting your computer is to use the free QuickRes utility that comes with Microsoft's PowerToys. QuickRes inserts a new icon into your taskbar's "tray" area (near the clock). Right-click the icon and choose from available resolutions on the menu. The only downside is that as desktop real estate shrinks, desktop icons may smoosh together. You can get PowerToys from FileWorld. Though PowerToys and QuickRes work with most Windows 98 systems, Microsoft warns users that it designed the applets specifically to run under Windows 95 OSR2.

Online fixes. Most browsers let you change font size on the fly. In Internet Explorer 3.*x* or 4.*x*, choose a size from the *View•Fonts* menu. In IE 5, use the *View•Text Size* menu. Other browsers offer more flexibility: In Netscape Navigator 4.*x*, press **<Ctrl>-]** as many times as needed to enlarge the font to the desired size (press **<Ctrl>-[** similarly to reduce it). In Opera, pick a magnification level from 20 to 1000 percent from the pop-up list in the lower right corner (see **FIGURE 3**). In AOL 4.0, select *My AOL•Preferences*, click the *Font* button, pick a font and a size, and click *OK*.

Adjust apps. Some apps offer their own ways for zooming in. Word for Windows, for example, lets you put a zoom control on its customizable toolbar. And most applications from Adobe Systems (such as PageMaker or Photoshop) have a Navigator palette that lets you zoom in and out as well as pan around your page.

Find files in this article at www.fileworld.com/magazine. We pay $50 for published items. Scott Dunn is a contributing editor for PC World *and a principal author of* The PC Bible, 2nd Edition *(Peachpit Press, 1995).* *See page 12 for contact information.* ■

WINDOWS TOOLBOX

Big Character Builder

ARE YOU TIRED of squinting at the small characters in Windows' Character Map utility? Sure, you can click to enlarge a character in the window, but to do this you have to hold the mouse button down on each one individually. For a better (and faster) view, download ExtendedCharacterMap, a freeware replacement that enlarges all the characters, shows bold and italic formatting, and lets you type in a sample sentence. This utility works in Windows 9*x* and NT 4.0. It's available from FileWorld.

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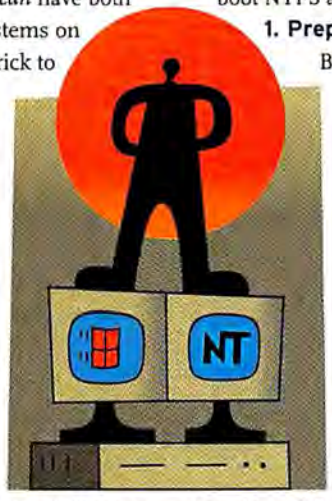
Add Windows 98 to Your NT System

THE FEBRUARY *Windows NT* column lists the pros and cons of four different dual-boot scenarios, including one in which Windows 98 is installed on a FAT32 partition and Windows NT is set up on an NTFS partition. But everything I have read says you can't dual-boot NTFS and FAT32 without a third-party boot manager.

Frank Goffena, Celina, Ohio

REST ASSURED that you *can* have both NTFS and FAT32 file systems on one PC. Ordinarily, the trick to dual-booting Windows NT and 98 is to install Windows 98 first, then NT. During installation, NT replaces Windows 98's bootstrap files with its own multiboot operating system loader, NTLDR, and creates entries for Windows 98 and NT on the multiboot menu. However, Windows NT will not boot (or install) if drive C: is a FAT32 partition. And if your system came with NT preinstalled, Windows 98's install program won't run in Windows NT.



This is where third-party boot managers can come in handy. But why pay good money for such a utility when NTLDR is a perfectly fine alternative and is free? With the aid of Windows 98's Fdisk disk-partitioning tool and the free Boot Partition 2.20 utility (available on FileWorld), you can easily install Windows 98 to a FAT32 partition, then add it to the Windows NT boot menu. Assuming that you have sufficient free drive space to create a FAT32 partition, here's how to dual-boot NTFS and FAT32:

1. Prepare a FAT32 partition. Boot the system with a Windows 98 start-up disk. Next, enter **fdisk** at the A: prompt. When Fdisk asks whether you want to enable large disk support, type **Y**. The utility will then ask you if you want to treat the existing NTFS partition as a large volume. It doesn't matter what your answer is, since we're not going to touch the NTFS partition. I typed **Y**. Next, press **1**, then **1** again to create a primary DOS partition—a logical drive in an extended partition. Answer the remaining prompts to finish creating the partition, then reboot the system with the Windows 98 start-up disk. Next, format the new partition using the command **format c:**. (Don't worry—your NTFS partition is safe and sound, invisible to Windows 98.)

2. Install Windows 98 on drive C:. Remove the Windows 98 start-up disk, insert the Windows 98 installation CD-ROM, go to the CD-ROM drive, and run **setup.exe**. If the Windows 98 start-up floppy's generic CD-ROM drivers do not work with your drive, consult your system or drive manufacturer's instructions to add the necessary drivers to the floppy's config.sys and autoexec.bat files.

3. Make NT bootable. Once Windows 98 is installed, reboot your computer with the Windows 98 floppy, launch Fdisk, and press **2**, then **1** to make the NTFS drive the active (bootable) partition. Next, answer the remaining prompts, remove the Windows 98 boot floppy, and then reboot. The computer should now boot to Windows NT.

4. Add Windows 98 to NT's boot menu. Download and unzip Boot Partition 2.20, then copy bootpart.exe to your root directory (C:\). Select *Start•Run* and type **command** to open a Windows NT command prompt window, and then enter the command **c:\bootpart** to display a list of boot sectors that are available on the system (see **FIGURE 1**). Lastly, type the command **bootpart 1 boot98.bin Windows 98**. Enter **exit** to return to NT.

The next time you start Windows NT, you'll see Windows 98 at the bottom of the multiboot menu. You can use Boot Partition to add other operating systems (including Linux or BeOS) to NT's multiboot menu as well. However, Boot Partition author Giles Vollant says the tool can't add OS/2 to the boot menu.

```
 0 : C:= type=7  (HPFS/NTFS), size = 2096451 KB
 1 : C:  type=b  (Win95 Fat32), size = 2104515 KB

C:\>bootpart 1 boot98.bin Windows 98
Boot Partition 2.20 for WinNT (c) 1995-98 G. Vollant (info@wininage.com)
WEB : http://www.wininage.com and http://www.wininage.com/bootpart.htm
Add partition in the Windows NT Multi-boot loader
Run "bootpart /?" for more information

 0 : C:= type=7  (HPFS/NTFS), size = 2096451 KB
 1 : C:  type=b  (Win95 Fat32), size = 2104515 KB
C:\boot98.bin written
C:\BOOT.INI updated

C:\>
```

FIGURE 1: USING A FREE UTILITY called Boot Partition 2.20, you can add another operating system to Windows NT's multiboot menu.

Keep It Current

WHETHER YOU'RE using Windows NT Server or Workstation, you should have Service Pack 5 installed. Its hundreds of fixes include everything that appeared in Service Packs 1 through 4, plus new fixes, including all current Y2K patches. In addition to being a convenient one-stop collection of current fixes, SP5 is rumored to be pretty stable. You can find a link to the 33MB download at www.fileworld.com/magazine, or order the CD-ROM ($20) from Microsoft (800/370-8758).

online *Find the files mentioned in this article at www.fileworld.com/magazine. We pay $50 for published questions and tips. Scott Spanbauer is a contributing editor for* PC World. *See page 12 for contact information.* ■

ILLUSTRATIONS: DOUG ROSS (LEFT); JEFFREY PELO (RIGHT)

YOUR QUESTIONS ON: Virus information resources • Sharing a printer

Clean Out the Debris Left by Deleted Apps

HOW DO I thoroughly get rid of programs I don't use anymore? Not every program has an uninstall routine, and even those that do leave garbage in my Windows and System folders.

Louise Garcia, Whittier, California

THIRD-PARTY uninstall applications are available, but my experience with them has been wanting. I recommend using the manual method instead. First, if an application doesn't come with an uninstall option (look in the Start menu, in Control Panel's Add/Remove Programs applet, or in the program's own folder), then delete the app's folder. It may be called C:\Program Files*program name*, C:\Program Files*vendor name**program name*, or simply c:*program name*. Use Windows Explorer to find the folder, then select it and press **<Delete>**. Click *Yes* every time Windows asks you if you really want to delete it.

Next you'll want to remove the program's shortcuts. Right-click *Start* and select *Explore*. In Explorer, remove any shortcuts or folders within the Start Menu folder that are named for that program. For instance, if you launch "BadCode" by selecting Start•Programs•BadCode, you'll want to go to the C:\Windows\Start Menu\Programs folder and delete BadCode. But if you launch "SystemCrasher" by selecting Start•Programs•System Crasher•SystemCrasher, you'll want to delete the C:\Windows\Start Menu\Programs\System Crasher folder.

Now it's time to clean out the System folder. Doing this isn't an exact science—it requires guesswork and caution. While in Explorer, go to C:\Windows\System. Select *View•Options* (or *View•Folder Options*). On the *View* tab, select *Show all files*, then click *OK*. Right-click an empty space in the folder and choose *New•Folder*. Name the new folder **Probably Garbage**. While you're still in the System folder, select *View•Arrange Icons•by Name*. Look for file names similar to the program's name, then drag each one to Probably Garbage. When you are done, move Probably Garbage to another place on your hard drive (see **FIGURE 1**) or better yet, to another drive. Wait three months to make sure you don't need any of these files before you delete them for good.

Finally, you should clean up the Registry. Editing the Registry is always dangerous, so make sure you have a good backup first. See "Troubleshoot and Repair Your Registry" (June *Windows Tips*, www.pcworld.com/june99/windows) for more on this.

When you're ready to clean, select *Start•Run*, type **regedit**, and press **<Enter>** to enter the Registry Editor. Press **<F3>**, type the name of the unwanted program, and press **<Enter>**.

Whatever result the search returns, click it, press **<Delete>**, then select *Yes*. Watch out for entries on both panes of the Registry—deleting an entry from the right pane alone may not be enough. Press **<F3>** to continue the search, deleting each reference you find. When you're done, close the Registry Editor and reboot.

E-Mailing From WinZip

COMPRESSING FILES before you e-mail them will save both you and the recipient online time. If you're using WinZip 7.0 and an e-mail program that supports MAPI protocol—Outlook, for example—compressing files is easy. Create the archive as you normally would in WinZip, then select *File•Mail Archive*. This will create a message with the file already attached. Address the message, add text if you want, and send. If you have no purpose for the archive beyond mailing it, select *File•Delete Archive* and click *Yes*.

WHERE TO GO FOR VIRUS INFO

I'M WORRIED about a virus named Weed.5850.D. Where can I learn more about this and other viruses?

Hazel White, Independence, Missouri

AN OBSTACLE to finding complete information on viruses is that a virus can have more than one name. For instance, Weed.5850.D is also known as HLL.5664 and RustyBug.5330.A. These names are determined by various antivirus vendors, who don't always coordinate their efforts.

The first place to look for information on a given virus is your own antivirus program. For instance, in Norton Anti- ▶

FIGURE 1: MOVE SYSTEM FILES you think you don't want (instead of deleting them), so they're easy to replace if needed.

ILLUSTRATIONS: DOUG ROSS (LEFT); JEFFREY PELO (RIGHT)

Virus 5.0, you can click the *Virus List* icon for a list of known viruses. Just double-click the one you're curious about for more details (see **FIGURE 2**). In McAfee VirusScan 4.0, launch the VirusScan Central program, click *Tools*, then *Virus Info*. Click *find Virus*, enter a name, and press **<Enter>**. Double-click the name for details. Be vigilant about keeping your antivirus program current, to ensure that it has the latest information and updated antivirus abilities.

In addition, several virus encyclopedias on the Web will provide you with more information than will your antivirus program. Because of name variations and some less-than-complete definitions, it's advisable to check more than one such encyclopedia. Among the best are Symantec's AntiVirus Research Center (www.symantec.com/avcenter/vinfodb.html), the AVP Virus Encyclopedia (www.avp.ch/avpve), Dr. Solomon's Virus Encyclopedia (www.drsolomon.com/vircen/enc), the Trend Micro Virus Encyclopedia (www.antivirus.com/cgi-bin/vinfo.pl), and McAfee Virus Information Center (vil.mcafee.com/vil-lib/alpha.asp).

FIGURE 2: ANTIVIRUS PROGRAMS like Norton AntiVirus 5.0 often contain useful facts about specific viruses.

RESTORING FROM AN OLD DOS BACKUP

BACK IN 1995, I used the MS-DOS 6.22 backup utility to archive important files onto floppies. Now I need those files, but the Windows 98 backup program can't restore them. Any ideas?

Joel Taimanglo, Colorado Springs, Colorado

LUCKILY, THE DOS 6.22 backup program, MSBackup, is available for free at ftp.microsoft.com/softlib/MSLFILES/msback.exe, or at FileWorld.

Once you've got MSBackup installed and configured (the program runs only in DOS compatibility mode), you have to restore the catalog. At the main menu, select *Restore•Catalog•Retrieve* and then your floppy drive. Click *OK*. Insert the *last* floppy of your backup set and select *Continue*.

If you don't have the last floppy, or if there is a problem with the floppy and MSBackup can't retrieve the catalog from it, select *Rebuild* rather than *Retrieve*. MSBackup will recreate a catalog as best it can from the information on all of the surviving floppies.

When the catalog has been retrieved or rebuilt, select *OK*, then *Load*. Click *Select Files* and then pick the files you wish to restore. Be careful about restoring anything to the Windows folder or to its subfolders. You may overwrite a file whose particular version you need.

Select *Start Restore*. Follow the prompts for feeding your floppies to the program one at a time. When it's done, click *OK*, then *Quit* to return to Windows. You should now have your files.

SHARING A PRINTER

I HAVE TWO PCs, but only one printer. How can I print from the computer that isn't connected to the printer? I don't want to bother with a network. And please don't tell me to move the file to the PC that has the printer. I need to print from programs that aren't on that PC.

