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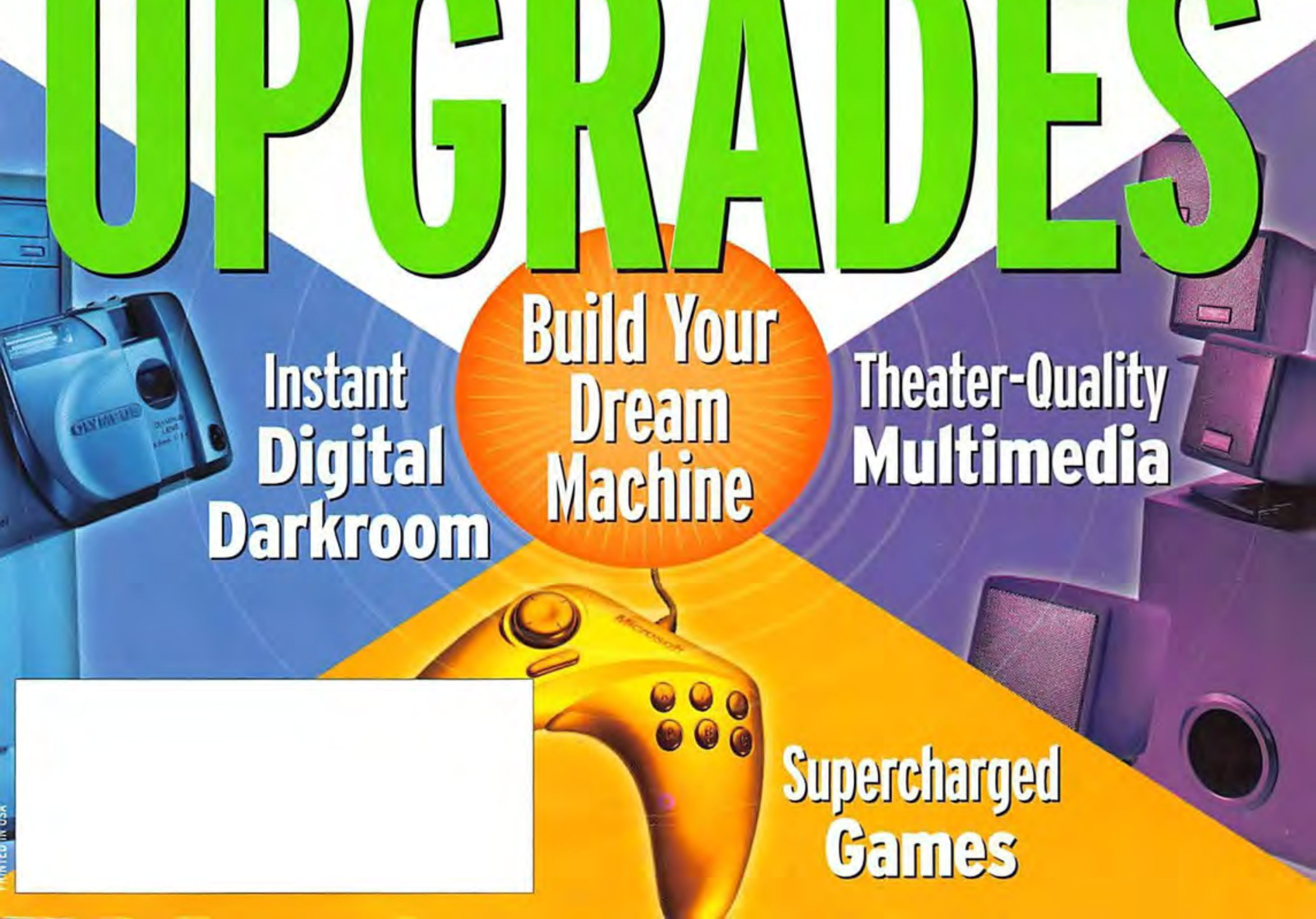

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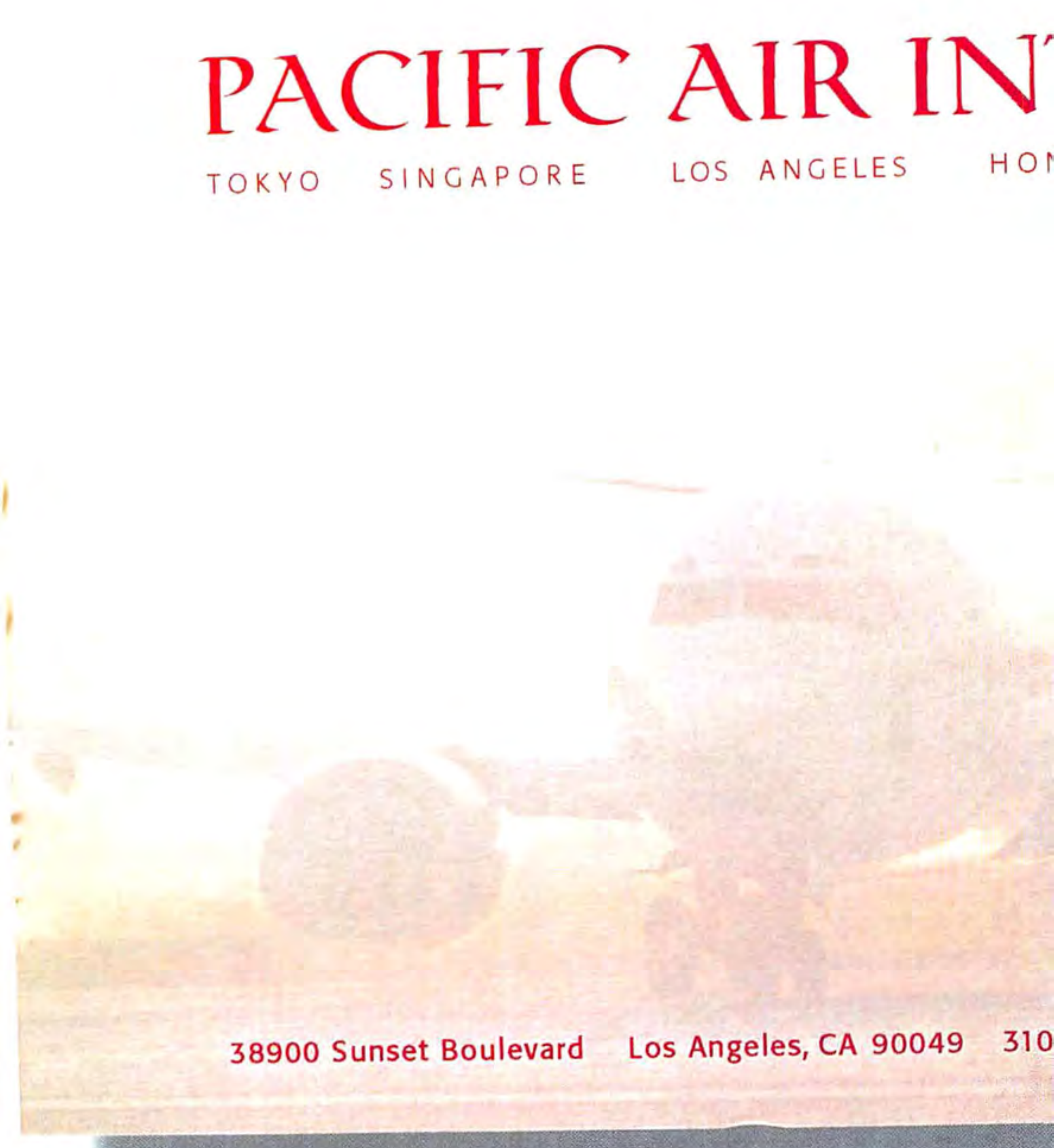

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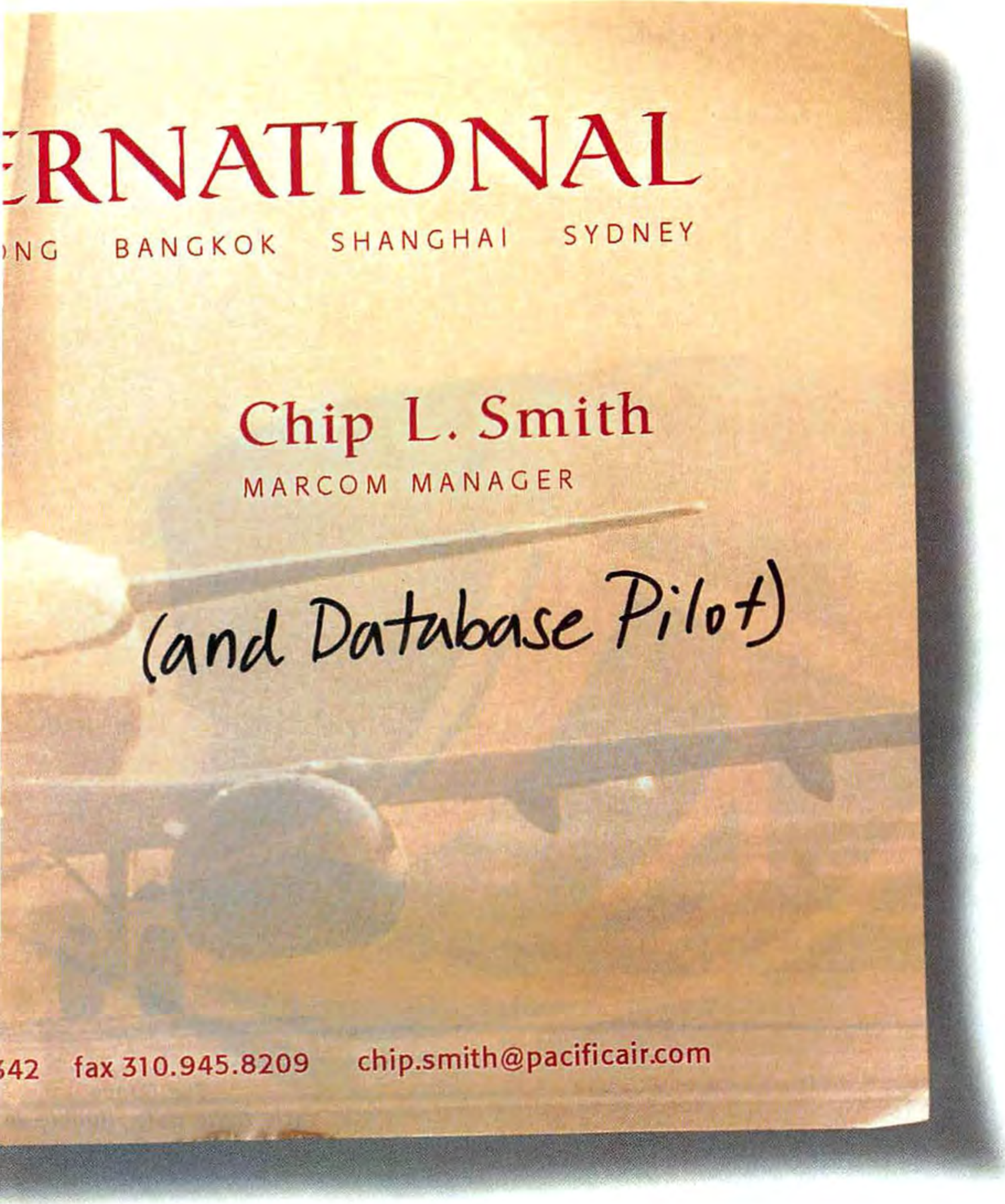
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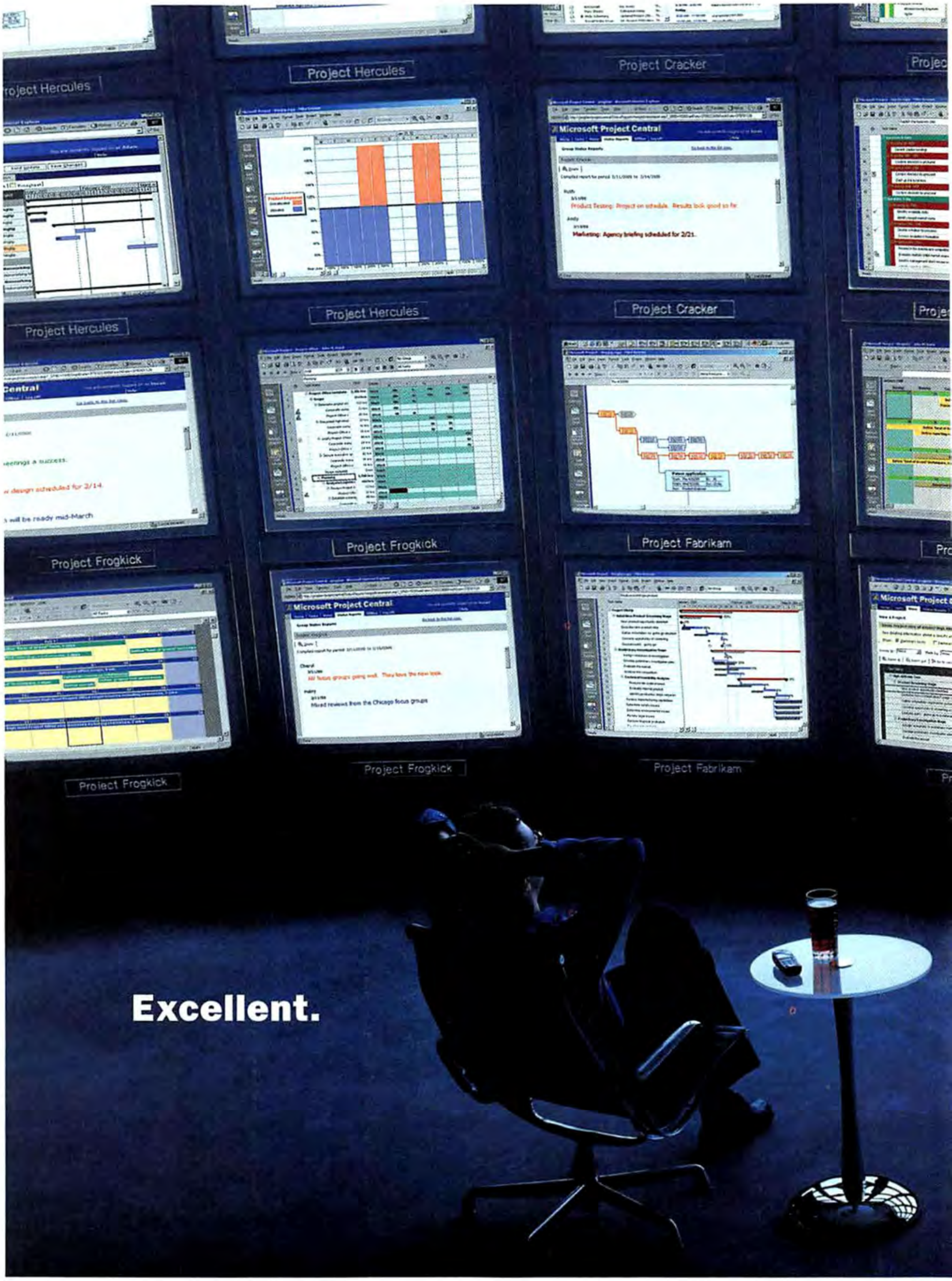
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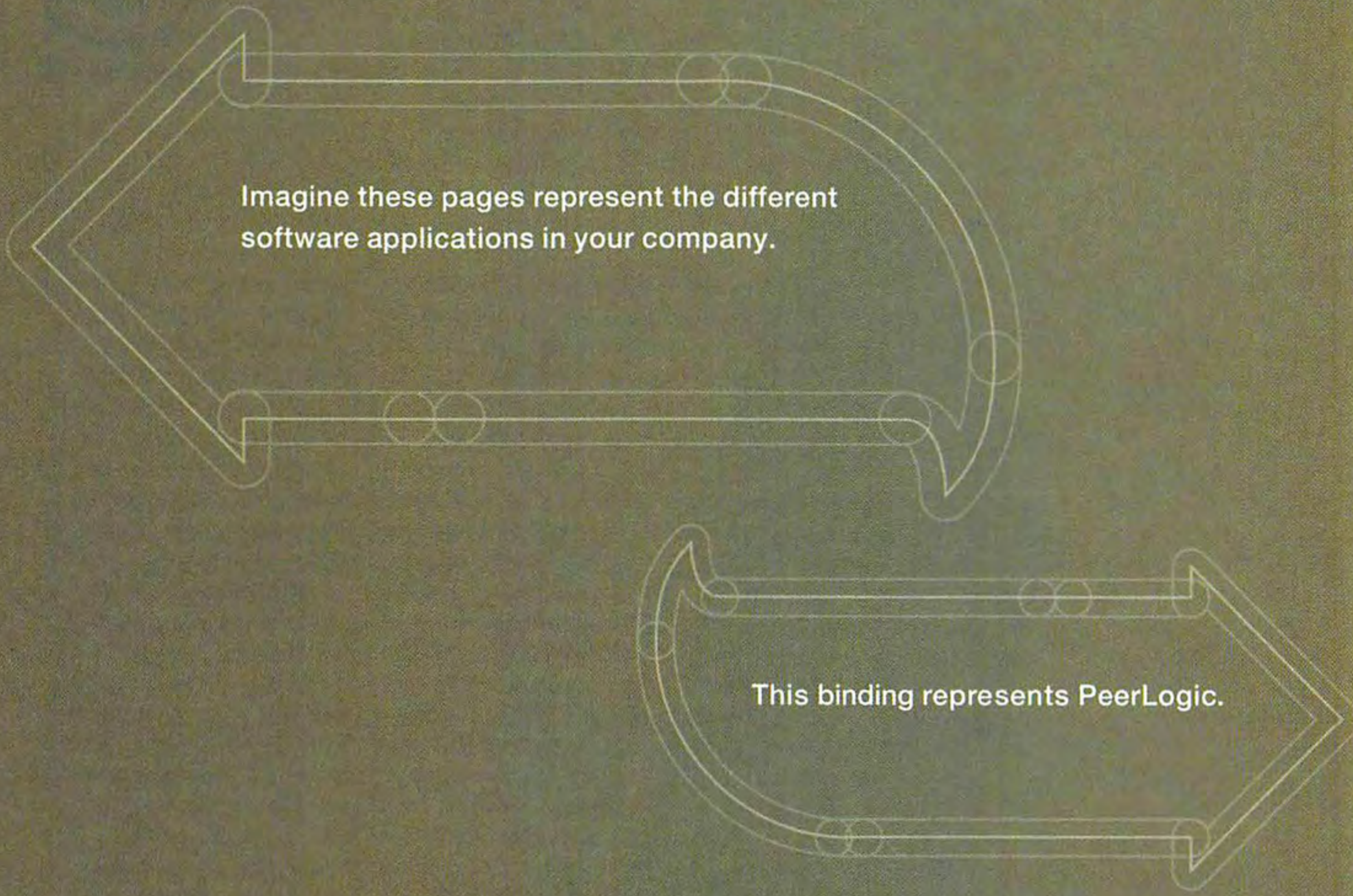

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114

COVER STORY

114 BUILD YOUR DREAM MACHINE

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169

Additional material available online at www.pcworld.com

FEATURES

129 HOW TO STOP SEARCHING AND START FINDING

WEB UTILITIES Tired of searches that yield 10,000 irrelevant links? With a billion-plus sites, the Web is the mother of all haystacks, so you need powerful search tools to isolate the elusive data you seek. We compare leading search engines, directories, and utilities and spot the ones best at tracking down that precious needle.

146 TEN FOR THE ROAD

REVIEW These days, some desktop-replacement notebooks seem intent on matching their stationary counterparts feature for feature and ounce for ounce. We cut back on the hardware options and found ten very mobile two-drive contenders for your next trip out of the office. Don't forget, when you hit the open road, you want a portable that doesn't take both hands to lift.

169 MAKE YOUR PC HACKER-PROOF

HOW-TO Dead bolts and an alarm system keep thieves out of your house when you're away. But when you're wired to the Internet, how do you protect your PC from hackers? A personal firewall will alert you if anything's amiss and keep the intruders at bay. We put six products through their paces to see which ones do the best job of barring the doors and windows.

181 LOCKING OUT THE DISABLED

CONSUMER ISSUES

The wheelchair ramps, Braille directions, and closed captions required for access in the real world have no virtual equivalents at far too many Web sites—but it doesn't have to be that way. And accessibility doesn't have to be costly or difficult. A *PC World* special report. ▶

TOP OF THE NEWS

54 ALL ABOUT (WINDOWS) ME
Windows Millennium is the latest OS in the 9x line of descent. How much does Me improve on Win 98, and what's in it for you?

62 AT-WORK PRIVACY RULES CHANGE
Employees are using a law from the 1930s to protect their e-mail from nosy bosses.

64 FREE DSL, SPONSORED IN PART BY...
The speed boost is outstanding, so if you can get used to the ads, you'll love no-fee DSL.

66 DVD-RAM TAKES ON THE VCR
The recordable DVD format doubles its carrying capacity and becomes a major player.

72 SO FEW PARTS, SO MUCH DEMAND
Low supplies of flash memory and other key components create a seller's market.

NEW PRODUCTS

88 HP Vectra VL400 and Micron ClientPro Cn PCs, Canon PowerShot S100 Digital Elph camera, Sys TaskMaster 600D PC, Compaq Presario 1200XL-450, Mimeo.com and NowDocs.com Net printing, Sony Mavica MVC-CD-1000 digital camera, and more.

HERE'S HOW

224 WINDOWS TIPS
Make Windows Help more legible, create shortcuts to specific topics, capture great screen shots with ease.

228 ANSWER LINE
End Windows boot-up error messages, create two mail in-boxes with one Outlook.

234 INTERNET TIPS
Use Netscape to read your AOL e-mail, copy Internet data into Office, access free news servers online.

238 WORD PROCESSING
Add eye-catching borders to text and graphics, find elusive DOS files.

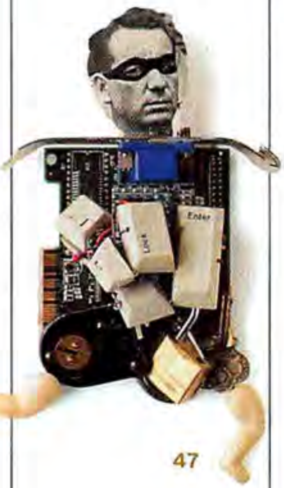
240 HARDWARE TIPS
Connect USB devices, add a USB hub, protect your system settings.

RESOURCES

18 HOW TO CONTACT PC WORLD
21 COMING UP
243 MAIL-ORDER SHOPPING GUIDE
248 PC WORLD MARKETPLACE
268 ADVERTISER INDEX

62

101



47

198

TOP 100

198 A FEW TICKS SHORT OF A GIGAHERTZ
Subgigahertz systems: slightly slower than 1-GHz PCs but lots cheaper.

200 TOP 10 POWER PCs
204 TOP 10 MIDRANGE PCs
208 TOP 10 BUDGET PCs
212 TOP 15 NOTEBOOK PCs
214 TOP 15 HOME PCs
217 TOP 10 LASER PRINTERS
219 TOP 10 SCANNERS
221 TOP 10 17-INCH MONITORS
223 TOP 10 GRAPHICS BOARDS

DEPARTMENTS

21 UP FRONT
25 LETTERS
33 CONSUMER WATCH
Online car dealers get the Tucker treatment.

39 ON YOUR SIDE
Do you have to pay to return defective parts?

43 WEB SAVVY
Harry McCracken tests online incentive programs and finds the best currency of all.

47 HOME OFFICE
Steve Bass gives his PC maximum security.

51 BUGS AND FIXES
Trouble with Norton AntiVirus, security patches for Internet Explorer.

270 FULL DISCLOSURE
Steven Manes finds the key to the dot-com mortality rate in *Citizen Kane*. Rosebud?

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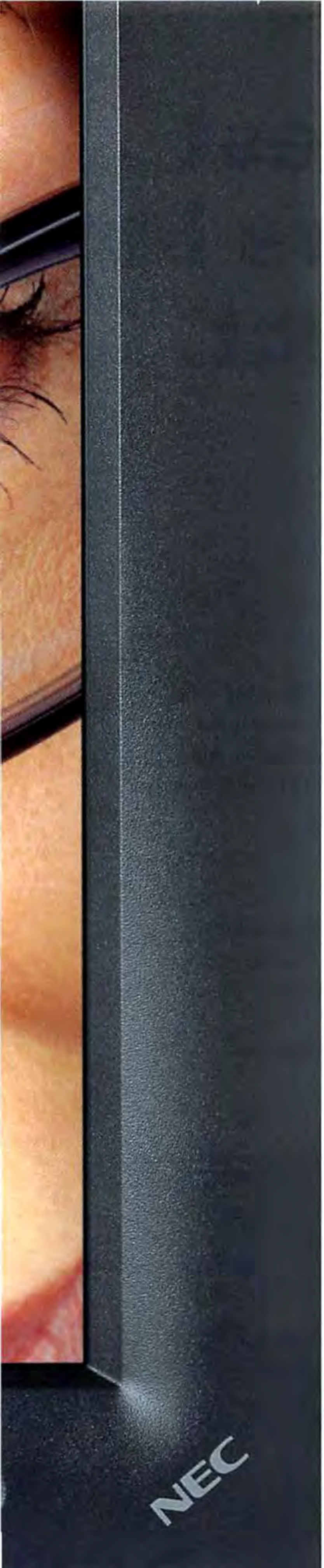

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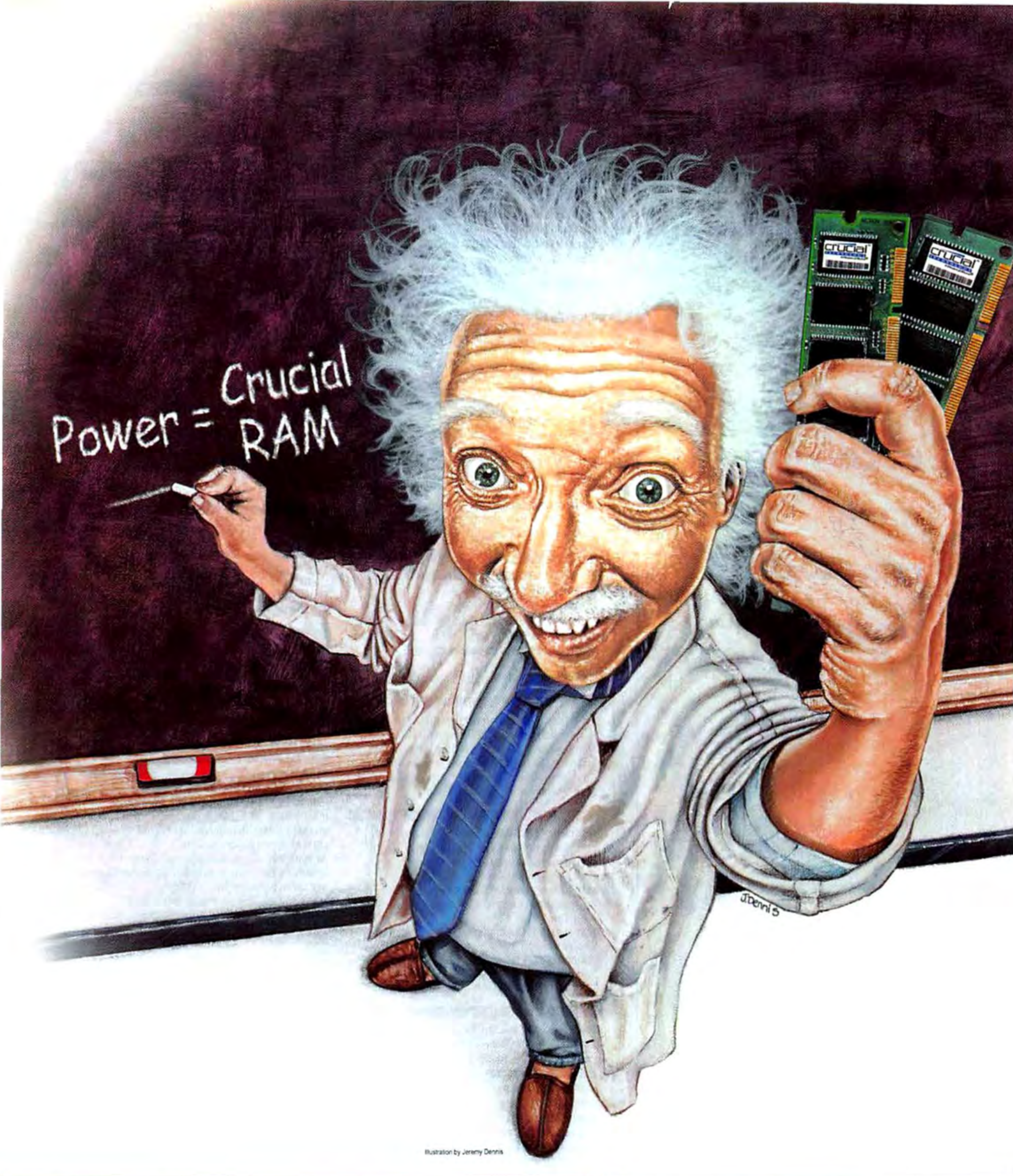
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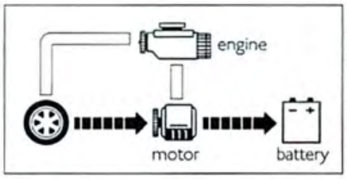