David Caya, Haddonfield, New Jersey

HERE ARE TWO solutions. One is hassle-free, and the other is just free.

The hassle-free solution is to buy an electronic switch box. Do *not* buy a mechanical switch box. If you do, you'll have to manually switch it to print from the other computer, and this mechanical switching can send voltage spikes down the cable that can damage your hardware.

An electronic switch box, such as those in ASP Computer Products' Intelligent AutoSwitch line, does the switching automatically and protects you from spikes. You can buy a low-end model—enough to support two computers and one printer—for as little as $25. (You'll shell out another $12 to $15 for extra cables.) Of course, the PCs must be in the same room.

If you'd rather not spend any money or if the machines are in different rooms, you can use good old-fashioned sneakernet—carrying a "print file" (rather than the data file, which would require its app to be on the second PC) between computers on a floppy. This trick won't work with very large print files (such as those with pages of graphics), but it'll work with most of them. Here's how:

On the system that is *not* attached to the printer, select *Start•Settings•Printers*. Double-click *Add Printer* and use the resulting wizard to install the drivers for the printer connected to the other computer. When the wizard asks for a port, select *FILE:*.

On the PC attached to the printer, select *Start•Programs•Accessories•Notepad*. Enter the line **copy a:file.prn lpt1: /b** followed by **cls** on its own line. Make sure that cls is the last line—don't press <Enter> after it. Select *File•Save*. For the 'Save in' option, select *Desktop*. For 'Save as type', select *All Files (*.*)*. For 'File name', enter **Print From Disk.bat**. Save the file and exit Notepad.

Once you're set up, printing is easy. First, tell your application to print the file. When it asks for a file name, pop an empty floppy into drive A:, and name the file **a:file.prn**. When the "printing" is done, remove the floppy and walk it over to the other computer. Put the floppy into the drive and double-click *Print From Disk.bat*.

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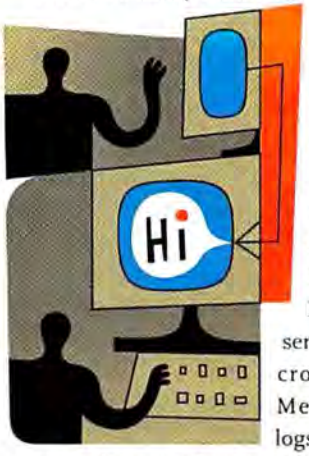
Use ICQ to Stay in Touch With Colleagues, Friends

ICQ—ACRONYM-SPEAK FOR "I Seek You"—is one of the most popular Web utilities around. What makes this instant chat tool a favorite among Netizens is its ability to locate friends and colleagues online and alert you when they're available to chat. Unlike some other chat tools, which seem to cater to teenagers, this one is gaining popularity among business users as a handy communication tool.



The utility—whose full name is ICQ 99—is offered free of charge by ICQ, a division of AOL. Like AOL's Instant Messenger and Microsoft's NetMeeting, ICQ logs you in to a central server whenever you connect to the Net, and tells you when your pen pals are online. Unlike with e-mail, you can use a chat tool to "converse" in real time, sending short messages that appear on the recipient's screen almost instantaneously. ICQ can also work hand in hand with conferencing software, such as NetMeeting and Netscape's Cooltalk, for both audio and video. ICQ 99 offers better Web integration than previous versions, including built-in search tools for finding news, software, and Usenet groups. It provides some nonchat tools, too, such as desktop notes, a reminder feature, and a to-do list.

At press time, the program was still described as being in beta, though it's already widely used. You may download it from PC World Online's FileWorld.

In case you've never used an instant messaging tool, or ICQ in particular, the rest of this column consists of helpful tips and tricks.

The first thing you'll want to do after installing ICQ is add names to your contact list. Open the ICQ window by double-clicking the green flower in the system tray (in the lower right of your screen). Click the *Add Users* button. In the next dialog box, enter your contact's name, e-mail address, or ICQ identification number (if you have it) to add him or her to your list. Then click *Next*. Repeat this procedure for everyone you want added to your list. If ICQ finds people who match the information you've provided, you'll receive a listing of all matches. If you see a match you're interested in contacting, click that entry, then click *Next*. If ICQ can't find any matches for the information you provided, you'll have the opportunity to send an invitation via e-mail. The other party will receive a message asking him or her to download and install ICQ so the two of you can start communicating.

GET MORE FUNCTIONALITY

BEFORE WE GO any further, it's a good idea to put the program in Advanced mode. Don't fret—it's no harder to use than Simple mode. The advanced setting just gives you access to more functions, like file transfer and e-mail. From the main ICQ window, click the button that says *To Advanced Mode*. Then, in the dialog box that pops up on the screen, select *Switch to Advanced Mode*.

FIGURE 1: ICQ MAKES IT easy for you to tell who's available to chat.

Who's Online? When people in your contact list are online, ICQ moves them to the Online section of the ICQ window (see **FIGURE 1**). To send a short message to a user, double-click a name (or click once and select *Message*). Type your message in the resulting dialog box and click *Send*. To open a real-time text chat, click once on a user name, then click *ICQ Chat*. A dialog box will permit you to enter some invitation text (like "let's talk for a second about the 3 o'clock meeting"). After you click the *Chat* button, ICQ will invite the user to chat with you. Once he or she accepts, the chat will begin.

To send a file to another user, click a name, then select *File*. A familiar Windows File/Open dialog box will appear. Find the file you wish to send, select it, and click *Open*. The next dialog will let you enter a description of the file before you click Send. Fill it in if you know your recipient is suspicious of unknown attachments. ICQ will then ask the recipient whether he or she wants to receive the file; if the person says yes, the transfer will begin.

Note that ICQ is ▶

E-Mail From Your Desktop

GOT SOMEONE with whom you exchange e-mail regularly? Place a shortcut on your desktop: Just drag a mail link from any Web page and drop it onto the desktop (make sure it's an e-mail link by placing your pointer over it and checking the browser's status bar for 'mailto:*username@domain*'). Next, right-click the new shortcut, select *Rename*, and change the label to the person's name. When you double-click that icon, your default e-mail client will open, and the To field will be filled in with the right address.

ILLUSTRATIONS: DOUG ROSS (LEFT); JEFFREY PELO (RIGHT)

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not a secure environment. It provides a handy means of sending messages and files instantaneously, but—in theory, at least—unknown third parties could intercept any information you send through ICQ. Therefore, we recommend that you use more secure methods (for example, PGP-encrypted e-mail) to send confidential messages and files.

Privacy Issues To keep strangers from finding out when you're online, set ICQ to require your authorization before others can add you to their contact list. To do so, click the *ICQ* button in the lower left of the ICQ window. Select *Security & Privacy*. Head to the *Security* tab and select *My authorization is required*. Then click *Save*. Alternatively, you can go to the *Ignore List* tab and check *Accept messages only from users on my contact list* to block unsolicited messages from strangers.

To prevent others from sitting down at your PC and posing as you on the Net, password-protect your ICQ program. Click *ICQ•Security & Privacy*, and then click the *Security* tab. Type in a new password and uncheck *Save Password*. Under *Security Level*, select *High*. Now, every time ICQ loads, it will prompt you to give your password before letting the world know that you're online.

With ICQ's "floating" feature you can create a desktop icon for your boss or that persnickety client, so you can monitor their availability. To do this, drag their names, one by one, from the main ICQ window and drop them onto your desktop. Floating icons on your desktop will remain visible above all other open windows. If you'd like them to be anchored on the desktop, permitting other windows to cover them, select *ICQ•Preferences*; then, on the *Contact List* tab, deselect *Make "Floating Users" Always on Top*.

FIGURE 2: CAN'T TALK right now? Set your availability in this menu.

Out to Lunch You can configure ICQ to display different messages when you're away from your desk or otherwise wish not to be disturbed. Click *ICQ•Preferences* and select the *Status* tab. ICQ uses several availability modes to let the world know what you're up to (see **FIGURE 2**). They include Away, N/A (Extended Away), Occupied (Urgent Msgs), and DND (Do Not Disturb). Select a mode listed in the drop-down menu that appears to the right of 'Enter Default Availability Mode Message For'. Then use the text box to enter the text you'd like other users to see when you're in that mode. For example, if you would like to let people know you're out to lunch when you set ICQ to N/A mode, select *N\A* and enter **I'm on my lunch break. Will return shortly.** or some such in the text box (see **FIGURE 3**). ICQ also offers preset text messages that you can choose from.

FIGURE 3: BEYOND CHAT, ICQ can serve as your answering machine, letting you leave messages for friends and colleagues.

To put ICQ into a different availability mode, open the main window by double-clicking the flower icon in the system tray, then click the flower box to the right of the ICQ Menu button. Now select a new mode. ICQ can automatically switch to Away or N/A modes after a specified period of PC inactivity or whenever the screen saver kicks in. To find these options, select *ICQ•Preferences*, and look on the *Status* tab.

You may find that you have trouble sending messages to some users in corporate environments. In organizations where computers share IP numbers, ICQ has difficulty figuring out where to send your messages. Fortunately, the messages can be sent through the main ICQ server rather than directly to the target PC. If ICQ finds that one of your messages needs to go through the server, you'll receive a dialog asking whether you really want to take that action. You do; to set ICQ to send messages through the server automatically when it encounters trouble, select *ICQ•Preferences*, click the *Events* tab, and select *Auto Send Messages Through Server*.

ICQ notifies you of incoming messages, requests, and files in many ways. By default, the main ICQ window pops up when an event occurs. You can choose to have ICQ just flash its flower icon in the system tray instead. Select *ICQ•Preferences*, click the *Contact List* tab, and then deselect *Popup Contact List upon Incoming Event*. Sick of that "Uh-oh!" sound already? Select *ICQ•Preferences*, click the *Events* tab, and uncheck *Play Sounds*.

Want to clean up your contact list window a little bit? Remove the 'ICQ Now!' button, the search box, and some other less-useful controls. Click *ICQ•Preferences*, and on the *Contact List* tab, select *Remove ContactList Buttons*.

For more ICQ information and tech support, check out the message boards and the frequently asked questions section on the ICQ Web site (www.icq.com).

TOP E-MAIL NEWSLETTERS

CAN'T GET ENOUGH TIPS? Check out the online version of this column (www.pcworld.com/heres_how) for a comprehensive listing of my favorite free computer-tips newsletters.

Find files from this article at www.fileworld.com/magazine. We welcome questions and tips and pay $50 for published items. Contributing Editor Judy Heim is coauthor of The Quilter's Computer Companion *(No Starch Press, 1997). See page 12 for contact information.* ■

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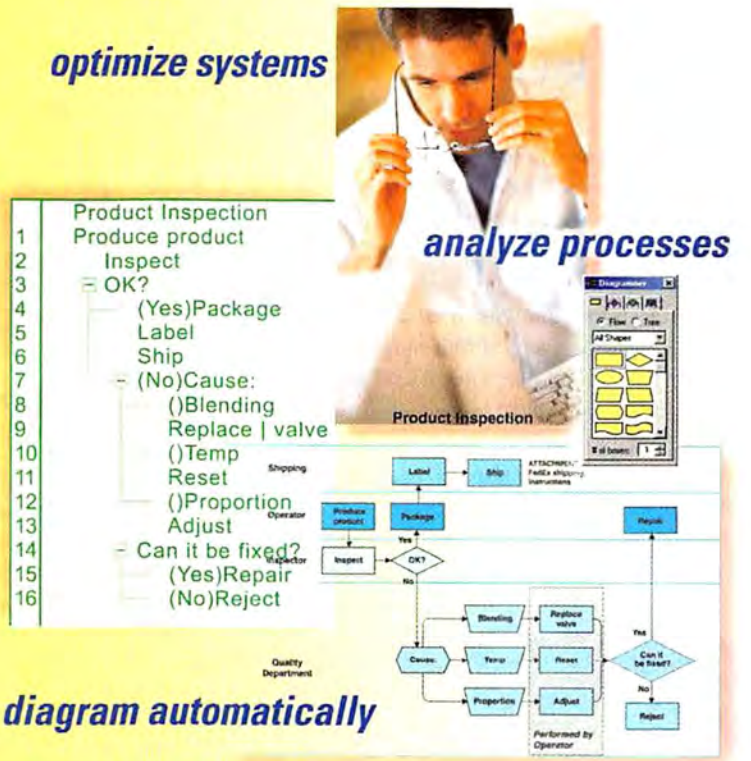

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Six Easy Steps for Creating Vertical Text in Word

A VERTICAL BANNER in large type can be a great means of calling attention to a section of text in your newsletter, memo, flyer, or other document (see **FIGURE 1**). Earlier versions of Word provided no good way to create one, but Word 97 and 2000 make it easy to get vertical with your text:

1. Start by selecting *Insert•Text Box*. Click and drag to draw a text box where you want your banner, and then type the desired text inside the text box, ignoring the horizontal orientation of the text.
2. Click the *Text Direction* icon in the Text Box toolbar until the banner's text is oriented the way you want it.

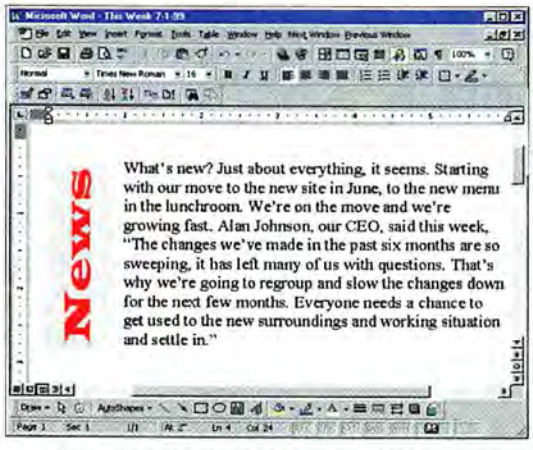

FIGURE 1: IT'S EASY TO CREATE vertical text banners in Word 97 and 2000 by using the Text Box tool.