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What Readers Think PC World Should Do

OUR REQUEST FOR YOUR OPINION in the August edition of this column brought a flood of thoughtful comments. Roughly two-thirds of you approved of the modest changes planned for *PC World*—namely that the magazine will pay more attention to business uses of technology and expand the range of gear it reviews, but will not change its name or its core mission of covering PCs.

Typical was the note from Lewis Locke, who wrote: "I am especially heartened that *PC World* will resist the trend to declare the personal computer a dinosaur." Or Kristen Sterbenz of Odenton, Maryland, who applauded the magazine for "not jumping on the e-bandwagon. Thanks!"

THE DISSENTERS

THE OTHER THIRD expressed reservations. Many, like James Manseau of Rocky Point, New York, worried that the new accent on business would blur *PC World's* focus on products: "I am one of the three out of four subscribers whom you noted are managers (a senior manager of a fairly large regional bank), but if I wanted to read a business magazine I'd choose *Business Week* or the *Wall Street Journal*.... I want you to continue to educate and keep me current on new technologies, products, and services."

PHOTOGRAPH: ERIK BUTLER

We won't try to tell you how to run your business. **Our mission** is just to help you **find the best tools.**

Not to worry. *PC World* can't—and won't—try to tell you how to run your business. Our mission is simply to report on the best tools to accomplish whatever you want to do. For examples, see our reports on traveling notebooks (page 146), Microsoft's new Windows Millennium Edition (page 54), and search engines that really produce results (page 129).

Others, like Tom Cabarga of Chapel Hill, North Carolina, feared that *PC World* would head in a direction like that of *PC Computing*, which recently renamed itself *Smart Business for the New Economy*: "*PC Computing* went from being an interesting computer magazine to being a slick but numbingly dull business mag; I won't be renewing my subscription.... Many of your readers are doctors, lawyers, engineers, or social workers who couldn't care less about selling widgets on the Web."

I guess instead of a "business" focus I should have said a "work" focus. But you can count on *PC World's* business-oriented articles to maintain broad appeal. Take Jeff Sengstack's story on firewalls ("Make Your PC Hacker-Proof," page 169). The opening anecdote focuses on two working professionals with Internet connections. Both were attacked by hackers. But only one suffered damage, since the other had installed a firewall on his system. Sure, that article is pitched squarely at businesspeople, but the same advice applies to anyone with "always-on" Web access.

ALL WORK, NO PLAY?

STILL OTHER READERS, like David Housholder of Marietta, Georgia, warned against doing away with the fun part of computers: "Do I need to hear about business computing, home computing, Internet issues, or hobby use? Yes! I have a home office and use computers for my work. I am also the consultant/tech support for our main office...advise the international office on hardware and software purchases...[and] design and maintain our company's international Web site. And I like to have fun with computers as well."

We do too, and that's why this month's cover story (page 114) shows how to upgrade your machine to produce great sound and graphics, while speeding up just about everything you do.

Finally, we heard from readers—H. M. White among them—who reminded *PC World* to stay accessible to anyone who invests the time to read it: "Please don't forget those of us who are lucky just to turn on the computer without it exploding.... We depend on folks like *PC World*, which has been my 'college of electronic science' for three years."

Good thoughts, all—and all part of *PC World's* future. Okay, enough from the soapbox. Next month we'll move on to other matters. In the meantime, feel free to write me at eddir@pcworld.com.

COMING UP IN OCTOBER

2010–A PC Odyssey: Will the PC become landfill, or will it play unexpected roles in our lives? Our experts peer into the future.

Beyond the Beige Box: Sleek lines and color are just the beginning. Simplified PCs and a new world of Net devices await us.

Cells Are Ringing: We scope out wireless providers, plans, and phones so you can choose the right one and avoid close calls.

When Good Drives Go Bad: We evaluate four backup solutions and tell you which one's best for safeguarding your irreplaceable data.

Scam-Proof Surfing: Don't be a sitting duck! We uncover the latest auction scams and help you outsmart the Web wolves.

Kevin McKean is editorial director of PC World. ■

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YOUR TAKE ON: Windows 2000 ◆ Napster ◆ DVD ◆ Best PC of 2000

ILLUSTRATION: ROBERT NEUBECKER

DEBATE OVER NAPSTER

WE MUSICIANS have a hard time with the cavalier attitude of some people toward copying music without permission ["New Wave Music," July]. Similar concerns arose when audiocassettes first came along. But now people are posting these copies on the Internet, where unlimited numbers of other people can download them for free. I'm not by any stretch defending major record labels. I just don't understand why everyone feels bad for the consumer. What about the artist?

"Hits & Misses" in your "Best Products of 2000" [July] states, "Despite My.MP3.com's and Napster's legal troubles, accessing anyone's CD collection via Web connection was très cool." That's intellectual looting. It's not a birthright to have free music. With this technology and this attitude, intellectual property is becoming public domain the moment it's released. The musicians and artists I know are trying to make a living and feed their families. Why should anyone continue to produce worthwhile art, music, books, or poetry without the chance of earning at least something for their effort?

George Marinelli Jr.
Guitarist, Bonnie Raitt's band
via the Internet

I DON'T THINK downloading songs on Napster should be against the law. My son has this software and downloaded about ten songs. Night after night, I would hear him play them on the computer. I liked three of them so much (all from the same band) that I went out and bought the CD so I could play it while away from my PC. It was only thanks to Napster that I heard these songs in the first place. So to me, it is simply great advertising.

P. Reynolds,
via the Internet

CROSS FIRE

Windows 2000: A PC Nightmare...

IF I DIDN'T KNOW BETTER, I'd suspect that Scott Spanbauer set out to write a humorous article instead of a serious critique ["Windows 2000: The First 100 Days," *Top of the News*, July].

Why any sane person would tackle this operating system—based on this article, at least—is a mystery to me! It's a bit like reporting on an automotive battery that will last for 10 years and give great power to your car *but* is likely to blow your audio system, short your starter motor, wipe out your headlights, and indeed knock out your entire electrical system!

Yes, we all know how frustrating Windows 95 and 98 freezes can be. But compared to the horror stories in this article, they're a walk in the park—especially for people like me who are not very computer savvy.

Tom Focone, Plainview, New York

...or a Dream of an OS?

AT WORK WE ALL USE Windows 2000 (we're part of the IT department). It's not perfect, and it took us a few tries to load the beast on our machines as we figured out which software worked and which needed to be upgraded. We also had to ditch some hardware that wasn't compatible. But overall I love Win 2000.

Since it was loaded on my PC, it has crashed less than once a month. I leave it on all the time (so I can remotely connect from home), rebooting once monthly. Corrupt documents that would crash Win 95 machines left and right couldn't bring my Win 2000 system down. And networking was a breeze: It auto-detected our network and set itself up.

For you home users who are curious about Win 2000, get it and dual-boot your machine—then you can have the best of both worlds.

Mark Steudel, Seattle

STILL BURNING OVER PRIVACY

YOUR SPECIAL REPORT "Privacy 2000" [June] was an excellent wake-up call to all those who use the Internet.

Electronic privacy is the civil rights issue of the 21st century and will not go away. If we in the e-commerce community do not make a sustained, good-faith effort to contribute to this debate, we will ultimately be the losers.

Michael L. Pinkerton,
Director, Institute of
Government Affairs
and Public Policy
Sacramento, California

DVD MOVIES: NOT IN FLIGHT

YOUR RECOMMENDATION to forgo the generally substandard in-flight movie in favor of a DVD movie on your laptop is an excellent one ["Spin City," July]. But check with the airline beforehand—some disallow the technology. About 30 minutes into an engrossing DVD film on my last trip with Lufthansa, I was ordered to shut it off. They don't permit even CD use, and seem to lump these drives with wireless devices, the banning of which I can understand.

Kurt-Owen Richards, New York

TRAVEL AND THE WEB

YOUR ARTICLE "Travel Web Sites: Just the Ticket?" [July] was well written and very informative. I've even added some of your links to my favorites. With this glowing review it might surprise you to know that I've owned a travel agency for the last 17 years. We in the travel industry embrace the Web and use it as an additional selling tool. It has helped our clients become more informed travelers.

Gregg Bartlett, Ft. Lauderdale, Florida

BEST PC OF 2000?

IN "BEST Products of 2000" [July], *PC World* picked the HP Vectra series as best corporate PC. But in "PC Reliability & Service: Things Fall Apart" [July], HP is rated as Fair for work PCs. In the ▶

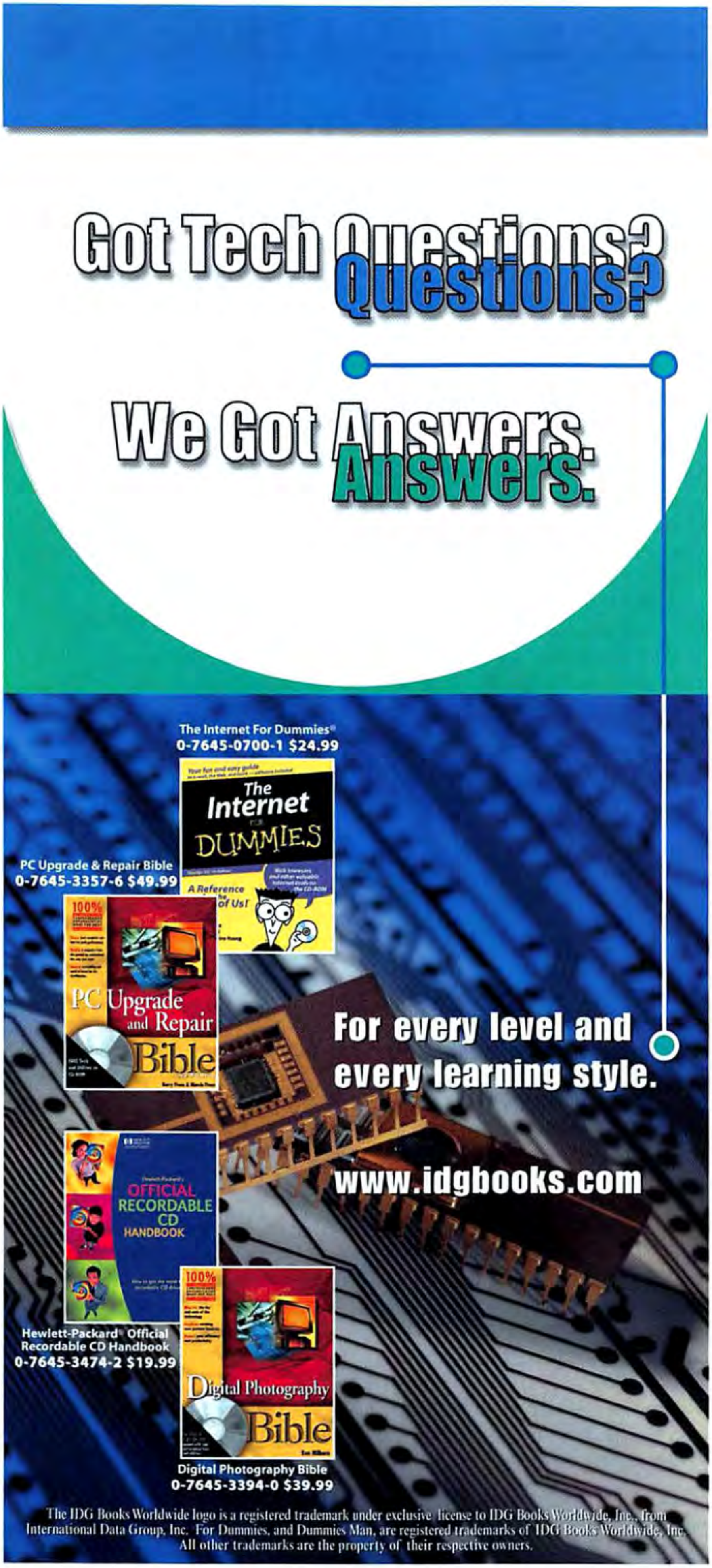

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chart "Readers Rate Work PCs" (same article). HP gets the comment "Low satisfaction all around."