3. Select the text inside the text box, and format it with a font and size that works with the style of your document. Drag the sizing handles of the text box to get the best fit, and reposition the box by dragging it on the screen.
4. Right-click the shaded border around the text box and select *Format Text Box*.
5. Within the Format Text Box dialog box, click the *Colors and Lines* tab in order to format the outer border of the box and specify a fill color, if desired.
6. Click *Layout* (Word 2000) or *Wrapping* (Word 97) and select a wrapping option that works with your document.

DISPLAY DIALOG BOXES IN VBA MACROS

UNTIL OFFICE 97 introduced Visual Basic for Applications—Office's macro language—the task of creating a standard Word dialog box to accept user input was tedious, involving several lines of obscure code. With VBA, available in Word 97 and 2000, it's a simple one-line operation, but you might miss the commands if you don't know where to look. Here's the drill to use while editing a macro (see also **FIGURE 2**):

1. Select *Tools•Macro•Macros*.
2. Choose an existing macro and click *Edit* or type in a new macro name and click *Create*.
3. Type **Dialogs (** at the start of any line in the Macro Editing window.
4. Double-click the desired dialog box constant name in the drop-down list. (In the example shown in Figure 2, *wdDialogFileOpen*.)
5. Type **).** (a right parenthesis followed by a period).
6. Double-click *Show* in the drop-down list.

PRESERVE EMBEDDED OBJECTS IN WORD

OBJECT LINKING and Embedding makes it possible to insert objects like Excel worksheets or charts into Word documents and easily update them in place. But when you send a document with an embedded object to others, either by e-mail or on a disk, they won't be able to see the object when they open the file—unless you take a few steps first:

1. Select *File•Save as* and save the document with a new file name.
2. Select the first embedded object.
3. Press **<Ctrl>-<Shift>-<F9>**.
4. Repeat steps 2 and 3 for each object.
5. Save the document and send it.

This sequence breaks the links to the objects, converts the embedded objects into graphics, and stores them with the document, making them accessible to others.

SEE FILES IN MULTIPLE DIRECTORIES

MOST PEOPLE store documents they've created in separate folders, identified by the project or another criterion. Normally, Word's *File•Open* dialog box shows ▶

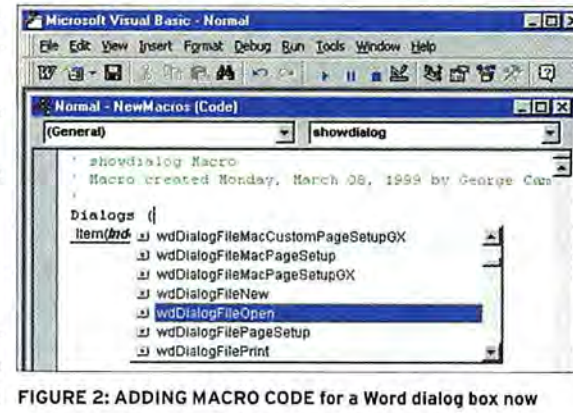

FIGURE 2: ADDING MACRO CODE for a Word dialog box now takes only a minimum of typing and a few mouse clicks.

ILLUSTRATION: JEFFREY PELO

Change Line Spacing in Word With Keystrokes

CONTROLLING LINE spacing in Word 6.0 through 2000 normally means a trip to the Format•Paragraph dialog box and at least four mouse clicks. A much easier method is as close as your keyboard. To set single, double, or 1.5 line spacing, simply highlight the desired passage or paragraph and press **<Ctrl>-1**, **<Ctrl>-2**, or **<Ctrl>-5**, respectively. If you want to add or remove a line space before a paragraph, press **<Ctrl>-0**.

you only one of these folders at a time, forcing you to open other directories separately to see their documents. Word 7 and 97 (running in Win 95 or 98) offer a handy option that shows a complete directory tree. Here's how to make it work:

1. Select *File•Open*. If it's not already displayed, click the folder that contains your document subdirectories.
2. Click the *Commands and Settings* icon on the dialog box's toolbar.
3. Select *Search Subfolders* from the menu.
4. Scroll down to select your document.

COPING WITH MISSING FONTS

A COWORKER HAS sent you a Word document by e-mail. When you open it, some of the fonts look very strange, making you think somebody's flipped their formatting lid. Don't send for the shrink—your colleague has simply used a font not installed on your computer. When this happens, Word takes its best guess and substitutes a default font for the missing one. Fortunately, replacing this substitute is a snap in all versions of Word. Here's what to do:

1. Select *Tools•Options* and click the *Compatibility* tab in the Options dialog box.
2. Click *Font Substitution*. If Word has encountered any fonts it doesn't have, it provides you with a Font Substitution dialog box that lists them and the substitutions it has chosen (see **FIGURE 3**).
3. To change a substitution, select a Missing Document Font from the list.
4. Drop down the *Substituted Font* list and choose a suitable replacement font.
5. To replace any other substituted fonts, repeat steps 3 and 4 as necessary.
6. Click *OK* to temporarily apply the substitutions to the current document, or click *Convert Permanently* to replace the fonts permanently in the document.
7. Click *OK* in the Options dialog box to complete the substitutions.

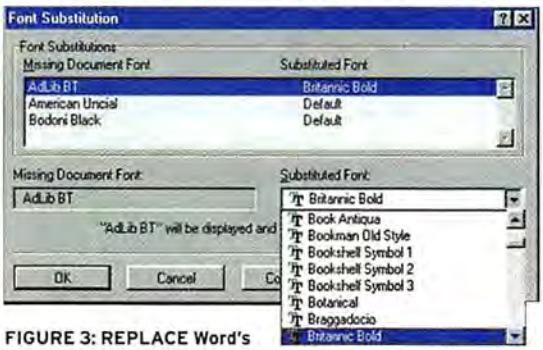

FIGURE 3: REPLACE Word's default substitute fonts with your choice from this dialog box.

WHAT COLOR DO YOU WANT TODAY?

WHILE YOUR monitor and printer have long been able to handle millions of colors, Word has always been limited to a basic set of 16 colors for text. Finally, Word 2000 provides access to an extended palette of 16 million colors. Want to try them out? Start by selecting the text you want to color, then do this:

1. Select *Format•Font* and drop down the *Font color* list (see **FIGURE 4**).
2. If you see a color you like, click the color patch and *OK*, and you're done.
3. Click *More Colors* to see additional colors. To choose one of these, click its octagonal region, then click *OK* in the Colors dialog box and again in the Font dialog.
4. If you're still not satisfied, click the *Custom* tab in the Colors dialog box. Click a region in the large color palette that's close to the color you want, and then move the slider on the right to adjust the hue. Watch the sample box for the actual color. Click *OK* in both dialog boxes to apply the color.

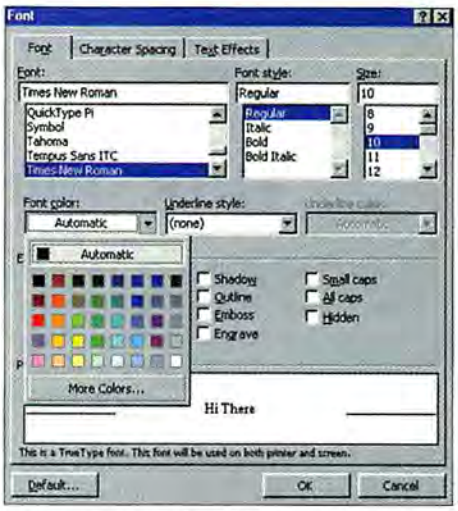

FIGURE 4: WORD 2000 enables you to display a font in any of 16 million colors.

CONTROL PAGE BORDER PLACEMENT

IN WORD 97 and 2000, you can easily add a border to your pages: Simply select *Format•Borders and Shading*. With some printers, however, the default border location is too close to the paper's edge, so parts of the border are cut off when you print. If you want more control over placement of page borders, follow these steps:

1. Select *Format•Borders and Shading* and click the *Page Border* tab. If you haven't chosen a Setting and Style, do so now.
2. Click *Options*.
3. In the *Border and Shading Options* dialog box, choose *Text* in the *Measure from* drop-down list. This will position the border close to the text margins on the page, rather than close to the edge of the paper.
4. Change the four Margin settings to increase the amount of separation between the text and the border lines (see **FIGURE 5**). A reasonable starting point is 12 points, but you're free to experiment with any value between 1 and 31 points. When you're done, click *OK* in both dialog boxes to complete your settings changes.
5. Check your new border setting by selecting *File•Print Preview*.

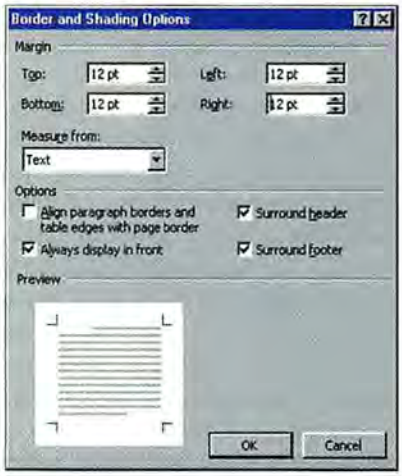

FIGURE 5: REPOSITION WORD page borders by aligning them with text, not paper edges.

Find additional tips at www.pcworld.com/heres_how. We welcome your comments and pay $50 for published items. George Campbell is a PC World *contributing editor. Find him on the Web at www.osomin.com, or see page 12 for contact information.* ■

How to Create a Time Sheet in Excel

IF YOU DON'T fully understand how dates and times work in Excel, attempting to use them is about as intuitive as setting the clock on a VCR. This month's column describes how to create a useful employee time sheet—and in the process tries to clear up some of the confusion associated with adding and subtracting times in a spreadsheet.

FIGURE 1 shows the finished product: a worksheet that computes total hours worked each day, as well as a weekly total broken down into regular hours and overtime hours.

Start by entering the descriptive labels. Rows 2 through 7 contain text only (no formulas). You can, of course, format the text to your liking. While you're at it, enter the text in the Weekly Total box.

Now you're ready for the formulas. Activate cell B8 and enter **=D5**. This formula simply picks up the week's starting date, which is entered in cell D5. In cell B9, enter **=B8+1** and then copy this formula to the range B10:B14. Next, activate cell C8 and enter **=B8**. Copy this formula to the range C9:C14. You'll need to format the dates in column C to display weekday names. To accomplish this task, select the range C8:C14 and choose *Format•Cells*. In the Format Cells dialog box, click the *Number* tab. Select the *Custom* category and then enter **dddd** in the box labeled Type. Click *OK* to close the dialog box.

Before entering any of the formulas that perform the actual calculations, you might want to test some sample time values in the range D8:G14. Make sure you enter a space before typing AM or PM.

Next, activate cell H8 and enter the formula **=IF(E8<D8,E8+1-D8,E8-D8)+IF(G8<F8, G8+1-G8,G8-F8)**.

HOW IT WORKS

THE FIRST PART of this formula subtracts the time in column D from the time in column E to get the total number of hours worked before lunch. The second part subtracts the time in column F from the time in column G to get the total number of hours worked after lunch. The IF functions accommodate graveyard-shift cases that span midnight—for example, an employee may start work at 10 p.m. and begin "lunch" at 2 a.m. Without the IF statement, the formula would return a negative result.

Copy the formula in cell H8 to the range H9:H14. Now you need to format these cells to display time values. Select the range H8:H14, choose *Format•Cells*, and click the *Number* tab. Select the *Time* category, click the first option in the Type list box, and click *OK*.

Next up: the weekly totals. Activate cell H17 and enter **=SUM(H8:H14)**. This formula computes the sum of the daily totals in column H. Now enter into cell H18 the formula **=MIN(H17,1+TIME(40,0,0))**. This formula, which assumes a 40-hour week, returns the smaller of two values: the total number of hours worked, or 40 hours. The final formula, in cell H19, is **=H17-H18**. This formula subtracts the number of regular hours from total hours to yield the number of overtime hours. If your standard work week consists of something other than 40 hours, you'll have to change the formula in cell H18 accordingly.

One critical step remains: formatting the time values in the range H17:H19. Since these cells are likely to display time values that exceed 24 hours, you'll need to use a custom time format. Select the range H17:H19, choose *Format•Cells*, and click the *Number* tab. Select the *Custom* category, enter **[h]:mm** into the Type box, and click *OK*. Using square brackets around the hour part of the format code allows the spreadsheet to display more than 24 hours.

If all this seems too cumbersome and you don't feel like creating your own time sheet, you can download the completed workbook from PC World Online's FileWorld (search for TimeSheet.zip) and adjust it as needed.

Employee Time Sheet

Employee Name:	Lisa Goodman					
Department:	Tech Support					
Start Day:	07/12/99					
Date	Weekday	Start Work	Time Out (Lunch)	Time In (Lunch)	End Work	Total Hours
07/12/99	Monday	8:00 AM	12:00 PM	1:00 PM	5:00 PM	8:00
07/13/99	Tuesday	10:00 AM	2:30 PM	3:15 PM	7:30 PM	8:45
07/14/99	Wednesday	10:00 AM	2:00 PM	2:45 PM	7:00 PM	8:15
07/15/99	Thursday	9:30 AM	1:00 PM	2:45 PM	7:00 PM	7:45
07/16/99	Friday	9:15 AM	12:00 PM	12:30 PM	6:45 PM	10:00
07/17/99	Saturday					0:00
07/18/99	Sunday					0:00

WEEKLY TOTAL	
Total hours:	42:45
Regular hours:	40:00
Overtime hours:	2:45

FIGURE 1: THE WORKBOOK TIMESHEET.ZIP calculates daily and weekly hours worked, including overtime.

Rounding to *n* Significant Digits

EXCEL INCLUDES three functions (ROUND, ROUNDUP, and ROUNDDOWN) that round values to a specified number of digits. In some cases, however, you may need to round a value to a specified number of *significant* digits. For example, you might want to express the value 1,432,187 in terms of two significant digits (that is, as 1,400,000). Here's an elegant solution. The formula below rounds the value in cell A1 to the number of significant digits specified in cell A2: **=ROUND(A1, A2-1-INT(LOG10(ABS(A1))))**.