Jay Wilford, Gig Harbor, Washington

HOW DID YOU come to your conclusion? Dell has long been the top-rated computer maker on your *Top 10 Power PCs* chart.

Timothy S. Pereira
West Palm Beach, Florida

Editors' response: For this year's World Class Awards, we recommended the HP Vectra as the Best Corporate PC for its features, performance, and expandability. Dell's PCs weren't as innovative as the Vectras.

Although HP did not rank high in our PC Reliability and Service survey, we still view its Vectras as strong corporate PC candidates, for the reasons given above.

–Grace Aquino and Eric Dahl

PC World *welcomes your letters to the editor. Send e-mail to letters@pcworld.com.* ■

CORRECTIONS AND CLARIFICATIONS

CLARIFICATION: August's "PC Repair Undercover" reported stores' responses to our findings. Circuit City representatives contacted *PC World* after press time and said they determined that their original statement to us on the company's repair policy was partly incorrect. Circuit City will repair products not purchased at its stores if the items are out of warranty and the stores carry both the manufacturer and the model. Circuit City doesn't carry the models we used–Compaq Deskpros–so its stores should not have accepted our PCs. This policy was not stated by any of the stores we spoke with, nor was it made clear on the company's Web site.

In August's *Top 15 Home PCs,* two PC WorldBench 2000 scores were switched. The score for the Gateway Astro should have been listed as 92 and that for the Quantex M650SX should have been 132.

In August's "Best of the Web," the City Guides section (page 108) should have identified the parent company of CitySearch.com as Ticketmaster Online-CitySearch Inc.

In July's *Top 10 Printers,* the price of the NEC SuperScript 4650N (a color laser printer that did not make the chart) should have been listed as $2699.

PC World regrets the errors.

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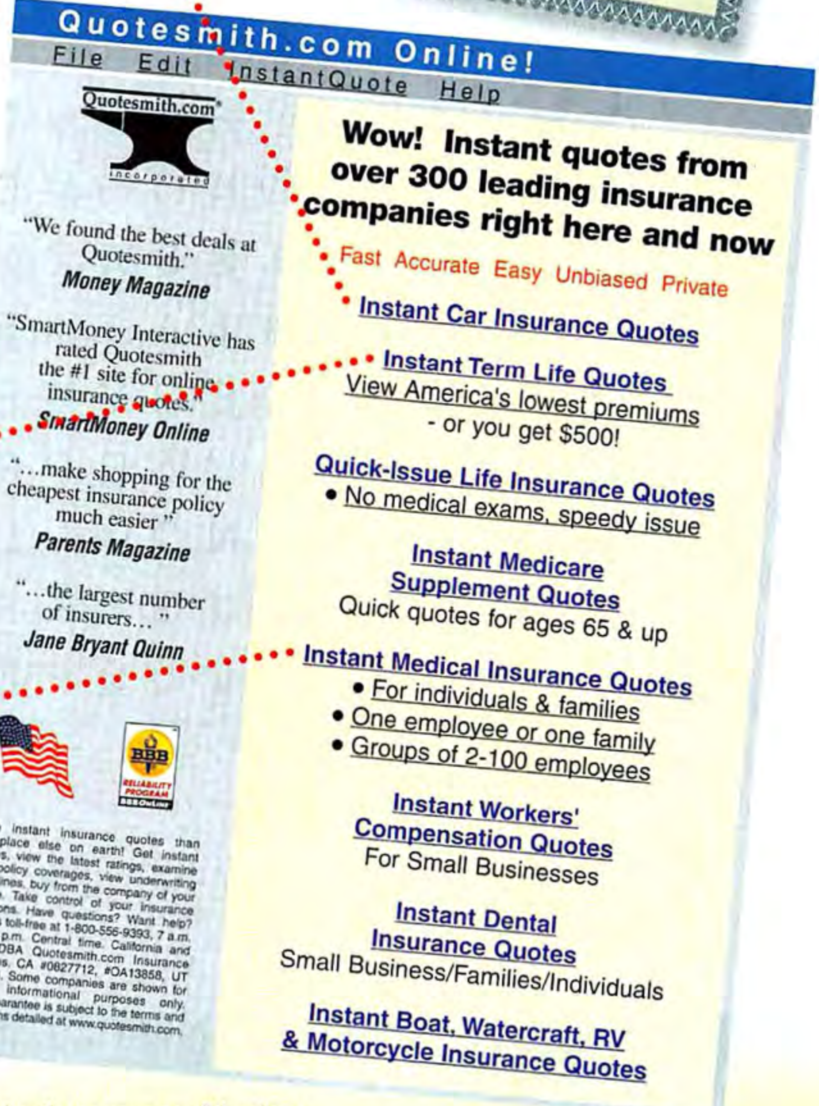

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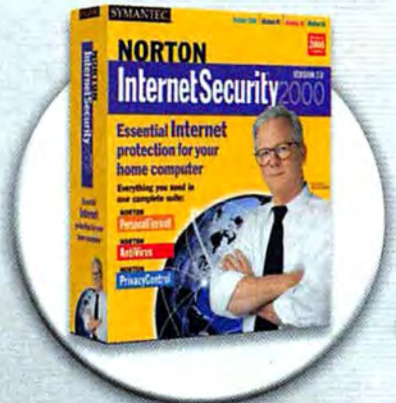

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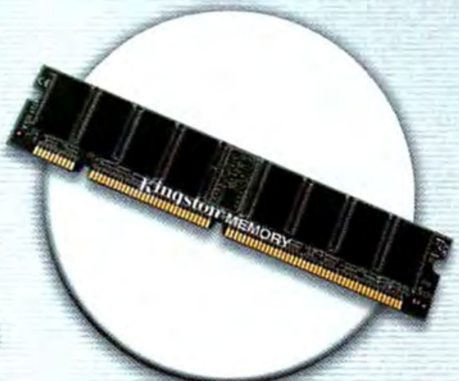

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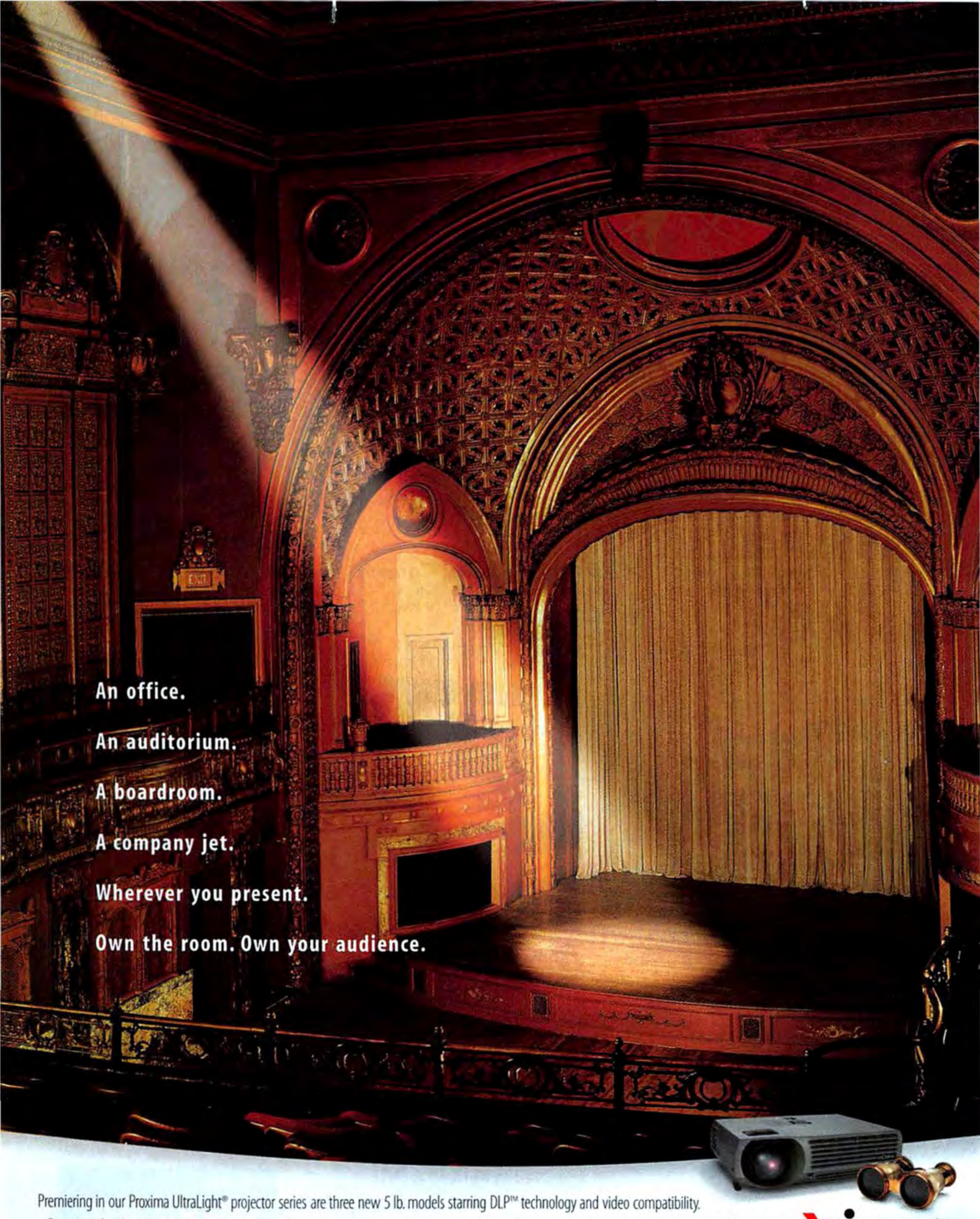
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Web's Car Wars: New Deal for Buyers?

Attention, drivers: The online battle for your business has just begun.

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ILLUSTRATION: JANET WOOLLEY

I CAN'T GET THE Francis Ford Coppola movie *Tucker: The Man and His Dream* out of my head. In that real-life story, set in the 1940s, a gifted entrepreneur develops an automobile loaded with revolutionary features like seat belts and safety glass. But before the American public gets to drive Tucker's wonder car, the major automakers' considerable funds, influence with suppliers, and lobbying power combine to squash him.

As I follow recent news about the car industry and the Web, I've been wondering if history will repeat itself. The National Automobile Dealers Association (NADA), for instance, has just launched DriversSeat.com, a car-selling portal aimed squarely at upstart sites such as Autobytel.com, Autoweb.com, and Microsoft's CarPoint. At the same time, the Big Three—DaimlerChrysler, Ford, and General Motors—have teamed to develop a business-to-business site.

Are the big auto companies out to squish a new breed of Tuckers—start-up sites that are trying to change the way we buy cars? Will we be denied the cars we want and given the ones the industry wants to sell us?

After speaking with a host of experts, I feel relieved. The Web's ultimate impact on the automobile business is unclear, but the consensus is that one way or another, buyers should benefit. "The big winner is the consumer who wants more for less," says David Cole, director of the University of Michigan's Office for the Study of Automotive Transportation. "The e-world and the dealers and the manufacturers are battling it out, but the consumer only stands to gain."

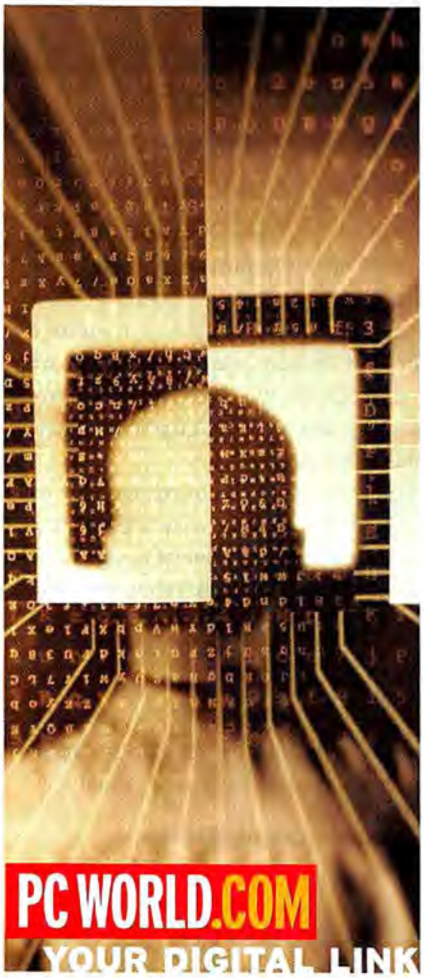
BIG, BIG BUSINESS

NO WONDER THE auto industry is scrambling for a piece of the Net. A recent study by Jupiter Communications predicts that online purchases will make up almost 8 percent of new vehicle sales in the United States by 2004—a projected $33 billion slice of the pie. Sales initiated online but sealed in the showroom will be even larger, predicts Jupiter: 22 percent, or $95 billion.

Already, the Web has thrown the car industry into turmoil. "The Net has changed the power structure in a car transaction," says Cole. "Typically a consumer used to shop at a few dealers. The dealers owned the relationship—they controlled the information. Now the consumer can easily shop the world via the Internet. So the power is now in the hands of the consumer."

"I can't really think of anything else in history that has caused this kind of change in the industry," says Randy Ortiz, executive director of the Consumer Ebusiness group at Ford. "And it is not so much just the change itself as it is the rapid pace of change."

How will this flux affect car shoppers? Let's start with the alliance of the Big Three automakers (which Toyota recently announced it plans to join) to build a Web site. It's not a consumer site; instead, it's a business-to-business hub designed to streamline the parts supply chain and reduce the cost of building a car. But most experts I spoke to agreed that some savings would probably be passed on to buyers. ▶



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(Other industries are creating similar sites, raising questions about how cooperatively competitors should operate and encouraging the Justice Department to look into the trend.)

Then there's NADA's new site. DriversSeat.com lets shoppers get invoice pricing information and find local dealers. Meanwhile, manufacturers and dealers are building their own sites that will let buyers configure cars, get price data, and locate nearby dealers. These newcomers will compete with the 20 or so start-up sites that provide similar information, act as brokers, or sell cars directly.

WHERE WILL WE BUY?

THE RESULTING competition should yield some attractive deals on new cars. But will shoppers flock to sites operated by the old-line car industry? "It depends on the how up-front the dealers are," says Thilo Koslowski, senior analyst at the Gartner Group. "If it is just a referral service, if consumers still have to [talk to a salesperson], that will only address a limited number of online car shoppers."

Mark Lorimer, CEO of Autobytel, says it's great that dealers and manufacturers want to get closer to their customers, but he suspects they'll have trouble building sites that shoppers see as trustworthy and impartial. "We are the pointy edge of the consumer attack on the distribution process," he says. "The consumers want to be sure they are treated properly, and that is exactly the service we provide." For instance, Autobytel lets users post both positive and negative reviews of cars; it's tough to imagine a manufacturer's site allowing that kind of forthright discussion.

But John Holt, CEO of The Cobalt Group, which develops Web services for car dealers, thinks the fight will ultimately come down to money and resources. "If the manufacturers and dealers spend only 10 percent of their ad budget on the Internet, that's $1.2 billion," he notes. Such a sum would dwarf what independent auto-selling sites could spend. In addition, manufacturers and dealers can bring formidable lobbying muscle to bear. For instance, in response to industry pressure, states around the country have been tightening up their franchise laws, making it harder for newcomers to jump into the car-selling game.

Again, I'm reminded of Preston Tucker, who (in real life, not in the movie) responded to the big carmakers' legal attacks with an open letter in 1948. "When the day comes that anyone can bend our country's laws and lawmakers to serve selfish, competitive ends, that day democratic government dies," he wrote. "And we're just optimistic enough to believe that once the facts are on the table, American public opinion will walk in with a big stick."

The public never got the chance, because only 51 Tucker automobiles were ever built. But these days, the consumer holds something even more potent than a big stick: a mouse. On the Web, nothing stops shoppers from surfing to another site to get information or buy a car.

As Sam Hedgpeth, COO of Autoweb, says, "As long as we provide an attractive [service] to consumers, the manufacturers will want to come here and show off their product. The key is the consumer."

THE CARS WE WANT

AS DEALERS AND manufacturers adapt to capture the wants and needs of online shoppers, the online marketplace should also affect what cars they build. In theory, at least, popular models (that Chrysler PT Cruiser in gangster black, say) should become more readily available. The Net will also let dealers provide such after-sale conveniences as e-mail notification of a car's service needs and the ability to schedule appointments online.

As with everything on the Web, some start-ups won't make it—because they had a bad idea to start with or a good one they couldn't sustain. But unlike American consumers in the 1940s—who were unable to buy the reasonably priced, safe automobile Preston Tucker promised them—we are, more than ever, likely to get exactly what we want.

Who knows? If Tucker were alive today, maybe he'd find a way to sell his cars—built to order—over the Internet.

Christina Wood is a PC World *contributing editor.* ■

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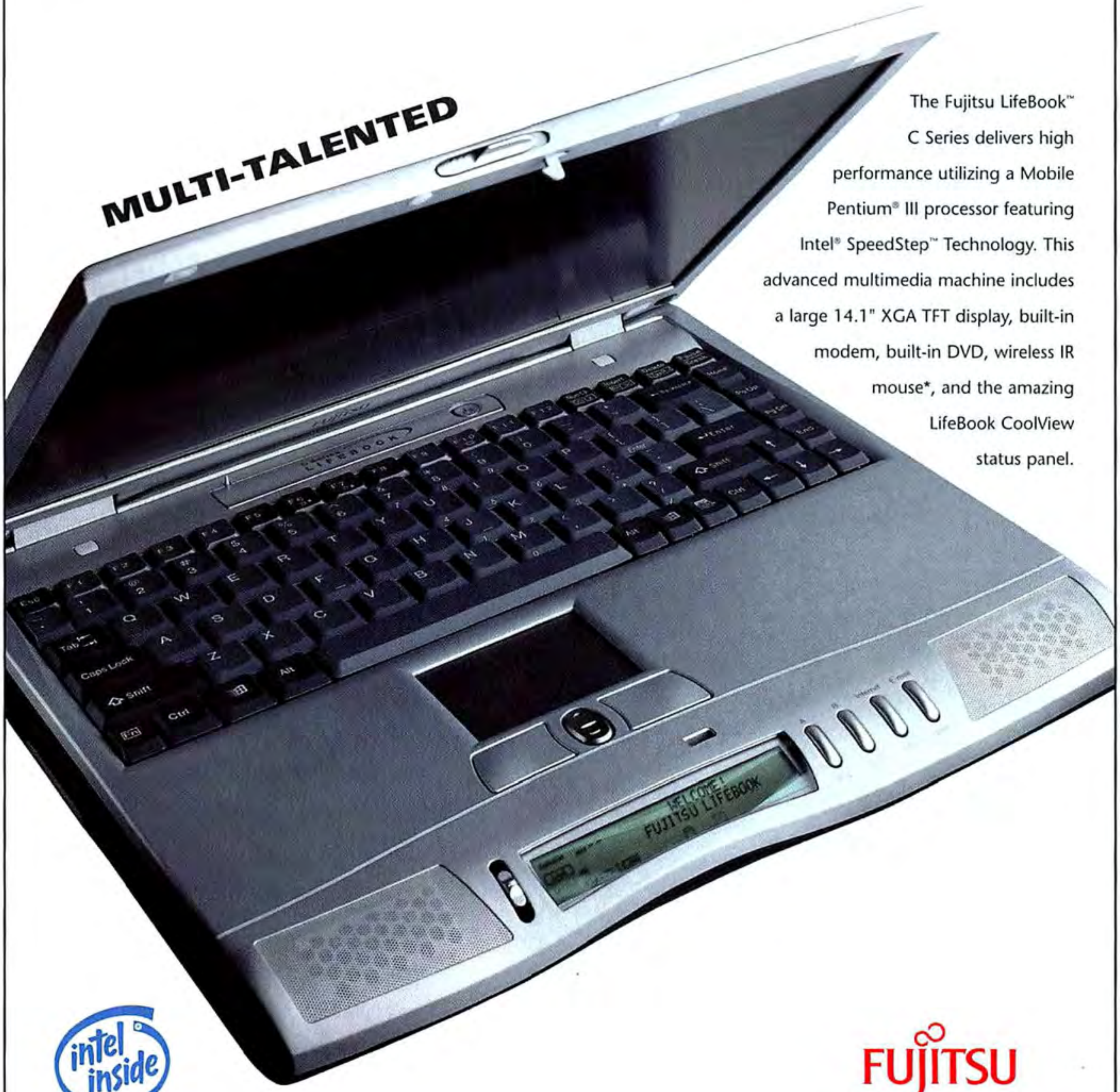

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*Free with select models.

Shipping Charges: Who Foots the Bill?

AFTER YOU BUY A NEW PC, you hope that it—and its components—will work without a hitch. But sometimes a part goes south before you've even tossed away the shipping box. You're entitled to a replacement part from the vendor, but you may have to pay to send the defective unit back to the company you bought it from even if the warranty is still in effect.

After buying a PC from Quantex, Ken Cranford of Colorado Springs recommended the company to his daughter, who then purchased a computer for herself. Her new PC had a defective modem. Quantex sent a replacement, which also turned out to be faulty. The third modem worked, but Cranford's daughter had to pay for shipping the defective modems back to the company. When Cranford bought his Quantex PC, he had had a similar problem, but he didn't have to pay any shipping costs. "If [a vendor] fails to adequately test products before shipping, [it] should be responsible for paying shipping costs both ways," says Cranford.

A Quantex customer service representative confirmed that the company's policy has long been to require customers to pay for shipping, insurance, and other costs when returning a defective system or part. In the past, Quantex sometimes paid for shipping on returned items; however, some customers abused this process by billing unauthorized and unrelated shipments to Quantex's mail-service account number, so the vendor no longer pays to ship product returns under any circumstances.

Quantex's policy is fairly typical in the PC industry (CyberMax and Micron have similar rules), though some vendors are more flexible. Dell, for example, may cover shipping for both the returned item and its replacement, but at its own discretion and only for addresses within the United States. Avoid surprises by checking the vendor's policy on shipping costs before you order.

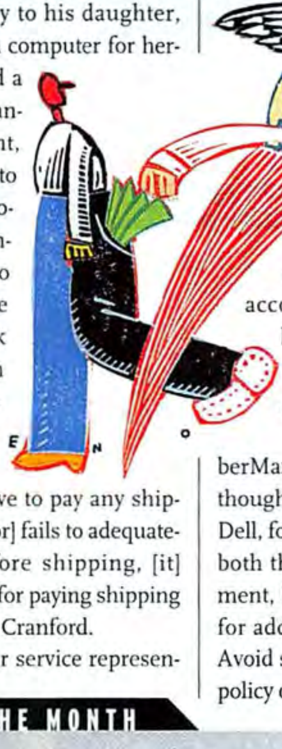

ILLUSTRATION: RANDALL ENOS; ICONS: JEFFREY PELO

Heads Up...

F.Y.I
3/16 X
PRWB 34 7/8 CPU

At Why.com, You Flooz, You Lose: Why.com—which features Web site reviews written by "real people"—recently made an offer to attract new members: Sign up, write two reviews, and get a $10 Flooz gift certificate (redeemable at online stores—see Flooz.com for details), plus a $5 Flooz certificate for each new member you refer. But when payoff time comes around, there's no Flooz fortune to be collected because several thousand new users set up multiple accounts to inflate their net Flooz worth. Why.com's vice president of marketing Cheryl Alpert explains, "our mistake was not having stringent guidelines at the get-go." Why.com is reviewing each account individually to determine its eligibility, but Floozies who've been denied their certificates grumble that it's too late to change the rules now. **Low Point for Hi-Val:** Storage device vendor Hi-Val has filed for bankruptcy. IOM Holdings acquired its assets and plans to sell and support its products. Call 714/953-3000 for more info. **Number Nine Is 86ed:** A veteran graphics board vendor once known for its Beatles-referenced product names—Revolution IV and Imagine 128, among others—has gone out of business. S3 bought some of its assets. No service or support is available, but users can access FAQs and existing drivers from the Web site (www.nine.com).

LETTER OF THE MONTH

I BOUGHT A REFURBISHED monitor from auction site UBid.com with a 90-day warranty from "vendor." I assumed the manufacturer or UBid covered the warranty. When I got the monitor, it had a defective, discolored screen, so I called UBid. My invoice listed a third party as the warranty provider, but UBid gave me another number for a fourth party, whose terms were unacceptable.

P. Subriar
San Buenaventura, California

***On Your Side* responds:** Nevenka Todorovic, manager of corporate communications for UBid.com, says the company "doesn't always list the name of the warranty [provider] on the Web site. There are instances where it will simply state 'from vendor' without listing the actual vendor's name. Warranties on refurbished products can be from either the manufacturer or a [third-party] vendor." Make sure you understand the terms of the warranty—and who is providing it—before you buy. ■

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. Anne Kandra is a contributing editor for PC World.

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Power Image 700 illustrated

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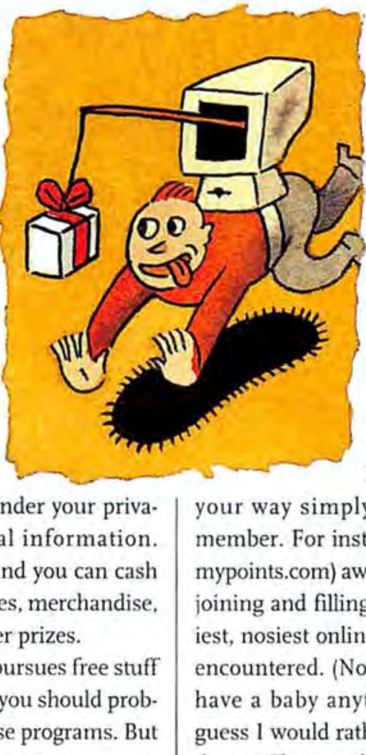
Web Shopper Points: Such a Deal?

I'VE NEVER BEEN A coupon clipper. I forget to send in rebate coupons. But when the stakes are high enough, I'm not completely immune to the lure of the freebie. Come to think of it, I keep closer tabs on my frequent flier statements than on my checking account.



So lately, I've been intrigued by Web incentive programs. They're springing up everywhere: Beenz, ClickRewards, Greenpoints, MyPoints, Yahoo Points, and similar programs award you points every time you buy something at an affiliated Web shopping site. Some even give you points for visiting partner sites or—if you're willing to squander your privacy—providing personal information. Amass enough points, and you can cash them in for gift certificates, merchandise, travel packages, and other prizes.

If you're the sort who pursues free stuff for the thrill of the hunt, you should probably belong to one of these programs. But now that I've spent some time chasing points from a bunch of the contenders, I can safely say that none of them will sway my habits as a cybershopper.

THE POINT SYSTEM

FIRST THE GOOD news: Most of these programs will throw at least a little something your way simply for registering as a member. For instance, MyPoints (www.mypoints.com) awarded me 150 points for joining and filling out one of the lengthiest, nosiest online surveys that I've ever encountered. (No, I am not planning to have a baby anytime soon, and yes, I guess I would rather listen to Tori Amos than to Fleetwood Mac.)

GIMME FIVE

ISP Information Sites

IF YOU'RE IN the market for a new ISP, your options can be downright dizzying. Arm yourself with the facts and advice dispensed by these sites:

1. **Dawn McGatney's ISP Guide** (dogwolf.seagull.net): A huge homespun hodgepodge of resources, including user reviews, ISP news, and more.
2. **The List** (www.thelist.com): The information is a bit sparse, but with 8800-plus providers, this ISP guide is definitive.
3. **Free ISP Directory** (www.isp.f2s.com): This nifty guide to no-fee providers details the pros and cons of more than 40 choices in the United States alone.
4. **4InternetService.com:** An ISP miniportal with links to info and offers around the Net, from provider ratings to DSL primers.
5. **Cable Modem Help** (www.cablemodemhelp.com): Come here for essential technical tips before (and after) you decide to go the broadband route.