Find files mentioned in this article on FileWorld (www.fileworld.com/magazine). We welcome questions and tips and pay $50 for published items. Contributing Editor John Walkenbach is the author of Excel 2000 Bible *(IDG Books, 1999) and maintains The Spreadsheet Page (www.j-walk.com).* *See page 12 for contact information.* ■

ILLUSTRATION: JEFFREY PELO

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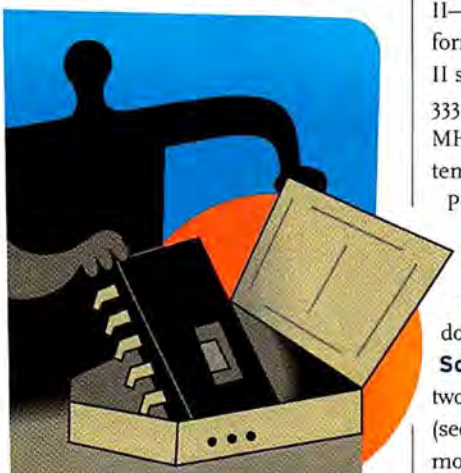
Defining RAM types • How much memory do you need? • **What are the benefits?**

RAM Upgrade Tips to Remember

OVER THE PAST few years, the cost of RAM has plummeted from over $40 per megabyte to around $2, making it one of the most affordable PC upgrades around. Most mainstream systems now come with 64MB of RAM, and some high-end models offer 128MB. So if you're running Windows 9*x* on an old Pentium with 16MB and you think that your PC may be



somewhat underequipped, you're right. Here's what you need to know to prepare for a successful memory upgrade.

THE RIGHT TYPE OF RAM

LOOK TO YOUR PC's motherboard to determine the particular form of upgrade RAM you should use to produce a configuration appropriate for your system. Know your motherboard's requirements before you buy RAM, and you'll do fine. Purchase blindly, and you could prevent your system from booting, cause constant memory-error messages, or (in the worst case) even destroy the RAM itself.

Here's what you should know about the motherboard before you buy memory:

RAM type. A chip set determines the type of memory the system supports. Most first-generation Pentium chip sets support Fast Page Mode DRAM (usually called DRAM for short) or a slightly faster version known as EDO DRAM.

Some later Pentium—and all Pentium II—chip sets also support one of the two forms of SDRAM. Pentium and Pentium II systems running at clock speeds up to 333 MHz use SDRAM designed for a 66-MHz motherboard. Newer Pentium II systems running at 350 MHz or faster use PC-100 SDRAM, built for a 100-MHz motherboard. PC-100 SDRAM works in most older SDRAM systems, but SDRAM for 66-MHz motherboards doesn't function on newer PII systems.

Socket type. Memory chips come on two types of modules: SIMMs and DIMMs (see **FIGURE 1**). Most 386 and 486 system motherboards use 30-pin SIMM sockets, while most early Pentium motherboards are built to use 72-pin SIMM sockets. A 168-pin DIMM carries EDO DRAM or SDRAM; such DIMMs show up on later first-generation Pentium systems and on all Pentium II systems.

Though DIMMs can be installed singly, 72-pin SIMMs must be installed in pairs (called *banks*) of equal capacity. Some motherboards require you to fill the sockets in a specific order—usually with the largest modules in the first banks. A few make you use modules that are all the same size.

But Wait! There's More Memory

ADDING RAM TO YOUR PC, one of the most popular upgrades, involves more than just opening the computer cover and plugging in the memory modules. It requires knowing the type of memory your system needs and assessing the tasks you perform to determine the appropriate amount to add. This month's *Hardware Tips* explains what you need to know before you buy RAM. *Upgrade Guide* on page 256 follows with step-by-step illustrated instructions on how to perform the actual RAM installation.

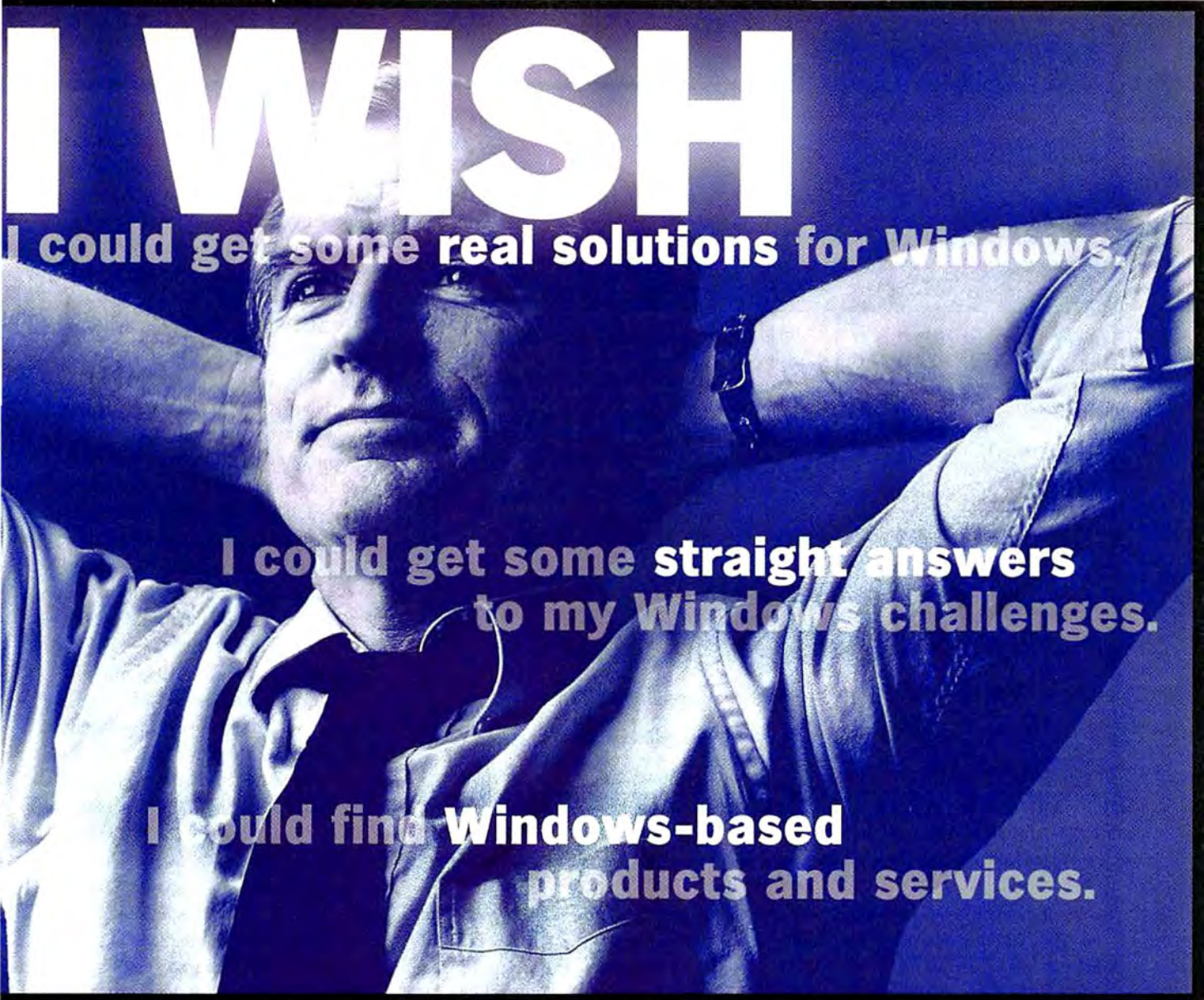
Speed. Memory chips run at different speeds. DRAM and EDO DRAM chips typically run at 80, 70, or 60 nanoseconds (often the exterior of a DRAM or EDO DRAM chip is stamped with a number giving the chips' speed). Adding faster memory to a slower motherboard is okay but won't boost performance. Adding slower memory to a faster motherboard can cause trouble. So buy memory that's the same speed as the installed memory.

Error checking. Some RAM modules support built-in error checking (called *parity*) and some don't. Don't mix them. Fortunately, the majority of Pentium systems use nonparity memory, so this issue does not affect most memory buyers. You can also check the CMOS setup program; error checking has to be enabled in BIOS.

Pin coating. Old SIMMs and DIMMs have gold-colored pins matching the ▶

FIGURE 1: DIFFERENT MEMORY MODULES look very similar and bear cryptic markings. Check the original packaging to confirm what yours is.

PHOTOGRAPH: KEVIN CANDLAND; ILLUSTRATIONS: DOUG ROSS (LEFT); JEFFREY PELO (RIGHT)



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2000 *Real World Answers for your Enterprise*

More RAM Equals More Speed

... but the law of diminishing returns limits performance gains.

CPU	Number of systems averaged	Operating system	RAM (MB)	Level 2 cache (KB)	PC WorldBench 98 score (Faster)
AMD K6-2-350	3 desktops	Win 98	128	512	174
AMD K6-2-350	9 desktops	Win 98	64	512	164
Celeron-333	16 desktops	Win 98	64	128	172
Celeron-333	3 desktops	Win 98	32	128	162
Pentium II-233	5 desktops	Win 95	64	512	138
Pentium II-233	13 desktops	Win 95	32	512	134
Pentium MMX-233	2 desktops	Win 95	64	512	123
Pentium MMX-233	9 desktops	Win 95	32	512	118
Pentium MMX-233	1 desktop	Win 95	16	512	81
Pentium MMX-166	1 notebook	Win 95	48	256	97
Pentium MMX-166	5 notebooks	Win 95	32	256	88
Pentium MMX-166	4 notebooks	Win 95	16	256	69

FIGURE 2: THOUGH ADDING RAM to your system can yield significantly better performance, your PC's speed will peak at a certain configuration, after which more RAM won't make it go any faster.

color of the motherboard's memory sockets. More recent motherboards and memory use less-expensive tin, which is silver in color. For best results, don't mix the two metals; over a period of years an oxidation layer can build, causing memory errors.

THE RIGHT AMOUNT OF RAM

THE AMOUNT OF RAM your PC needs depends on its operating system and task load. To see how much RAM your PC currently has installed, right-click *My Computer•Properties* and select the *General* tab.

Windows 9*x* systems need a minimum of 16MB of RAM—and that amount is enough only if you limit your computer activity to light e-mail, word processing, Web browsing, and minimal multitasking. If you work on spreadsheets, presentations, or databases and you keep two or three applications open at a time, your system requires at least 32MB. If you multitask four or more applications and you work with graphics or play games, you need 64MB. If you run Windows NT, you require from 32MB to 128MB of RAM, depending on your task profile.

After completing the upgrade, you should notice a difference when you launch or switch between applications (see **FIGURE 2**). Nonetheless, the more RAM you add, the less performance gain you'll see per megabyte. The law of diminishing returns rules here. Worse, some Pentium machines may actually slow down: Some chip sets—the collection of chips that control the flow of data through your PC—provide cache support only for the first 64MB of system RAM.

THE RIGHT NUMBER OF MODULES

BESIDES PAYING attention to the characteristics of your motherboard, you'll need to determine the specific number and combination of memory modules to buy. These factors depend on the number of free sockets in your motherboard and on the specific memory module capacities that your motherboard can support.

Motherboards recognize only certain combinations of memory modules in their memory sockets. The system manual should list total system RAM amounts supported and specific memory module combinations to make up those amounts.

If your motherboard has two or more empty SIMM sockets or one or more empty DIMM sockets, you must figure out the combination of modules your motherboard needs to equal the amount of RAM that you want to add. For example, if you want to add 48MB to a motherboard that has four free 72-pin SIMM sockets, you'll probably find that the board can't accept the combination of four 12MB SIMMs or two 24MB SIMMs. In that case, you'll instead have to fill two of the vacant banks with 8MB SIMMs and the other two with 16MB SIMMs.

To add the same 48MB to a motherboard with only two free SIMM sockets, though, you'll have to take a different route. Since 24MB SIMMs are not an option, finding a SIMM pair that adds up to the 48MB needed is clearly impossible. So you'll have to settle for a SIMM pair that yields a different total capacity, or you'll have to remove two existing SIMMs and fill four sockets with some combination of SIMMs that equals 48MB plus the amount of the two removed SIMMs.

You'll need to corral all this info before you pop the top off your system and start the upgrade. If you lack the necessary documentation, call your PC manufacturer or contact memory vendors Kingston Technology (www.kingston.com) or Crucial Technology (www.crucial.com). Both of these well-known sellers of memory upgrades employ experts who'll help you find the right RAM. They charge a few dollars more for their chips than discount dealers do, but the peace of mind they provide may justify the extra expense.

Now that you know what to look for when upgrading your PC's memory, turn to *Upgrade Guide*, page 256, for a step-by-step guide to installing it in your PC.

Kirk Steers is a PC World *contributing editor. We welcome your tips and questions and pay $50 for published items. See page 12 for contact information.* ■

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8.4GB	9.5ms	5400	CR308400A	3	$139
9.1GB	8.5ms	7200	KA309100A	3	$190
10.2GB	9.5ms	5400	CX310200A	3	$157
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40X	NEC	CDR3000	75	$65
40X	Toshiba	XM6502B	79	$66
48X	Memorex	CD48X	90	$71
52X	Kenwood	UCR412	90	$120

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36X	Pioneer	DRU766S	70	$80
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18.2GB	7200	Quantum	XP318200SCA	$665
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7/99 PC World

Upgrade Your PC Memory

ONE OF THE CHEAPEST and easiest ways to boost your computer's performance is to add RAM. Before you start, check out this month's *Hardware Tips* (page 252) for the lowdown on buying the right kind of RAM. Then come back here, roll up your sleeves, and follow the steps below to upgrade your PC's memory.

Stan Miastkowski is a contributing editor for PC World. ■

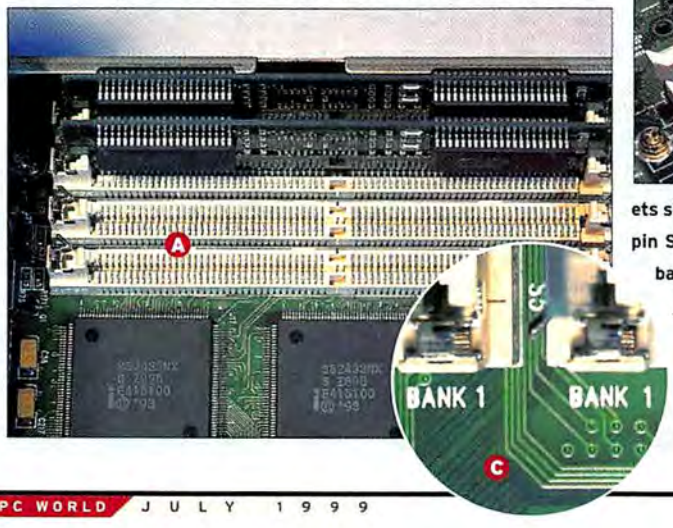
THE TOP DOWN

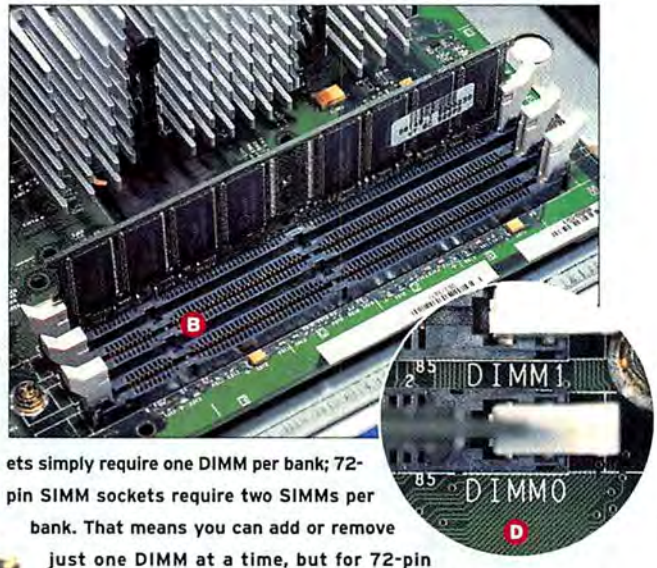
Benefits: better system performance
Cost: $60 (32MB) to $200 (128MB)
Time required: 30 to 60 minutes
Tools required: large Phillips and small flathead screwdrivers, antistatic wrist strap (recommended)
Expertise level: intermediate
Resource: Crucial Technology (www.crucial.com), Kingston Technology (www.kingston.com), Simple Technology (www.simpletech.com)

1 Be static-free. Memory modules are among the most susceptible of all PC components to damage from static electricity. Before you take your new modules from their antistatic bag, put on your antistatic wrist strap (shown) and clip it to a grounded metal object (such as a screw—slightly loosened and preferably unpainted—that holds the faceplate on an AC outlet). If you choose not to use a wrist strap, remember to ground yourself by touching a grounded metal object before touching your new memory modules or any of your system's internal components.

2 Locate the memory sockets. Turn off your computer, unplug the AC power (very important if you have a Pentium II–based system), and remove the cover. A Pentium system's memory sockets—white SIMM sockets (A), or perhaps a combination of SIMM and longer, black DIMM sockets (B)—can be anywhere, but they're usually located toward the front of the system as you face it. The sockets of a Pentium II, Pentium III, or K6 machine—almost always DIMM—tend to be near the CPU.

PC memory modules go into sockets in sets called *banks*. DIMM sockets simply require one DIMM per bank; 72-pin SIMM sockets require two SIMMs per bank. That means you can add or remove just one DIMM at a time, but for 72-pin SIMMs, you'll need to add or remove two at a time from the same bank. Right next to the sockets, you should find labels on the motherboard indicating the sockets' bank numbers (C and D). Fill the banks with the lowest numbers first.

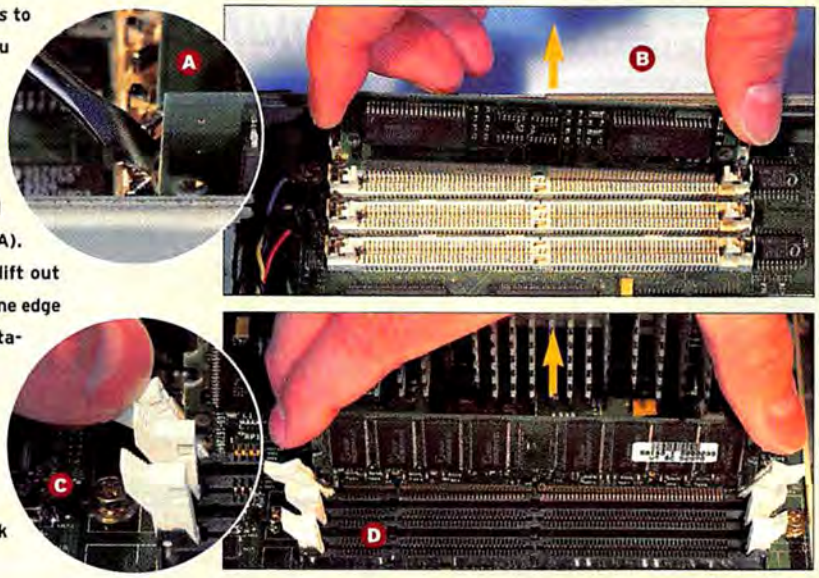


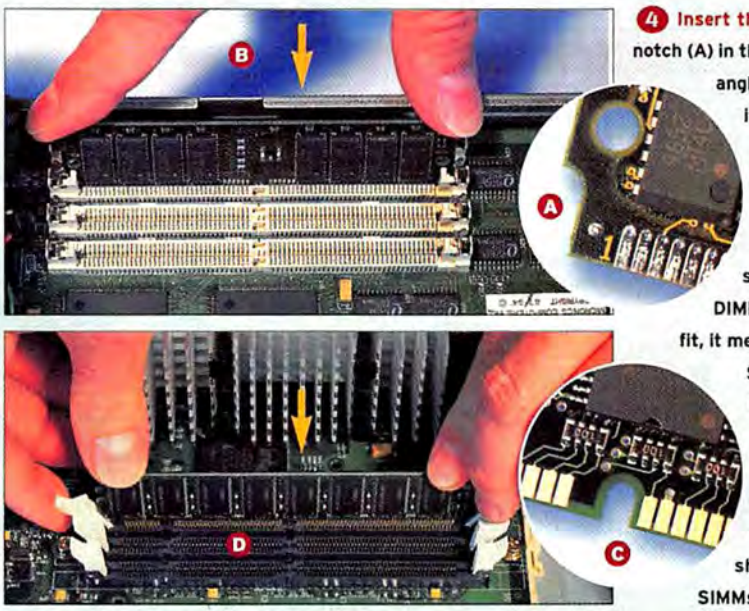


PHOTOGRAPHS: KEVIN CANDLAND

3 Remove the old RAM. (See *Hardware Tips* to determine whether this step is necessary.) If you need to remove SIMMs, work carefully. They're held in place by fragile metal or plastic clips that you must release before you remove the SIMM. Use your fingertips (again, remember to dispel static first) or a very small flathead screwdriver to gently push the clips aside (A). Then pivot the SIMM sideways (B); it should lift out easily without force. Take note of the notch on one edge of the SIMM—you'll need to remember its orientation to install the new SIMMs.

Most DIMM sockets have clips on either side that you easily push aside (C), although some older-generation DIMM sockets don't use them. DIMMs usually can be pulled straight up from their slots (D). If necessary, you can rock them very gently to release them.



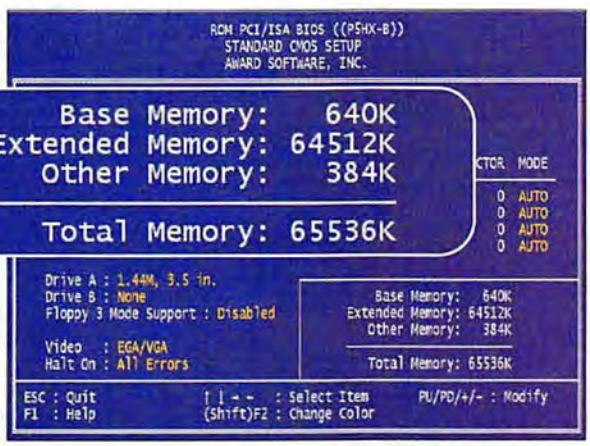


4 Insert the new RAM. Install each SIMM by first orienting the notch (A) in the correct direction (from step 3) and inserting it at an angle into the socket (B). Then press down firmly and pivot it upright until it snaps into place. Don't use force; if the module doesn't fit, try inserting it again. Repeat until you've installed all the SIMMs. DIMMs simply plug into their sockets, and their two notches (C shows one) allow them to be inserted in only one way. Press straight down firmly (D), but don't force them. If your DIMM sockets have clips, click them into place. If they won't fit, it means you haven't pushed the DIMMs in far enough.

Some older PCs require that you set jumpers or miniature switches to inform your PC about the new memory. If your computer is over three years old, check your manual to see if this additional step is necessary.

Before you power up your computer, take a good look at the memory modules you've just installed. They should be straight and upright. Double-check that all SIMMs and DIMMs are correctly seated.

5 Start it up. Plug in your PC and power it up without putting the cover back on. Most newer systems will automatically recognize the new memory and show it on the screen. Some older machines will display an error message and require that you enter your system's BIOS setup. Usually, you don't have to actually specify the new amount of RAM in your BIOS setup; just exit and reboot.



6 Problems? If your PC refuses to recognize the new RAM (or won't start at all), turn it off, unplug it, and make sure that all the SIMMs or DIMMs are firmly seated in their sockets. (It's easy to overlook a misaligned module.) If that doesn't solve the problem, take out all the memory modules and start again. If you still don't have any luck, you may have defective memory, which is rare but possible. Contact the memory vendor's technical support for help.

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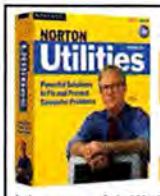

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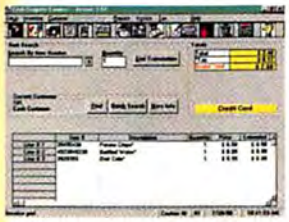

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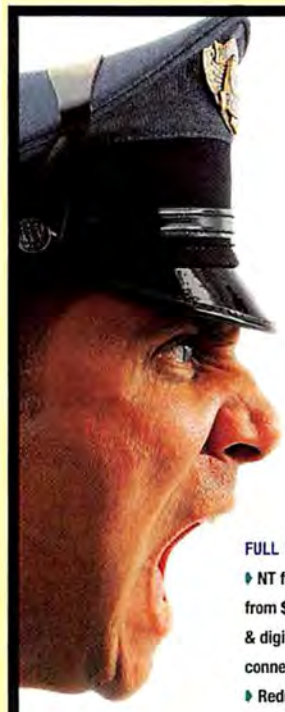

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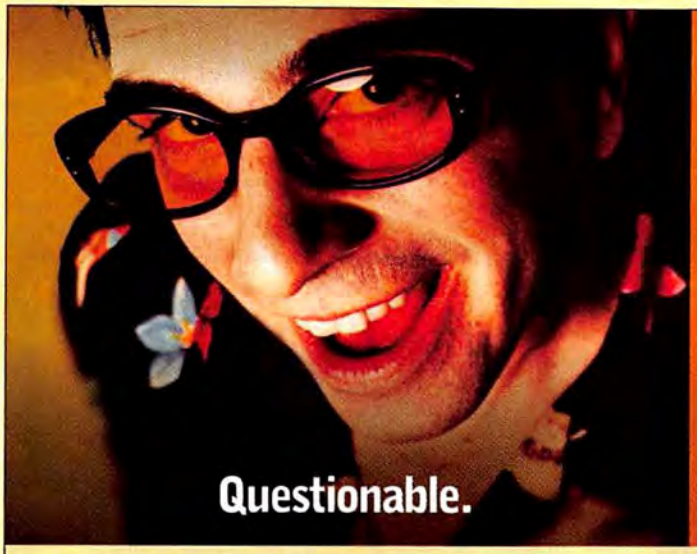

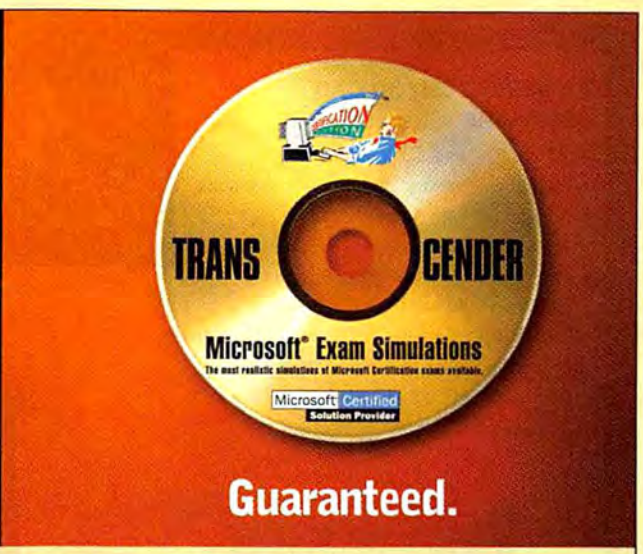

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UNLIMITED FREE TECH SUPPORT	YES!	NO	NO	YES	NO
DESIGN FOR WINDOWS 98	YES!	YES	NO	NO	YES
3D SYMBOL LIBRARY	YES!	NO	NO	YES	NO
DWG/DXF MULTI-VERSION SUPPORT	YES!	YES	YES	NO	YES
VRML SUPPORT	YES!	NO	NO	YES	NO
3D PRIMITIVES	12	11	0	3	11
3D ANIMATION	YES!	NO	NO	NO	NO
TEXTURE MAPPING	YES!	YES	NO	NO	YES
ANTI-ALIASING	YES!	YES	NO	NO	YES
SURFACE HAMMER	YES!	NO	NO	NO	NO
SURFACE INTERSECTION	YES!	YES	NO	NO	NO
SELECT HIDDEN EDGES	YES!	YES	NO	NO	YES
3D KEYBOARD CURSOR MOVEMENT	YES!	NO	NO	NO	NO
AUTO-WELD SHAPES TO ONE PERIMETER	YES!	NO	NO	NO	NO
CUT ONE PLANE FROM ANOTHER	YES!	YES	NO	NO	YES
DIRECT SCANNER SUPPORT	YES!	NO	NO	YES	NO
IMAGE AUTO-TRACE	YES!	NO	NO	YES	NO
DIGITIZER TRACING SUPPORTED	YES!	YES	YES	NO	NO
ZOOM ALL VIEWS TO SELECTION	YES!	NO	NO	NO	YES
PANELING, MULTI-PAGE PRINTER OUTPUT	YES!	NO	NO	YES	NO
FAST REDRAW OPTIONS	YES!	YES	NO	YES	YES
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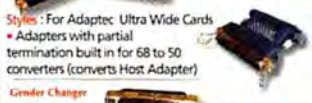