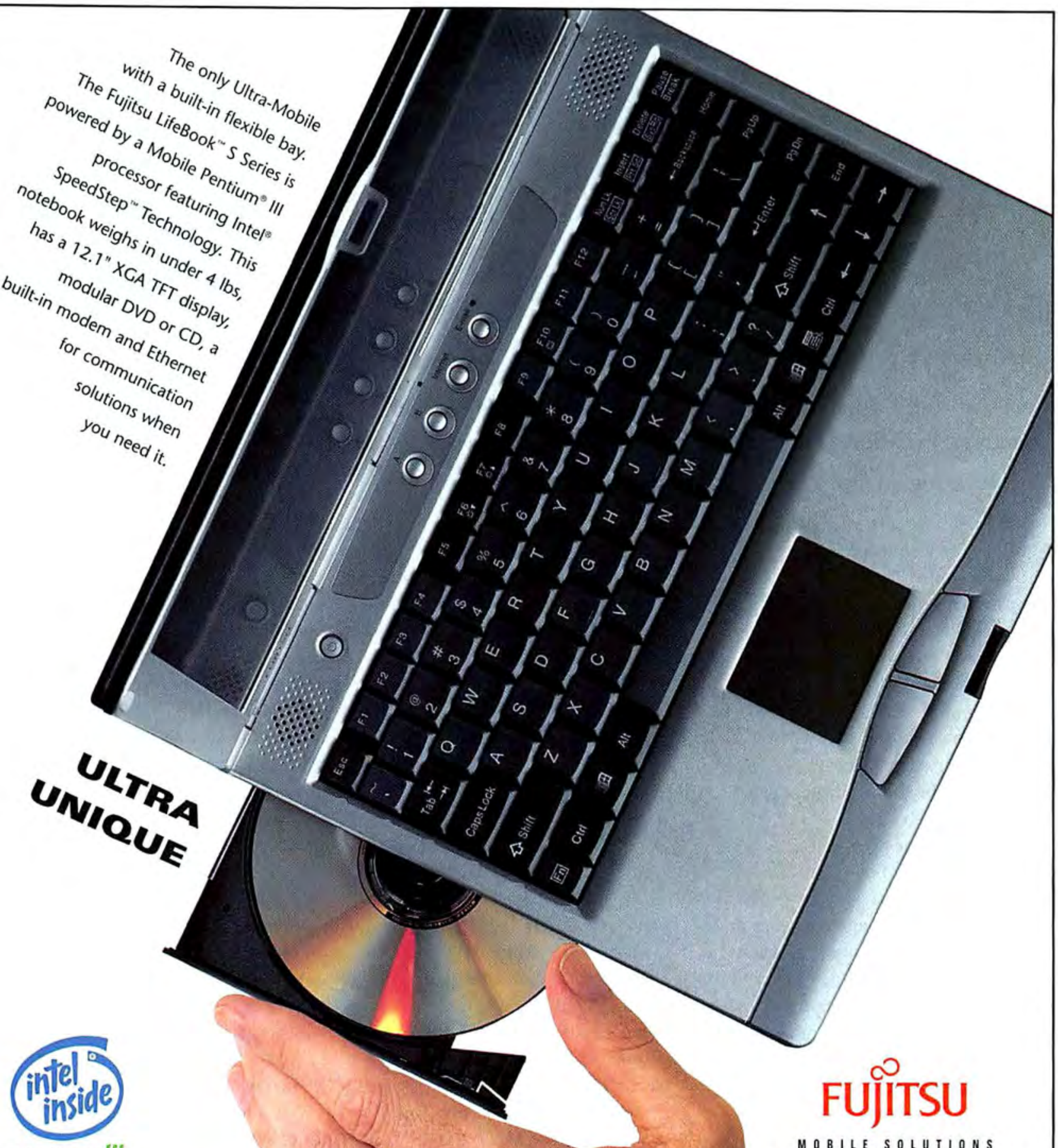
On the Net...

Brainy Searches: WebBrain (www.webbrain.com) is a search engine with a 3D interface that uses spoke-and-hub graphics to show how search topics interrelate. I can't say that it outperforms its more humdrum rivals, and its results do vary in quality. But it sure is fun to fool around with... **Hired Hands, Web Style:** Many a Web site will do your grocery shopping for you. But how about other tedious tasks such as tidying your house or mowing the lawn? The provocatively named MyLackey.com will send someone around to take those and other chores off your hands (for a fee, natch). The service is available in Portland, Oregon; Washington, D.C.; and Seattle, with plans for more cities soon... **No More Free Ride:** Will the Web stay a freeloader's haven forever? Maybe, but I recently got an e-mail from all-in-one in-box service MessageClick (www.messageclick.com) notifying me that my free account was going away. MessageClick now charges its users $10 and up per month, but a host of similar services—including EFax.com and Onebox.com—still don't cost a dime.

Just what will 150 MyPoints get you? Well...nothing, actually. Even a reward as mundane as a $5 Red Lobster gift certificate costs 750 points. Worse, the complications of the MyPoints currency make me pine for the simplicity of Skee-Ball tickets. At Borders.com, for instance, you can earn points but not redeem them, while Barnesandnoble.com lets you redeem points but not earn them. Or was that the other way around?

Then there are Beenz (www.beenz.com), 275 of which I quickly collected by registering at The Motley Fool and Bidz.com and taking a tour of the Madame Alexander doll site. This booty, I discovered, was worth roughly $1.37; to ▶

ILLUSTRATION: MARC ROSENTHAL; ICONS: JEFFREY PELO



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gather Beenz in meaningful numbers, you need to make purchases at Web stores that dole them out. Unfortunately, those sites are dominated by nichey merchants, some of whom are located outside the United States and don't award Beenz to stateside shoppers. (Typical example: an Australian purveyor of "innovative women's fashion underwear.") I was left with the feeling that I'd be hard-pressed to assemble a substantial hill of Beenz even if I put my mind to it.

Of course, it's unrealistic to expect instant gratification from MyPoints or Beenz or any other point system. They are, after all, *frequent*-shopper programs, designed to to reward folks who make lots of purchases. But even when you pile up some points, most of the deals seem pretty lackluster. For instance, you'd have to buy around five dozen CDs at CDNow to accrue enough ClickMiles for a $15 CDNow gift certificate. Over at MyPoints, blowing $2600 on a loaded Dell laptop would get you almost (but not quite) enough points for a $50 Eddie Bauer gift certificate. Big whoop.

FYI

FEELING LONELY? Surf more. Internet users are closer to family and friends than those who aren't online, says a new survey.

SOURCE: PEW RESEARCH CENTER

STAMP OF APPROVAL

THE ONE WEB incentive program I can muster any real enthusiasm for is S&H Greenpoints (www.greenpoints.com). Maybe I'm just waxing nostalgic: Greenpoints are a cyberoffshoot of S&H Green Stamps, which evoke shopping excursions with my folks circa 1967. Still, S&H has lined up a sizable roster of name-brand Web stores, including Borders.com, Buy.com, Dell.com, Outpost.com, Toysrus.com, and plenty of others. When you sign up, you get enough points to claim a modest prize (such as a movie ticket) immediately. And although the site's larger prizes tend toward the prosaic (toasters, floor lamps) and/or kitschy ("Grandma's Little Angel" tapestry pillows), I can see myself amassing enough points to claim an item I actually wanted.

But I'd never opt to buy from a particular shopping site simply to collect Greenpoints. Not when a few clicks at a shopping bot might let me save some bucks by taking my business elsewhere.

And bucks, I've decided, remain the ultimate incentive currency. They're accepted everywhere, and they never expire. Save up enough, and you can cash them in for just about anything under the sun—floor lamps and innovative underwear included. If you find a points program that has more advantages and fewer drawbacks, let me know.

Contact PC World *executive editor Harry McCracken at websavvy@pcworld.com.* ■

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Secure Your PC From Thieves

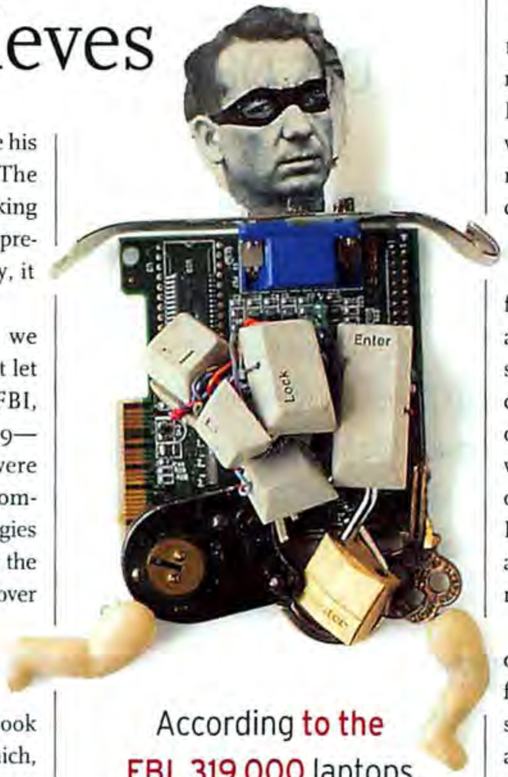

ILLUSTRATION: POLLY BECKER

HE LANDED ON both feet: I could see his footprints on the bathroom floor. The sheriff said the burglar was a pro, looking only for jewelry and cash. And my depreciating-as-we-speak PC? Fortunately, it wasn't touched.

That was three years ago, and we haven't been hit since. But I haven't let my guard down. According to the FBI, 319,000 laptops were stolen in 1999—and you can bet that few of them were recovered. As my contribution to community policing, I'll share some strategies for preventing your PC from leaving the office, as well as a sneaky way to recover the machine if it does disappear.

Imagine an unsavory character (and not one of those ASCII types) ripping off your office PC or notebook with dozens of sensitive files on it (which, we'll assume, you've faithfully backed up). My fantasy would be to set off a small charge of TNT remotely as the guy boots up. A legal alternative? Install CompuTrace, a crafty undercover utility that lets your kidnapped PC call the cops.

Here's how it works. The product hides a program on your system that calls CompuTrace's server every few days to check in. If your computer gets stolen, just alert CompuTrace. Your PC's modem (if it has one) silently calls CompuTrace when the thief goes online, and the program supplies the company with your computer's unique ID as well as the phone number it's calling from. (Not to worry: Caller ID blocking doesn't work with CompuTrace's phone number.) Neat, eh?

According to the FBI, 319,000 laptops were stolen in 1999.

GUESS WHO'S CALLING?

COMPUTRACE'S 24-HOUR recovery line immediately contacts the police in the area your PC's calling from and provides them with details about the theft. The company also contacts you by e-mail (not really helpful, though, if your only PC's in the hands of the thief), fax, and voice. CompuTrace claims a 90 percent recovery rate. The cost is $50 for the software and a one-year subscription, and $50 a year thereafter for the service.

I know what you're thinking: A smart thief can simply disable the CompuTrace program. Nope. Nothing pops up on the screen to give away the ball game. And CompuTrace is even designed to survive hard-drive reformatting. (The secret, though, might be revealed to experienced users with a knack for word puzzles, especially with a careful look at this sentence.)

PC LOCKDOWN

FEELING LIKE A Luddite and don't want more technology? Use brute force instead. I've secured all my desktop equipment with an assortment of cables. I recommend Secure-it's $35 Kablit II kit: It comes with a 10-foot cable, assorted fasteners, and a lock. The cable attaches to the PC and peripherals, which you then fasten with strong adhesive to an immovable object—say, the leg of a desk or a senior editor. For extra security, I loop the cable through a hole drilled into the back of my desk. To steal my PC, the thief would either have to take the whole desk or saw a big chunk out of it. It's not Fort Knox, but thieves are in a hurry and usually take only what's easy to steal. So why not make their job a little harder?

If your business has a server to protect, or if you're feeling exceptionally paranoid, find comfort with an Anchor Pad Universal Entrapment setup. Fasten a heavy-duty adhesive mat to your desk, then attach your PC to a locking plate, which secures the mat with pick-resistant locks. A buddy of mine had a dozen PCs stolen from his business—a loss that Anchor Pads could probably have prevented.

MIA NOTEBOOKS

AIRPORTS ARE NOTORIOUS for notebook thefts, so to protect my laptop, I use a Targus Defcon 1 motion detection alarm. It looks like a bicycle cable and lock. I stick the gizmo's cable into my notebook's security lock slot. If someone cuts the cable (or if I set the Defcon to go off when it detects motion), a 110-decibel alarm wails. For $50, it's a cheap way to put eyes in the back of my head.

Do yourself a favor. Secure your PC before you become another unfortunate FBI crime statistic.

PC World *Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. You can reach him at steve_bass@pcworld.com.* ■

Anchor Pad Universal Entrapment
$145; Anchor Pad Int'l; 800/626-2467; www.anchorpad.com

CompuTrace
$50 per year; Absolute Software; 800/220-0733; www.computrace.com

Kablit II
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AWARDS[2]

NeoServer 150 — WinList
WinMag.com, April 2000

Armada E500 — WinList
WinMag.com, March 2000

Deskpro EP — Best of the Best
WinMag.com, September 1999

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If I had my own channel I would only put on shows that depict strong, independent women so I could see how they do their hair.

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Norton AntiVirus woes ◆ IE security patches ◆ Digital camera firmware updates

Norton AntiVirus Freezes Some PCs

IN BRIEF

Nikon Improves Coolpix Firmware

NIKON HAS POSTED a new firmware update, version 1.3, for its Coolpix 950 digital camera. Enhancements over version 1.2 include more accurate manual focus and white-balance fine tuning. If you're updating from version 1.0 or 1.1, you'll get greater sensitivity in low light. For installation instructions and a link to the 365KB download, go to www.nikontech-usa.com/950_1_3_NTSCWin.htm.