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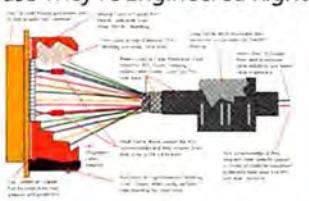

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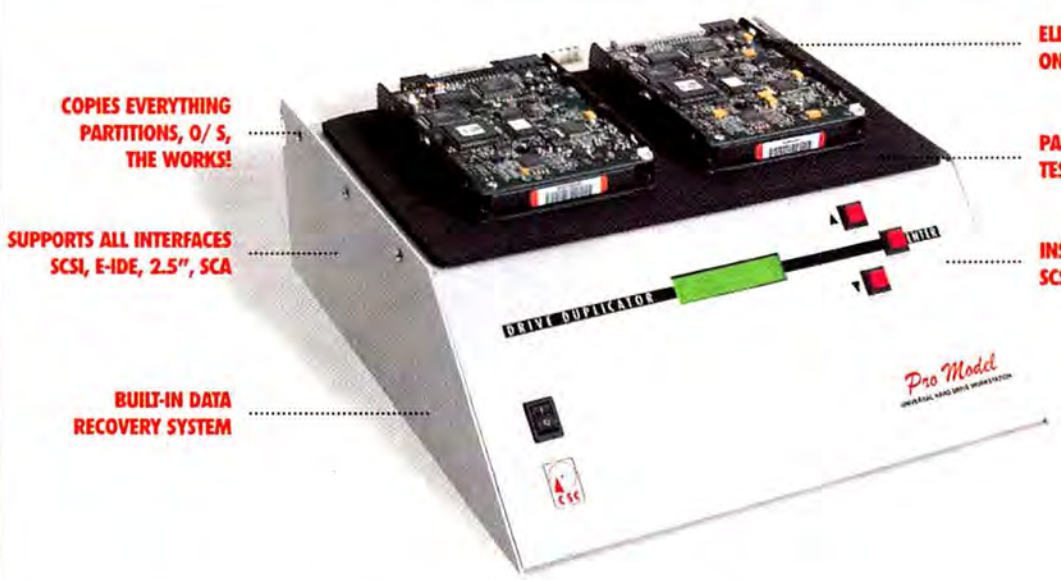

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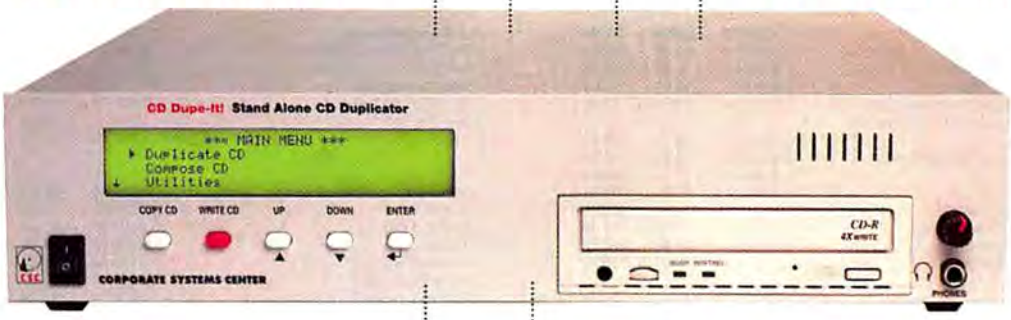

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16Meg	29	—	—	—	Non-Reg./	Non-Reg./
32Meg	49	59	49	69	Registered	Registered
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P-75 – P233MMX, 4PCI, 4ISA 69.00

AMD K6-2, 100 MHZ Bus 89.00

Pentium II, BX Chipset, PC-100 109.00

SIMM MODULES

	6ONS	7ONS	8ONS
1Meg x 3 (3 chip)	1.50	1.50	1.50
1Meg x 9 (9 chip)	1.50	1.50	1.50
4Meg x 3 (3 chip)	18.00	18.00	–
4Meg x 9 (9 chip)	19.00	19.00	19.00
16Meg x 9 (9 chip)	54.00	54.00	–

CPU CHIPS

INTEL			
Pentium II 300-450/100 (1M)	$1049/729	Celeron 400/066/233	239/109/104
Pentium II 266-400MHZ (1M)	729/499	Celeron 366/233/300A	269/194
Pentium II 333-400MHZ (512K)	599	Pentium 233MMX	89
Pentium II 300-450	679/499	Pentium 200/200 MMX	159/64
Pentium II 450/400 MHZ	499/299	Pentium 166/166MMX	54/79
Pentium II 350/333 MHZ	194/134	Pentium 150/133/120	64/49/39
Pentium II 300/266 MHZ	159/149	486 DX2 66/S/S4 100	49/39/29

AMD	
K6-3-400	209
K6-2 450/400/350	179/139/89
K6-2 333 (66MHz)	87
K6-2 300 (100MHz)	79

DELL MEMORY

Dimension XPS D233, D266, D300, D333 (SDRAM)	32/64/128Meg 59/89/199
Dimension XPS D233, D266, D300, D333 (ECC)	32/64/128Meg 59/99/199
Dimension XPS T333, 366S, 200S, P133r, P200r (SDRAM)	16/32Meg 34/64
Dimension XPS R350C, R400, R450 (PC-100)	64/128Meg 89/159
Dimension XPS V333, V333C, V350 (PC-100)	32/64/128Meg 49/99/159
Dimension XPS M166A, M200A, M200S (SDRAM)	16/32Meg 34/64
Dimension XPS Pent II H233, H266 (EDO pairs)	8/16/32Meg 19/44/79
Dimension XPS P100C, 120C, 133C, 166C (EDO pairs)	4/8/16/32Meg 11/19/44/79
Dimension XPS P60, P75, P90, P100 (FPM pairs)	4/8/16/32Meg 19/19/49/89
Optiplex GM, GMT P75, P90, P100, P120, P133, P166 (EDO pairs)	4/8/16/32Meg 11/19/44/79
Optiplex GNT, N Series (EDO Dimm)	32/64/128Meg 79/189/249
Optiplex GX Pro 150, 200 (SDRAM)	32/64/128Meg 59/99/169
Optiplex XL, XM, XMT (FPM pairs)	32/64/128Meg 19/49/89
PowerEdge 2100, 2200, 4100, 4200 (EDO, ECC)	32/64/128/256Meg 64/149/249/549
PowerEdge EL, SP, SP2 (FPM pairs)	8/16/32Meg 26/49/89

IBM APTIVA, PC, P/S1 & P/S2

Aptiva 2136 (EDO pairs)	4/8/16/32Meg 8/19/49/89
Aptiva 2137, 2140, 2143 (SDRAM)	16/32/64/128Meg 39/59/129
Aptiva A, M, 300, 500, 700 Series	4/8/16/32Meg 6/19/49/89
Aptiva C, S-Series (EDO pairs)	4/8/16/32Meg 6/19/49/89
Intellistation Models 6888, 6899	32/64/128/256Meg 64/139/279/549
Netfinity	Please Call
PC 300 PPM-PC300 EDO	4/8/16/32Meg 6/19/49/89
PC 300 GL (SDRAM) / PC 330 PL	16/32/128/256Meg 39/69/109/229/519
PC 330 Model 6577 (EDO pairs)	4/8/16/32Meg 6/19/49/89
PC 350 Models 6581, 6583	4/8/16/32Meg 6/19/49/89
PC 350 Model 6588 (pairs)	4/8/16/32Meg 6/19/49/89
PC 350 Model 6587 (EDO pairs)	4/8/16/32Meg 6/19/49/89
PC 730 Models 6875 6876 (pairs)	4/8/16/32Meg 6/19/49/89
PC 730 Model 6877 (EDO pairs)	4/8/16/32Meg 6/19/49/89
PC 750 Models 6885-6886 (pairs)	4/8/16/32Meg 6/19/49/89
PC 750 Model 6887 (EDO pairs)	4/8/16/32Meg 6/19/49/89
PC Server 313 (pairs)	4/8/16/32Meg 6/19/49/89
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IBM NOTEBOOK/LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NiMh/Li-on
Thinkpad i Series	32/64/128Meg	79/149/299	
Thinkpad 310E, ED, 315	16/32Meg	49/89	
Thinkpad 340, 345, 355, C, CS	4/8/16Meg	44/54/89	115/—
Thinkpad 360C, CE, CSE, P, PE	4/8/16Meg	44/54/89	105/—
Thinkpad 365X, 365XD	8/16/32Meg	29/49/79	105/—
Thinkpad 380, 380D, 380E, 385ED, 385XD	8/16/32/64Meg	49/79/139	110/238
Thinkpad 560E, 560X	8/16/32/64Meg	29/49/79/139	241/—
Thinkpad 600, 770, ED (SDRAM)	16/32/64/128Meg	39/79/139/299	—/239
Thinkpad 700, 720, 750, CS,375X	4/8/16/32Meg	59/89/129/219	140/175
Thinkpad 701, 701C, 701CS	4/8/16/32Meg	19/34/69/99	115/—
Thinkpad 755C, 755CD, CDV, CSE,CV	8/16/32Meg	59/79/129/219	140/271
Thinkpad 760C, CD, L, LD	8/16/32Meg	29/49/99	140/271
Thinkpad 760E, ED, EL, ELD	8/16/32Meg	29/54/99	140/271
Thinkpad 760EL, 760XL	8/16/32/64Meg	29/44/79/139	140/271
Thinkpad 765D, 765L	8/16/32/64Meg	29/44/79/139	140/271

GATEWAY MEMORY

Desk. Big Screen DS – SDRAM	16/32/64Meg	29/59/99
Desk. Big Screen DX – EDO (pairs)	4/8/16/32Meg	5/19/29/69
Family PC w/MMX – SDRAM	16/32/64Meg	29/59/99
GS-166, 200 Prof. System – SDRAM	16/32/64Meg	29/59/99
GS-166M, 200M MMedia System – SDRAM	16/32/64Meg	29/59/99
G6-200 Prof. System – SDRAM	16/32Meg	29/59
G6-Prof. M MMedia System – EDO	4/8/16/32Meg	5/19/29/69
Multimedia G-S Systems – SDRAM	16/32/64Meg	29/59/99
Prof. P-S Series – SDRAM	16/32/64Meg	29/59/99

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LASER PRINTER MEMORY UPGRADES

AMOUNT UPGRADED	1	2	3	4	5	8	16	32	64	128
Canon LBP 430	9	–	–	14	–	–	–	–	–	–
Canon LBP 860, 1260	–	9	–	14	–	39	98	98	–	–
Epson Action Laser 1150, 1600	5	9	–	14	–	29	39	–	–	–
Epson Action Laser II	59	–	89	–	119	–	–	–	–	–
Epson 8000, 1800, 4000, 4100, 4300	59	–	89	–	119	–	–	–	–	–
Epson 1200, 1500, 5000, 5200	–	30	–	60	–	–	–	–	–	–
HP 2, 2D	–	59	–	89	–	–	–	–	–	–
HP 3, 3D, 3P, 3Si	–	59	–	89	–	–	–	–	–	–
HP 4, 4M, 4Si, 4SiMX	–	59	–	89	–	–	–	–	–	–
HP 4MP, 4P	5	14	–	19	–	39	–	–	–	–
HP 4+, 4M+, 4V, 4Si/,	5	14	–	19	–	39	59	99	–	–
HP 5, 5M, 5MP, 5N, 5P, 5Si, 5MX	5	14	–	19	–	39	59	99	–	–
HP 5L, 6L	–	–	–	49	–	69	–	–	–	–
HP 6MP, 6P	9	19	–	29	–	39	59	99	–	–
HP 1100, 2100	–	–	–	29	39	39	59	–	–	–
HP 4000, 8000, 8100, 8500	–	–	–	–	–	–	–	–	149	–
HP Laser Jet 4050, 5000, (SDRam)	–	–	–	29	–	39	39	89	–	–
HP Laser Jet 4500, 8000, 8100, 8500	–	–	–	29	39	39	59	–	–	–
HP Design Jet 200, 220	–	–	–	19	–	39	–	–	–	–
HP Design Jet 230, 250C	–	–	–	19	–	39	59	99	–	–
HP Design Jet 330, 350C	–	–	–	19	–	39	59	99	–	–
HP Design Jet 600, 650C	–	–	–	19	–	39	–	–	–	–
HP Design Jet 700, 750C	–	–	–	19	–	39	59	99	–	–
HP Design Jet 700, 750C Plus, 755	–	–	–	19	–	39	59	99	–	–
HP Deskjet 1200C, 1200C/PS, 1600C,1600CM	–	–	–	19	–	39	59	–	–	–
IBM Laser 4029, 4037	–	–	–	29	–	39	–	–	–	–
IBM Laser 4039, 4079	–	–	–	29	–	39	–	–	–	–
Lexmark, Optra L, LX, R, RX	–	–	–	19	–	39	59	99	–	–
Lexmark, Optra 4026-1040, K Series	–	–	–	19	39	89	139	199	–	–
Lexmark Valuewriter 300,600	29	39	–	49	–	–	–	–	–	–
Lexmark Wowriter 200, 400, 600	29	39	–	49	–	–	–	–	–	–
Lexmark S Series	–	–	–	–	–	29	59	99	–	–
Panasonic 4426/4450†	–	64	–	108	–	–	–	–	–	–
Panasonic 4410/4430	–	64	–	86	–	–	–	–	–	–
Panasonic 4450	49	–	–	–	–	–	–	–	–	–
Panasonic 4430/5400	49	69	–	99	–	–	–	–	–	–
Panasonic 4440, 5410	49	–	–	99	–	–	–	–	–	–
Panasonic 8500	14	14	–	29	–	–	–	–	–	–
Sharp 9400, 9460, 9600, 9700†	49	59	–	99	–	–	–	–	–	–
Sharp 9500, L-N, 9700	49	–	–	99	–	–	–	–	–	–
Tektronics Phaser 140,240, 380	–	–	–	19	14	74	–	59	99	169
Tektronics Phaser 740,780,840	–	–	–	–	–	–	–	–	–	319

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COMPAQ MEMORY MODULES

Deskpro 450, 4100, 575, 590, 5120, 5133	4/8/16/32Meg	6/19/49/89
Deskpro 575, 5120, 5133, 5150, 5160 (EDO, pairs)	4/8/16/32Meg	6/19/49/79
Deskpro 2000, 4000, 6000 Series (EDO, pairs)	4/8/16/32Meg	6/19/49/79
Deskpro 2000, 4000, MMX (SDRAM)	16/32/64/128Meg	29/49/99/199
Deskpro 6000,	16/32/64/128Meg	34/59/109/229
Deskpro 5/60M, 5/66M, XS560 (quads)	4/8/16/32Meg	14/29/59/99
Deskpro XL 6150, 6200 (ECC pairs)	8/16/32/64/128Meg	Call
Presario 512, 520, 524, 660, 670, 672, 674, 860	4/8/16/32Meg	6/19/49/89
Presario 920, 924, 954, 974, 978, 992	4/8/16/32Meg	6/19/49/89
Presario 2130, 2137, 2150, 2170, 2180, 2360 (EDO pairs)	4/8/16/32Meg	6/19/49/79
Presario 4112, 4122, 4162, 4402 (EDO pairs)	4/8/16/32Meg	6/19/49/79
Presario 4524, 4528, 4529 (SDRAM)	16/32Meg	34/69
Presario 4704, 4706, 4710, 4712, 4714, 4716 (EDO pairs)	4/8/16/32Meg	6/19/49/79
Presario 4764, 4772, 4784, 4786 (SDRAM)	16/32Meg	34/69
Presario 4806, 4814 (SDRAM)	16/32Meg	34/69
Presario 7162, 7182, 9534, 9546, 9548, 9564 (pairs)	4/8/16/32Meg	6/19/49/89
Presario 9232, 9234, 9240, 9250, 9642, 9660 (pairs)	4/8/16/32Meg	6/19/49/89
Proliant 1000 5/66, 2000, R, 4000, R (quads)	4/8/16/32Meg	14/29/59/99
Proliant 1500, 1500R (pairs)	4/8/16/32Meg	14/29/59/99
Proliant 2000, 2500, 600 Series	4/8/16/32/64Meg	5/29/44/89/129
Proliant 5000, 5000R (pairs)	32/64/128/256Meg	Call
Prolinea 570, 5100, 5100, 5120, 5133 (pairs)	4/8/16/32Meg	6/19/49/89
Prolinea 5100, 5120, 5133, 5150, 5160 (EDO pairs)	4/8/16/32Meg	6/19/49/79
Prolinea 575E, 100E, 120E, 575MX (pairs)	4/8/16/32Meg	6/19/49/89
Prolinea 590MP, 5120MX (pairs)	4/8/16/32Meg	6/19/49/89
Prolinea 6150E, 6180E (pairs)	8/16/32Meg	29/49/89
Prosignia 300 5/75, 5/90, 5/120, 5/150 (pairs)	4/8/16/32Meg	14/29/59/98
Prosignia 500 5/90 5/120, 5/150 (pairs)	4/8/16/32Meg	14/29/59/98

COMPAQ NOTEBOOK/LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NiMh/Li-on
Armada 1100, 1110, 1120T, 1120, 1125	8/16/32/64Meg	29/44/79/139	104/—
Armada 1130, 1130T	8/16/32/64Meg	29/44/79/139	104/—
Armada 1500, 1520, 1530	8/16/32/64/128Meg	29/44/79/139	103/229
Armada1700, 3500, 7400	16/32/64/128Meg	39/79/149/299	—/219
Armada 4100, 4130, 4135T, 4135D (KI)	8/16/32/64/128Meg KII	29/49/99/149/299	—/219
Armada 4100, 4130, 4135, 4135D, 4136T (KII)	8/16/32/64/128Meg KII	29/49/99/299	—/299
Armada 4210T, 4220T	16/32/64/128Meg	49/99/139/299	—/299
Armada 6500	32/64/128Meg	79/149/299	—/219
Armada 7300, 7330, 7350, 7360, 7362, 7370, 7380, 7800	16/32/64Meg	44/79/139	—/221
Armada M1 7700 Series	16/32/64Meg	44/79/139	—/229
Armada SII Series 5230, 5231, 5233, 5266	16/32/64/128Meg	44/79/149/299	138/219
Armada SM Series 6334 (2)	16/32/64/128Meg	39/79/149/299	
Contura 4/25, 4/25CX	4/8/16Meg	39/49/89	115/—
Contura 4/20C, 4/20CX, 410C, 410CX	4/8/16Meg	39/49/89	104/—
Contura 420C, 420CX, 430C, 430CX	4/8/16/24Meg	5/29/49/89/99	104/—
LTE 5000, 5100, 5200, 5300, 5400 (KII)	8/16/32/64Meg KII	5/19/39/79	138/259
Presario 1060, 1062, 1020, 1030, 1210, 1080	8/16/32Meg	29/49/99	118/217
Presario All 1200, 1500, 1800 Series	16/32/64/128Meg	39/79/139/299	112/236

TOSHIBA LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NiMh/Li-on
Libretto 50CT, 70CT, 100CT	8/16/32Meg	39/69/99	—/161
Tecra 500CDT, CS, 510CDS, CDT, 520CDT, 530CDT	8/16/32/48/64/128Meg	22/44/79/119/139/289	231/239
Tecra 540, 550, 550CDT	8/16/32/64/128Meg	22/44/79/139/289	259/—
Tecra 700CS, 700CT (SDRAM)	8/16/32Meg	59/89/149	279/299
Tecra 710CDT, 720CDT, 730CDT, 750CDT, 750CDT, 740CDT	8/16/32/64/128Meg	39/49/89/149/299	279/259
Tecra 750CDT, CDM,DVD, 780 Series	8/16/32/64Meg	22/44/79/139	
Tecra 8000 Series	32/64/128Meg	79/149/299	
T2130 Series	4/8/16/24Meg	4/29/49/79	104/—
T1900, T4500, T4600, T4700, T4900 All Models	4/8/16/32Meg	33/49/79/129	104/—
T4400, T6400, T6600	16Meg	129	279/—
Satellite 1100, 1105, 1105S, 1110CT, 115CS	8/16/32Meg	39/59/99	104/—
Satellite 2000CDS, 2050CDS, 210CS, CT Series	8/16/32Meg	39/59/99	104/—
Satellite 2060CDS, 225CDS, 230CX	8/16/32/48/64/128Meg	24/44/79/115/139/289	196/208
Satellite 300, 305, 310, 315, 320, 325, 330, 335 Series	8/16/32/64/128Meg	22/44/79/139/289	196/208
Satellite 2500DS, 2515, 2535	16/32/64/128Meg	44/94/149/479	
Satellite 3000 Series	32/64/128Meg	79/149/299	
Satellite Pro 7400, 425, 410, 415, 420, 425, 430, 435 Series	8/16/32Meg	39/59/89	169/199
Satellite Pro 440CDT, 440CDX, 445, 460CDT	8/16/32/48/64/128Meg	24/44/79/115/139/289	196/208
Satellite Pro 465, 470, 480	8/16/32/48/64/128Meg	24/44/79/115/139/289	196/208
Satellite Pro 490	16/32/64/128Meg	44/79/139/289	189/199
Portege 610CT, 620CT	8/16/32Meg	39/59/89	—/199
Portege 650CT, 660CT	16/32/64/128Meg	59/89/139/479	—/240
Portege 7300, 7010	64/128Meg	149/399	

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S-Ram Cards	1/2/4/8Meg	79/119/189/229
Smart Media	2/4/8/16/32Meg	17/19/29/59/109
Compact Flash Adapter	15	Smart Media Adapter 65

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PC CARDS

Ethernet Combo (10 BT & 10 B2)	54.00
Kingmax 100 Base-TX	109.00
Calluna Tech Type III Hard Drive, 520 Meg	499.00
Calluna Tech Type III Hard Drive, 1GIG	599.00
PCMCIA Card Reader (Internal)	109.00
PCMCIA Card Reader (External)	109.00
CD Rom Kit (Card, Drive, Cables) 20X	299.00
DVD Rom Drive Kit (External)	799.00

NOTEBOOK, LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NiMh/Li-on
ACER Extensa 336/367/366/368	16/32/64Meg	49/79/139	
ACER Extensa 380, 391, 392, 393, 394, 395	16/32/64Meg	49/79/139	
ACERNote 760, 765, 782, 784, 786	4/8/16Meg	19/29/69	
ACERNote Light 356, 358, 359, 361 (pairs) edo	4/8/16Meg	19/29/69 ea	147/—
ACERNote Nuvo 971, 972, 372, 373, 374	8/16/32Meg	29/49/79	
ACERNote Pro 950, 954, 955, 957, 959 (pairs)	4/8/16/32Meg	19/29/69 ea	
ACER Travelmate		Call	
AST Ascentia A Series and M Series	8/16/32/64Meg	29/49/79/139	154/218
AST Ascentia 700, P50	8/16/32Meg	49/89/129	—/298
AST Ascentia 210, 230,250 (pairs)	4/8/16/20Meg	19/29/69/89 ea	—/168
AST Ascentia 800N, 810N, 900N, 910N	4/8/16Meg	49/59	105, 147/187
AST Ascentia 950N	8/16Meg	59/79	—/187
AST Ascentia M5230 J/M 5260X	16/32/64Meg	49/79/139	—/199
AT&T Globalyst 130	4/8/16Meg	4/29/69	103/—
Canon Innova Book 350CD, 360, 475 (pairs)	8/16Meg	29/69 ea	119/—
Canon Innova Book 480, 490 EDO (pairs)	8/16Meg	29/69 ea	119/—
CTX EZ Book 300 EDO (pairs)	8/16/32Meg	39/69/109 ea	138/—
CTX EZ Book 500, 600 Series	4/8/16Meg	19/29/69 ea	138/—
CTX EZ Book 700, 760, 770 (EDO) (pairs)	4/8/16/32Meg	19/29/69/109 ea	138/—
CTX EZ Book 760MT, 765MT (EDO)	16/32/64Meg	49/79/139	138/—
DEC HiNote Ultra 2000	16/32/64Meg	49/79/139	
DEC HiNote VP 520,525,535,545/150MMX (pairs)	4/8/16Meg	19/29/69 ea	119/259
DEC HiNote VP 5100, 5120	8/16/32/64Meg	29/49/79/139	119/—
DEC HiNote VP 5200, 5255, LS15, GT5, LT5	8/16/32/64Meg	29/49/79/139	119/—
DEC HiNote VP700, 703	16/32/64Meg	49/79/139	
Dell Inspiron 3000, 3200, 7000	16/32/64/128Meg	49/79/139/299	—/229
Dell Latitude CP, CPi Series	16/32/64Meg	49/79/139	
Dell Latitude LM, LM P166MMX (pairs)	4/8/16/32Meg	19/29/69/109 ea	—/245
Dell Latitude 433, C, CX	4/16Meg	49/79	119/—
Dell Latitude LX, M	8/16/32Meg	49/59/89	100/—
Dell Latitude XP, XPi, XPi CD M166ST (pairs)	4, 8/16/32Meg	19/29/69/109 ea	
Epson ActionNote 850, 650c, 660c, 690cx	4/8/16Meg	5/9/89	115/—
Epson ActionNote 880C, 880CE, 890, 810	4/8/16/32Meg	19/29/69/89	115/—
Fujitsu Lifebook 400, 500, 600 Series	8/16/32/64Meg	29/59/79/139	103/203
Fujitsu Lifebook 500, 900, 700, 900 Series	16/32/64Meg	49/79/139	103/203
Fujitsu Stylistic 500, Montego, Mojo	8/16/32/64Meg	29/49/79/139	—/203
Gateway 2000 Colorbook 4/33	4/8Meg	69/119	117/—
Gateway 2000 Solo Series (pairs)	4/8/16Meg	19/29/69 ea	199/—
Gateway Solo 2000, 2100, 2200 edo	8/16/32Meg	49/79/139	—/219
Gateway Solo 2300, 2500, 3100, 5100, 9100	16/32/64Meg	49/79/139	—/299
Hitachi C Series	8/16/32Meg	29/69/99	
Hitachi E Series, MMX Series	8/16/32Meg	49/69/129	119/219
Hitachi M Series	8/16/32Meg	49/69/129	104/—
Hitachi Visionbook Elite, Plus, Pro	8/16/32/64Meg	29/49/79/139	154/217
HP Omnibook 800	8/16/32/64Meg	49/79/129/149	—/145
HP Omnibook 2100 PII, 4100	8/16/32Meg	79/139/399	
HP Omnibook 4000C, CT, C	4/8/16Meg	49/54/89	126/—
HP Omnibook 5000CT, CTS, C, 5500CS, 5700	8/16/32/64Meg	54/79/149/299	126/—
Micron Go Back 233 Lite, 233, 266	16/32/64Meg	49/79/139	
Micron MilleniaTransport Pentium (pairs), MRX	8/16Meg	29/69 ea	
Micron MilleniaTransport VLX P133 (pairs)	8/16/32Meg	19/29/69 ea	
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NEC Ultralite Versa, E, V, MF	4/8/16/32Meg	24/69/149	133/—
NEC Versa 2600 Series (pairs)	4/8/16Meg	19/29/69 ea	
NEC Versa 4000, 4050,4080, 4000, 4230	4/8/16/32/64Meg	29/49/79/149	—/219
NEC Versa 6000, 6050, 6300	8/16/32/64Meg	39/79/149/289	
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TI Extensa 550, 555, 560, 565, 570 (pairs)	4/8/16Meg	19/29/69 ea	181/—
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CTRTM45	Pentium III 550	17"	128MB PC 100	19GB UDMA	32X	AGP/8MB	ATX/BX Chipset	Windows 98	$61/Month	$1729.99

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Tiger M-571 AT Socket 7

M-571—AT SOCKET 7 with 4 PCI/3 ISA, PCI Sound &PCI Video with 4MB Onboard

Tiger 571 Form Factor: **AT** • CPU: **Socket 7** • Bus Speed: **Up to 75 MHz** • Onboard Video: **PCI 4MB** • Onboard Audio: **YES** • PCI Slots: **4** • ISA Slots: **3** • Memory: **2DIMM/4SIMM** • Max Memory: **128/256 MB**

Tiger M-598 AT Super Socket 7

M-598—AT SUPER SOCKET 7 with 3 PCI/2 ISA, PCI Sound & AGP Video with 8MB Onboard

Tiger 598 Form Factor: **AT** • CPU: **Super Socket 7** • Bus Speed: **Up to 100MHz** • Onboard Video: **AGP 8MB** • On Board Audio: **YES** • PCI Slots: **3** • ISA Slots: **2** • Memory: **3DIMM** • Max Memory: **768 MB**

Tiger ATX 6KE LX, 6BA+ BX Slot 1 With AGP

Motherboard Includes: Motherboard with cable and manual.