Canon Updates PowerShot S10

OWNERS OF CANON'S PowerShot S10 camera will find a firmware update of their own. Version 1.0.0.2 improves flash photography, and by upgrading from version 1.0 you gain compatibility with the IBM Microdrive. For more details, visit www.canon.co.jp/Imaging/PSS10/PSS10_Firm-e.html.

ICON: JEFFREY PELO

USERS OF NORTON ANTIVIRUS 4.0 and later versions have reported a slew of problems with the product, including annoying computer freeze-ups. With these system hangs, pressing <Ctrl>-<Alt>-<Delete> produces the error message 'Msgsrv32.exe (Not responding).' ScanDisk may then create numerous temporary subdirectories (named DIR00000, DIR00001, and so on) that you can't easily remove.

Another AntiVirus-related problem may afflict your PC if you use Netscape Messenger as your e-mail program. The Messenger Inbox may take a long time to open, or it may not open at all. Messenger may stop responding when you try to open a message, and again your system may create many temporary files. Symantec confirms that the virus definitions dated June 16, 2000, and June 19, 2000, are responsible for these problems.

You should get rid of the mischievous virus definitions immediately. To update your virus definitions, choose LiveUpdate from within your version of AntiVirus or point your browser to www.symantec.com/avcenter/download.html. To eradicate the temporary subdirectories created by ScanDisk, however, you'll need to run a specially designed utility from Symantec. For more information and a link to the utility, go to www.symantec.com/avcenter/venc/data/fix.dir00000.html.

SURF EASY WITH MORE IE PATCHES

HARDLY A MONTH goes by without a Microsoft security scare of some sort. True to form, the company recently released the latest in a succession of security fixes. The most serious ones address various Internet Explorer weaknesses that could expose your computer to disaster.

BUG Simply visiting a Web site run by a malicious operator could unleash debilitating code on your PC, reformatting your hard drive or deleting files. An ill-intentioned site operator could introduce the nasty code via shortcuts embedded in an HTML Help (*.chm) file. That file could reside either on your hard drive (if you were enticed into downloading the file, for instance) or—more likely—in a type of shared folder known as a UNC (Universal Naming Convention) on a remote system.

FIX The solution prevents shortcuts from being invoked in an HTML Help file unless the file resides on the user's local hard drive. To keep such files off your system, Microsoft suggests, refrain from downloading .chm files from Web sites you don't know. To download the 733KB patch for Internet Explorer 4.*x* or 5.*x* running on Windows 9*x* or NT 4.0, visit www.microsoft.com/Downloads/Release.asp?ReleaseID=21705. Windows 2000 users can get a 503KB patch for IE 5.01 at www.microsoft.com/Downloads/Release.asp?ReleaseID=21706.

BUG When you whisk off your credit card number as part of a secure transaction with a site, your browser is supposed to verify that the site is the one you think it is. However, two flaws in the way IE 4.01 and 5.01 validate Secure Socket Layer certificates could allow a rogue Web site to pose as a site you trust and conduct seemingly secure sessions with you. The malicious site operator could also read selected files on your computer.

The first flaw: When you connect to a secure server through either an image or a frame, IE verifies that the server's certificate was issued by a trusted source (like VeriSign), but it doesn't verify the name of the entity or the expiration date. The second gaffe: When you initiate a new SSL session with a server previously validated during an IE session, IE does not revalidate the certificate.

FIX Separate patches for IE 4.01 and 5.01 close the breaches. Find these fixes at www.microsoft.com/windows/ie/download/critical/patch7.htm.

BUGGED?

FOUND A HARDWARE or software bug? Tell us about it via e-mail at bugs@pcworld.com.

You can find files from this article at PCWorld.com's FileWorld (www.fileworld.com/magazine). Mitt Jones is a contributing editor for PC World. ■

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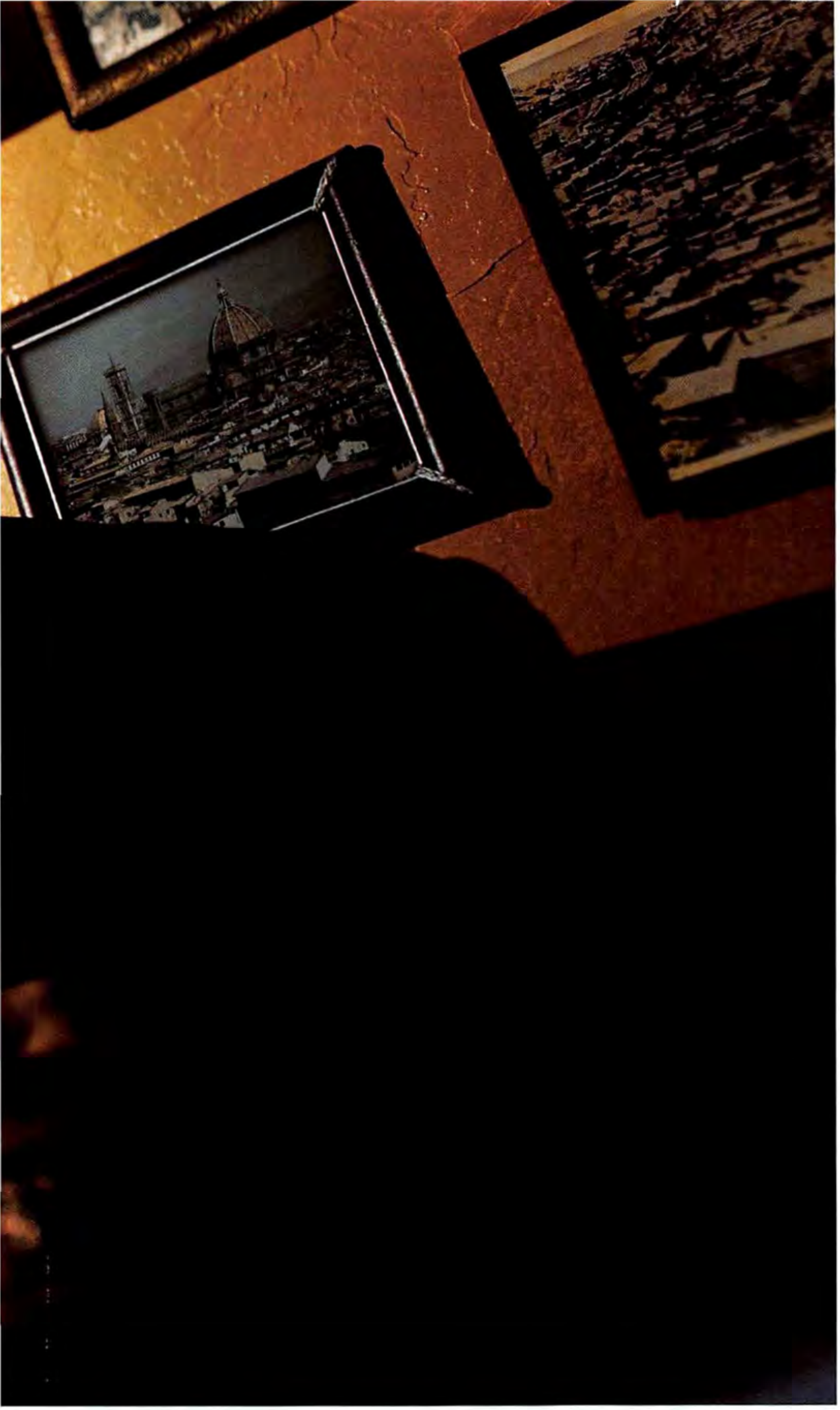

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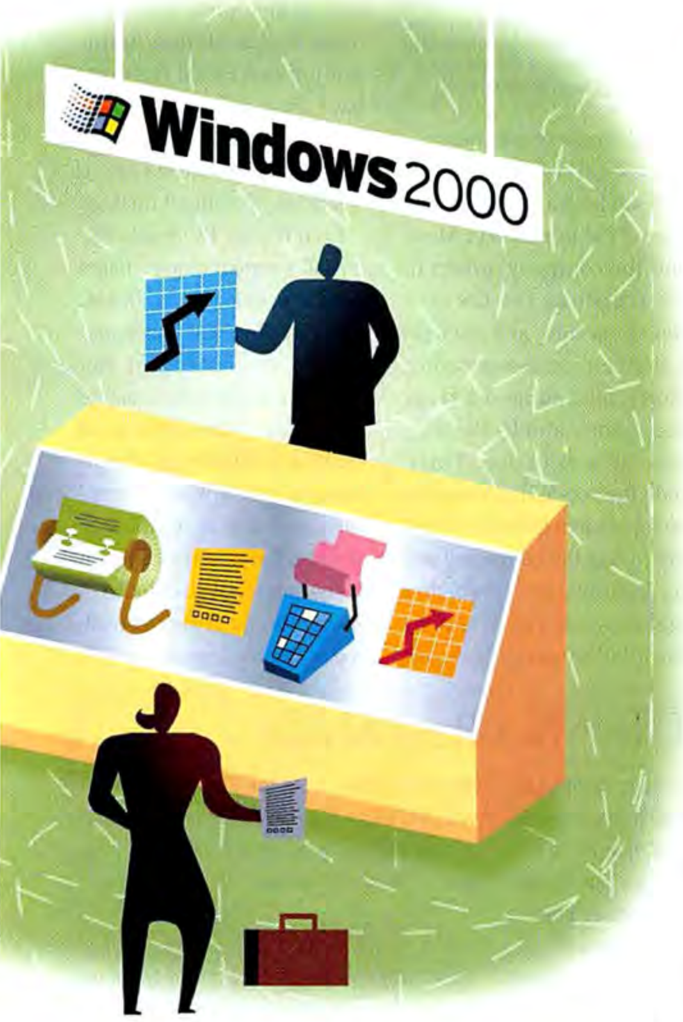
All About Me



The last entry (probably) in the Windows 9x line offers a bit of multimedia razzle-dazzle, cool idiot-proofing, and Internet Explorer 5.5. Should you bite?

ILLUSTRATION: PETER COATES; ICONS: JEFFREY PELO

◆ **By Scott Spanbauer**

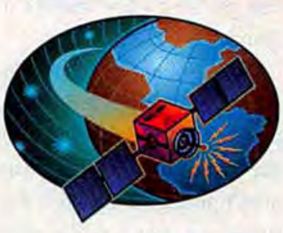
IT'S THE END of an era. Microsoft says that Windows Me—its cutesy abbreviation for Millennium Edition—is the last member of the product line that conquered the world's desktops five years ago with the release of Windows 95. (Yes, Microsoft said the same of Windows 98, but this time they seem serious.)

This final installment in the Windows *9x* family is aimed at device-happy consumers who like multimedia tools and long for a more crash-resistant PC. Businesses using Windows 95 or 98 will also find things to like about Me (see "The Business Side of Me," page 60). In particular, its recovery capabilities could entice systems administrators beset by users who crash machines after installing unauthorized software. But companies that prize stability, networking capabilities, and security features are far better off migrating to Windows 2000 Professional.

Home is where the heart is for Me. An enhanced digital video and audio player, a new digital camera and scanner interface, and a basic video editor make Me the most thoroughly multimedia-enabled Windows yet. In addition, the OS comes with a new Home Networking Wizard, online games, and the long-awaited shipping version of Internet Explorer 5.5 (see "It's New to Me," page 58).

Two powerful system-safety features—which Microsoft has grouped under the general heading of PC Health—are among Me's best innovations. One is an invisible watchdog that prevents disastrous alterations to system files. Even better is a rollback tool that lets you revert to an earlier system configuration—a godsend to anyone who has ever tried to revive a PC torpedoed by crummy software.

We put the final shipping code of Windows Me to the test, working with its system recovery, file protection, Internet sharing, and digital media doodads. We also gauged Me's startup, shutdown, and overall speeds in comparison to ▶



Product Pipeline

1-GHZ TOO SLOW for you? If you demand the fastest PC on the block, look for Intel's 1.13-GHz Pentium III chip, expected to launch by the time you read this. Systems will be shipping in limited quantities, from big-name vendors only. Look for a greater supply later in the fall. Analysts expect this to be the last speed bump for PIII before the P4 chip arrives in early fall.

➤ **Big LCD Deal:** Looking for a large-screen LCD that costs no more than a typical midrange desktop PC? Samsung's SyncMaster 770TFT, introduced last spring at $1800, now sells for $1454–an outstanding price for a high-quality 17-inch active-matrix display. One caveat: If you set it any lower than its native 1280 by 1024 resolution, type begins to look smudgy.

Tidbytes

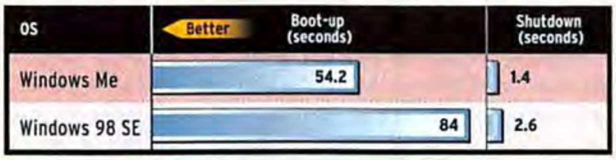
➤ **Wireless Broadband for Travelers:** Metricom's eagerly awaited 128-kbps next-generation Ricochet service should be available in Atlanta and San Diego by the time you read this, with rollout in additional cities by summer's end. You can expect to pay $60 to $90 a month for unlimited access–initially via serial port or USB modem, but eventually via PC Card. Ricochet use gives you untethered access to all types of online services. ▶

online GET UP-TO-THE-MINUTE NEWS, including hot game demos, the latest reviews, and productivity shareware, at PCWorld.com. Point your browser to **www.pcworld.com/pcwtoday**.

the performance speeds of Windows 98 SE.