Tiger 6KE LX Form Factor: **ATX** • CPU: **Slot 1** • Bus Speed: **Up to 66 MHz** • PCI Slots: **4** • ISA Slots: **3** • Memory: **3 DIMM Sockets** • Max Memory: **384 MB**

Tiger 6BA+ BX Form Factor: **ATX** • CPU: **Slot 1** • Bus Speed: **Up to 100MHz** • PCI Slots: **5** • ISA Slots: **2** • Memory: **4 DIMM Sockets** • Max Memory: **1024 MB**

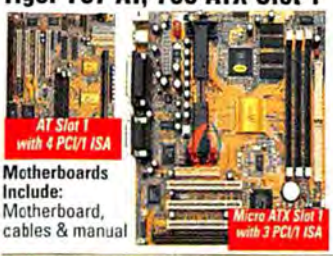
Tiger 5EMA+ ATX Super Socket 7

Motherboard Includes: Motherboard with 1MB Cache; cables, manual

Tiger 5EMA+ Motherboard Features At-A-Glance

Form Factor: **ATX** • CPU: **Socket 7** • Bus Speed: **Up to 100 MHz** • AGP Slots: **1** • PCI Slots: **5** • ISA Slots: **2** • Memory: **3DIMM Sockets** • Max Memory: **768MB**

Tiger 767 AT, 760 ATX Slot 1



AT Slot 1 with 4 PCI/1 ISA

Micro ATX Slot 1 with 3 PCI/1 ISA

Motherboards Include: Motherboard, cables & manual

Tiger 767 Form Factor: **AT** • CPU: **Slot 1** • Bus Speed: **Up to 100 MHz** • Onboard Video: **8MB AGP** • Onboard Audio: **YES** • PCI Slots: **4** • ISA Slots: **1** • Memory: **DIMM** • Max Memory: **768 MB**

Tiger 760 Form Factor: **Micro ATX** • CPU: **Slot 1** • Bus Speed: **Up to 100MHz** • Onboard Video: **8MB AGP** • Onboard Audio: **YES** • PCI Slots: **3** • ISA Slots: **1** • Memory: **DIMM** • Max Memory: **768 MB**

MOTHERBOARD SPECIFICATIONS / MOTHERBOARD ONLY

Motherboard Design	Processors Supported	Item No.	1-2 units	3-5 units	6+ units
Tiger 571 AT including Wave Table sound and PCI video	**AMD** Up to K6-300 & K62-266 **Intel** Pentium up to 233 MMX **IBM/Cyrix** Up to PR300	MB1-C-1B	$75.99	$70.99	$65.99
Tiger 2011 ATX including 75MHz Bus and Ultra DMA/33	**AMD** Up to K6-300 & K62-266 **Intel** Pentium up to 233 MMX **IBM/Cyrix** Up to PR300	MB2-PA-2011	$39.99	$36.99	$34.99
Tiger 598 AT including 1MB Cache, Wave Table sound and PCI video	**AMD** Up to K6-2/450; K6-3/400 **Intel** Pentium up to 233 MMX **IBM/Cyrix** Up to PR366	MB1-E-9A	$82.99	$79.99	$75.99
Tiger 5EMA+ Super Socket 7 1MB Cache	**AMD** Up to K6-2/450; K63-400 **Intel** Pentium up to 233 MMX **IBM/Cyrix** up to MII 366	MB1-T-7B	$74.99	$72.99	$69.99
Tiger 767 AT Slot 1 with Sound & AGP video	**Celeron** up to 433MHz **Intel** Pentium III up to 500MHz	MB1-E-5A	$97.99	$95.99	$91.99
Tiger 760 Micro-ATX Slot 1 w/Sound & AGP video	**Celeron** up to 433MHz **Intel** Pentium III up to 500MHz	MB1-E-6A	$96.99	$94.99	$91.99
Tiger 6KE LX ATX Slot 1	**Celeron** up to 433MHz **Intel** Pentium III up to 333MHz	MB1-T-10A	$42.99	$40.99	$38.99
Tiger 6BA+ BX ATX Slot 1	**Celeron** up to 433MHz **Intel** Pentium III up to 550MHz	MB1-T-9B	$84.99	$82.99	$79.99

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#CP2-K62-400 400 3DNow!	$99.99	$94.99	$89.99*
#CP2-K62-450 450 3DNow!	$135.99	$129.99	$122.99*
#CP2-K63-400 400 3DNow!	$219.99	$209.99	$199.99*
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#CP2-6X366 MII 366 CPU	$72.99	$69.99	$65.99*
#CP2-P233 Pentium 233 CPU	$46.99	$43.99	$39.99

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#CP2-CI366 Intel Celeron **366** processor***	$75.99	$73.99	$71.99
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Will Your Next PC Be a Cell Phone?

WOULD YOU BUY A PC that lacks a keyboard, mouse, serial port, or Windows? You might, but you wouldn't call it a PC. Take the new digital TV recorders from Replay Networks and TiVo. These devices cost about $700 each, including downloadable program listings, and they share plenty of characteristics and parts with garden-variety PCs—like off-the-shelf microprocessors, modems, and hard drives. They even have operating systems: TiVo is based on the increasingly popular Linux.

Where those devices differ from PCs is in their simplicity, purposefulness, and inflexibility. They're appliances meant for a single purpose—recording TV shows, in this case—not contortionists that can do everything from processing photos to ordering pizzas.

A few years ago, the buzzword was "network computer." Now that the network computer has turned out to be—surprise!—the networked PC, attention has turned to the evergreen concept of the "information appliance." The idea is that our PCs, jacks of all trades but masters of none, will be supplanted by devices designed to do just one thing and do it extremely well.

The idea is that PCs will be supplanted by devices that are designed to do just one thing and do it extremely well.

NICHES AND GLITCHES

IN AN ERA OF PLUMMETING PC prices, die-hard users find it hard to believe that consumers will choose a plethora of dedicated devices over a single versatile computer. But game consoles have already shown how it can happen. The truth is that, barring some sort of massive recession, both PCs and appliances will do well. They'll simply have their own niches.

In areas where the PC ain't broke, there's little point in fixing it. A couple of years ago, vendors touted Internet phones that could do precisely three things: collect e-mail, browse the Web, and dial phone numbers. They were supposed to go into the kitchens of America. They ended up going absolutely nowhere because they were too expensive, too limited, and too lame. And nobody's managed to come up with a remotely sensible replacement to perform any of the office functions—word processing and the like—that the PC does so well in a single package.

But we'll likely see standoffs as one shape-shifting device assumes characteristics of another. In this corner: The dedicated game console with aspirations to become a Web-connected communications tool. In the other: The Web-connected PC that aspires to be a great game machine. Set-top boxes that surf the Web will duke it out with both. The winners? Consumers, who'll benefit from healthy competition.

BUY OR CELL?

THERE WILL ALSO be clear victories for appliance makers. With the right hardware and software built in, a PC could perform the same tasks that ReplayTV and TiVo can do. But most couch potatoes would probably prefer to watch TV on a big screen with the help of a dedicated remote, not a wireless keyboard and mouse. The computer-centered do-it-all entertainment center, pioneered a few years back by Gateway's big-screen Destination machines, did not exactly set the world on fire. When was the last time you heard someone say "I'll reboot the TV?"

In the mobile market, portable PCs of every size and shape will begin mixing it up with phones that are light and handy but have underdeveloped keyboards and displays. This time, the cell phone may play the PC's customary role of Swiss Army Knife. Why carry a separate pager, organizer, e-mail device, and Web browsing tool when a single phone can do them all? And as voice recognition improves, the phone may become even more compelling. Why be tethered to a keyboard when you can dictate your work, have it converted to text, and read it on your phone's Web-connected screen in a matter of minutes?

Will PCs go away? Hardly. People the world over will continue to rely on them as the most functional and affordable single solution. To reach the vast market of customers who don't depend on them, PC vendors will need a way to deliver truly useful machines in far simpler and more dependable packages.

If that doesn't happen soon, bet on the phones.

PC World Contributing Editor Stephen Manes is cohost of Digital Duo, *a new series appearing on public TV stations nationwide, and coauthor of* Gates, *a biography of Microsoft's chairman.* ■

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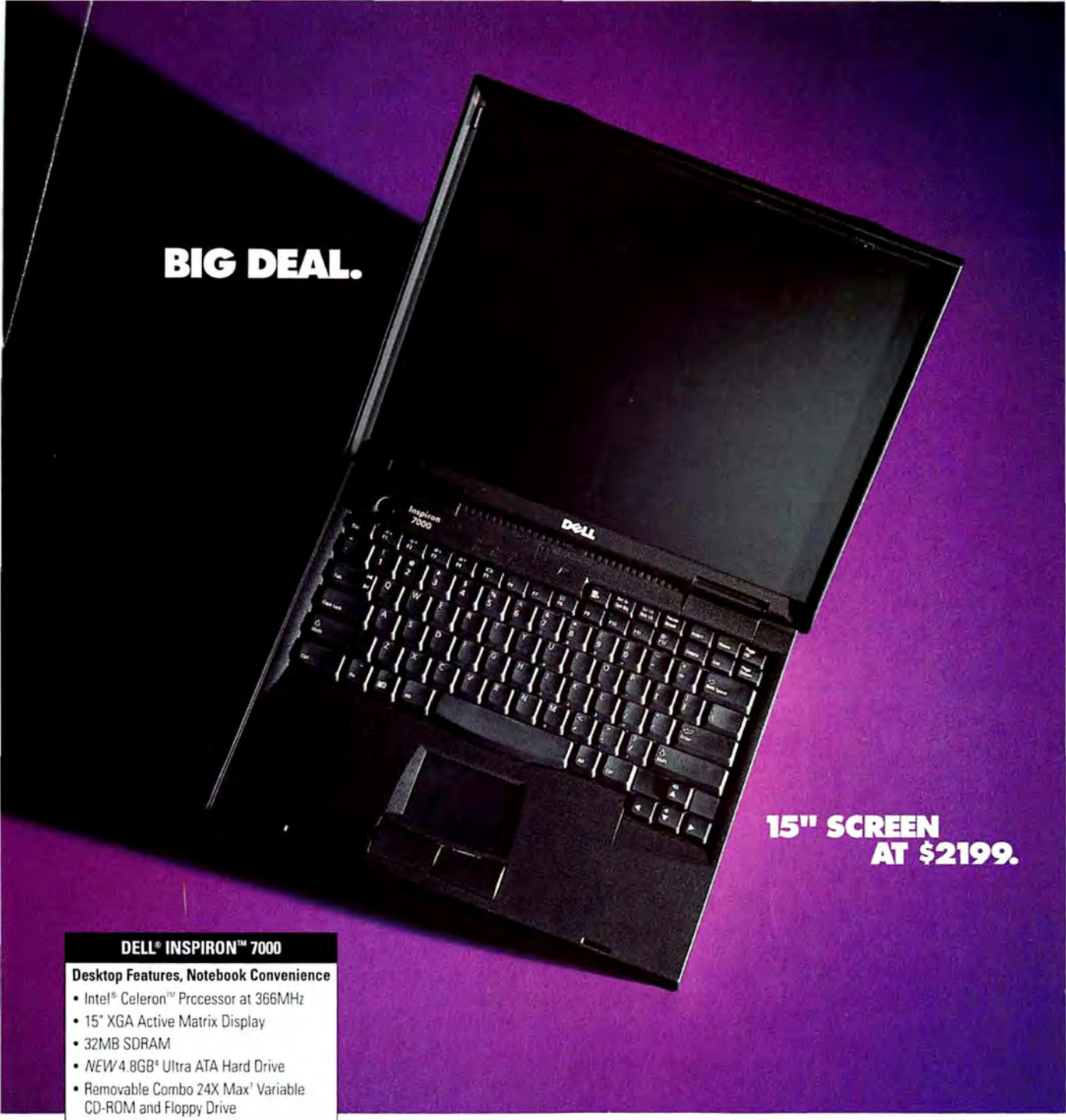

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- MS Windows NT Workstation 4.0
- APC SurgeArrest Pnote Pro

$3549

Business Lease[15]: $119/Mo., 36 Mos.

E•VALUE CODE: 03637-890635

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- 15" XGA Active Matrix Display
- 32MB SDRAM
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E•VALUE CODE: 03637-890619

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- 32MB SDRAM
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- Microsoft Works Suite 99 with Money 99 Basic
- MS Windows 98

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Business Lease[15]: $60/Mo., 36 Mos.

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- harman/kardon HK-195 Speakers
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- Microsoft Windows® 98/IntelliMouse®
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