WINDOWS ME TEST REPORT

Fast Arrival, Faster Departure



HOW WE TEST All tests were performed on Windows 98 SE and Windows Me on Pentium III-733-based PCs with S3 Savage4-based graphics adapters and 128MB of RAM. We hand-timed boot-up from the time the PC's power button was pressed until the Windows Desktop displayed. Shutdown was timed from when we selected *Shut Down* until the 'It's now safe to turn off your computer' message appeared or the PC powered itself off. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

Our conclusion: The Me-exclusive PC Health features are the best reason to invest in the $109 upgrade. But if you aren't pining for recovery features, you don't really need Me. Instead, wait for Microsoft to fix bugs and incompatibilities (we spotted a few), or hold out for the next Windows (see "Beyond Me," page 58). Meanwhile, take advantage of the various new features that you can download independently of the OS.

THERE'S MORE OF ME

THOUGH Microsoft isn't touting Windows Me as a performance-boosting upgrade, our tests did corroborate the company's claim that it boots faster than Windows 98 SE.

Freed from processing autoexec.bat and config.sys and displaying the whole MS-DOS user interface (see "Death Throes of DOS," below), Windows Me booted up about 35 percent faster than Windows 98 SE, which took 84 seconds. Shutdown times, already in the 3-second neighborhood for Win 98 SE, decreased by half.

Overall, Windows Me ran a tad slower than its predecessors on our PC WorldBench 2000 business applications suite—probably due to the housekeeping tasks the PC Health features handle. But the difference is so tiny—less than 5 percent in our tests on a group of 21 desktops and five notebooks—that most users won't detect a slowdown in typical business applications.

Microsoft says that your PC needs at least a 150-MHz Pentium CPU to run Win Me—and the company means it. Try installing the OS on a slower machine, and you'll get a polite error message saying, 'Sorry, but you need a faster processor—and by the way, click OK to exit Setup.' I overrode the 150-MHz limitation on my ancient Pentium-75 laptop (using the command setup /nm) just to see whether the OS would run at all. The installation dragged on for nearly two hours, but afterward Windows Me appeared to run just as well as Windows 98—which is to say, extremely slowly. I couldn't do much with the computer anyway: Windows Me's default installation gobbled up 657MB of my laptop's undernourished 774MB drive. I probably could have gained some breathing room by disabling or uninstalling individual features, but I chose to back out of Me instead. Fortunately, the uninstall routine returned me to Windows 98 without mishap.

Even if your PC meets Microsoft's system requirements (which include 32MB of RAM, 320MB of free disk space, and an Internet connection), you may want to think twice before upgrading. Most of the good stuff is available for downloading into a Win 9x environment. And in jumping to Me, you forfeit some compatibility—mainly with older DOS programs and drivers. A read-me file on the installation CD-

Death Throes of DOS: Life After Real Mode

IF YOU ARE A longtime PC user, you probably remember tweaking config.sys and autoexec.bat files—or even manually launching Windows by booting your PC to the C> prompt and then typing "win." But as hardware drivers and applications have steadily migrated away from Windows' 16-bit MS-DOS underpinnings, the need for a DOS prompt at boot-up has gradually diminished.

Autoexec.bye

STARTING WITH Windows 95, the config.sys and autoexec.bat files became optional: You could use them if necessary to configure legacy applications and hardware, or you could delete them and still boot successfully. Win Me takes the final step of ditching them completely (though they won't be erased if you upgrade), along with the ability to boot your PC to a C> prompt from the hard disk (you can, however, still do this by using the Windows Startup Floppy you created during installation).

Also gone is the complex but occasionally invaluable MS-DOS Mode. If you couldn't get a DOS application to run properly within Windows, MS-DOS Mode enabled you to exit the Windows graphical interface, boot the computer with MS-DOS alone, launch your application, and then restart Windows when you exited the application.

Windows Me does permit you to launch the familiar command-prompt window from the Program menu. A few DOS commands have been altered slightly or retired, but you can still dir, xcopy, ping, and so forth to your heart's content.

Don't Cry for DOS

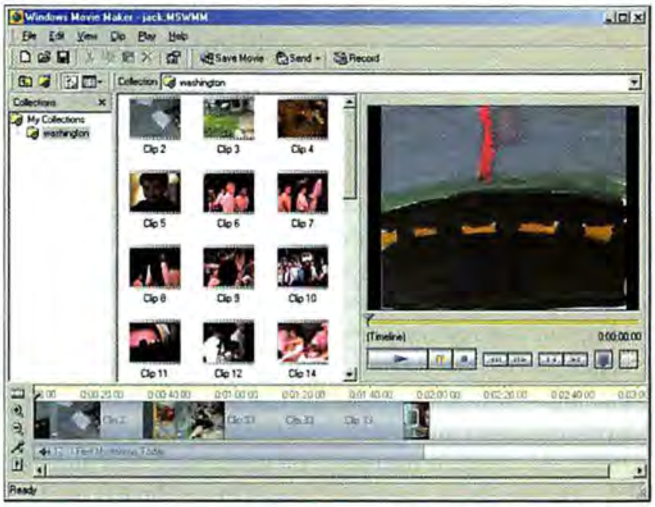
WHAT DOES IT ALL MEAN? For most of us, not much. You're unlikely to run into problems with applications and hardware less than five years old. Some DOS games and apps will run correctly as full-screen DOS programs within Windows Me. The first time you try to run an MS-DOS Mode application in Win Me, a dialog prompt will ask you to approve the change. In my tests with five old DOS games—Doom 1.9, Heretic 1.2, Tomb Raider 1.0, Nascar Racing 95, and Dark Forces 1.0—only Dark Forces refused to run on Me. But I don't miss it much: Gaming has come a long way since these titles appeared. —S. S.

ILLUSTRATION: PETER COATES

ROM says Adaptec's GoBack, NAI's PGP Desktop Security, and some antivirus utilities may prevent Win Me from installing; you'll have to disable them first.

JUST SHOOT ME

OVER THE YEARS, Microsoft has done a pretty good job of supporting the PC's development into a multimedia playback device. Windows Me's new media tools look like a logical step in that evolution—until you look at them closely.



VIRTUAL CUTTING ROOM: Windows Movie Maker does a good job of assembling home video clips but is otherwise pretty limited.

The Scanner and Camera Wizard lets you view your digital camera's pictures, copy them to the hard disk, look at the camera's internal properties (such as flash setting, battery status, and focus mode), and even snap a picture from the keyboard or mouse (something you might want to do in an office where the camera isn't near the PC). It also allows you to transfer image files directly from the camera to documents or e-mail. To work with the wizard, your scanner or camera must support Microsoft's newly minted Windows Image Acquisition programming interface. Fortunately, it probably does: Microsoft's mid-July list of WIA-compatible devices (online at www.microsoft.com/hwdev/wia) included many older camera models. Microsoft promised that the list would include newer models in time for Windows Me's September ship date.

But don't run out and buy Windows Me just because you have a digital camera. Most of them come packaged with software that does everything the Scanner and Camera Wizard does and much more. In my tests with a Kodak DC290, for example, I found that the camera's included software lets you tweak every single feature—including some that you can't even adjust on the camera itself. To my consternation, Windows Me automatically disabled Kodak's software to prevent conflicts with WIA. According to Microsoft, most camera and scanner manufacturers will have WIA-compatible versions of their software available this fall. Nikon and Kodak confirmed that they have program updates in the works, though these might not be available by the time Windows Me ships.

Fortunately, the incompatibility does not extend to third-party tools that access your camera or scanner using the TWAIN interface. Since WIA supports TWAIN, I could import photos into Adobe Photoshop without trouble. But until your camera or scanner maker delivers a WIA-compatible version of its software, you probably shouldn't upgrade to Windows Me. In the long run, WIA will help camera manufacturers connect their units to Windows more easily, but WIA offers almost no additional capabilities to users of existing cameras.

MAKE ME MOVIES

DIGITAL video editing has become the latest rage among people with leisure time, and Microsoft joins the bandwagon with Me's Windows Movie Maker feature. Still, this particular parade may not be heading where you want to go.

Video editing on a PC involves several tasks: loading clips from a video camera or VCR; putting them into order; adding a soundtrack, special effects, transitions, and titles; and viewing the results on a PC or TV. Windows Movie Maker does a nice job of the first three. So if you just want to assemble a quick summary of Junior's toddler years from the piles of videotapes in the closet, Movie Maker is grand.

The program quickly converts raw video from your digital or analog camera or VCR into an on-screen library of ▶

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❺ **WinFax Pro**
36.83MB, 7324 downloads
Sends batch faxes; logs and sorts received faxes.

Download files can be found on www.pcworld.com/fileworld/top5.

Beyond Me: What's Next for Windows

IT SOUNDS LIKE A PC user's nirvana: an operating system with the stability and power of Windows 2000 Professional and the convenience and compatibility of Windows 9*x* and Me. Fulfilling a long-standing promise, Microsoft next year expects to merge its consumer- and network-oriented OSs into an all-purpose, best-of-both-worlds Windows.

Whistler in the Wind

CODE-NAMED WHISTLER, the new OS will be based on the Windows 2000 (formerly NT) core but will include Me's multimedia integration and PC Health safeguards, among other features.

But wait, there's more.

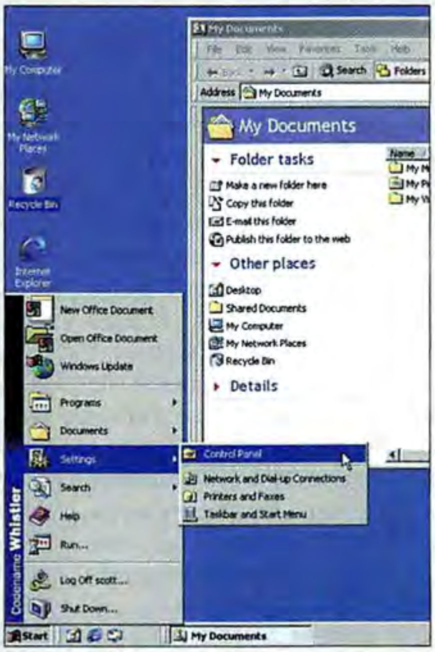
Microsoft believes that its customers want ready access to their data and to software, no matter where they are. In this brave new world of pervasive computing, updates you make in your desktop address book would automatically and transparently appear in your cell phone/PDA hybrid, and your latest Excel spreadsheets would be accessible on any connected desktop or notebook.

In June, Microsoft unveiled its plans for implementing this vision, which it calls the Dot-Net platform. Full-blown functionality remains several years away, but Whistler—due by the end of 2001—will incorporate the first iteration of Windows.net—Microsoft's moniker for the client-side OS that the Dot-Net platform will require.

Initially, MSN will enable the Dot-Net functionality in Windows.net. The company will integrate the OS with Microsoft Passport for personal identity management, with MSN's calendering function, and with MSN's messaging and notification features.

Eventually, Microsoft hopes to charge you a subscription fee for its Windows-everywhere service, either directly or via a third party (an Internet service provider, for example). How soon this will happen is unclear.

When you take into account the impending merger of the Windows NT and 9*x* lines, the promise of a long-overdue interface update, and the powerful new Dot-Net features, the next Windows has lots of changes in store. Whether it will be a stairway to computing heaven remains to be seen. **—Yardena Arar**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E-mail this folder
Publish this folder to the web
Other places
Desktop
Shared Documents
My Computer
My Network Places
Recycle Bin
Details
Name
New Office Document
Open Office Document
Windows Update
Programs
Documents
Settings
Search
Help
Run...
Log Off scott...
Shut Down...
Control Panel
Network and Dial-up Connections
Printers and Faxes
Taskbar and Start Menu
Codename Whistler
Start
My Documents

WINDOWS 2001? The desktop isn't dramatically different, but folders in a beta sport a new look.

clips. It can even break up long sequences on a single tape into smaller ones by identifying scene changes (see the illustration on page 57). To create a movie, simply drag clips, still images, and audio files from your clip library (or from another location on your PC) to the movie timeline. Record a narration on your PC's microphone, and reorder scenes by dragging and dropping elements on the timeline.

But if you're looking for full-powered desktop video production, this isn't it. You can't use Windows Movie Maker to add titles or special effects, and you have to choose from just two types of transitions between scenes: straight cuts and dissolves. The program's biggest limitation: It saves movies only in Microsoft's ASF file format. ASF reduces image and audio quality to one of three levels—low, medium, and high—which Microsoft says are geared to modem, ISDN, and cable/DSL Internet transmission speeds, respectively. Movie Maker is essentially a special-purpose tool for creating short, simple clips for distribution via e-mail or the Web. If you want to maintain the quality of your original video source, add special effects, or output your opus to a format other than ASF, don't waste time with Movie Maker.

But if Movie Maker is exactly what you've been looking for, you're all set. Just be sure to warn Grandma that the clips are coming: Even a relatively short, compact Movie Maker clip fills a megabyte or more, which could tie up a dial-up connection and bamboozle an e-mail system that doesn't handle large attachments well.

MEDIA CENTRAL

NOT ALL OF Windows Me's bundled utilities are lite versions. Harvesting concepts from rivals such as AOL's Winamp MP3 player and Real's RealPlayer, Me's Windows Media Player 7 is the Swiss Army knife of audio/video playback devices. The app searches your computer for digital audio files (including MP3); audio CD tracks; MPEG, AVI, and ASF video clips; and files in Microsoft's Windows Media Audio format. A Radio Tuner section offers a vast array of Web audio streams arranged by category, and lets you save multiple lists of station presets. And Media Player lets you browse, download, or stream media files through Microsoft's Windowsmedia.com site. Though Windowsmedia.com isn't an all-encompassing music and video portal, you'd have a hard time exhausting its offerings.

And that only scratches the surface of Media Player's capabilities. If you have a digital audio player such as Creative Labs' Nomad II, RCA's Lyra,

It's New to Me

- Media Player 7*
- Internet Explorer 5.5*
- Scanner and Camera Wizard
- System Restore
- Windows Movie Maker
- Home Networking Wizard
- System File Protection
- DirectX 7*

*DENOTES A FEATURE THAT CAN BE DOWNLOADED SEPARATELY FOR USE WITH EARLIER VERSIONS OF WINDOWS.

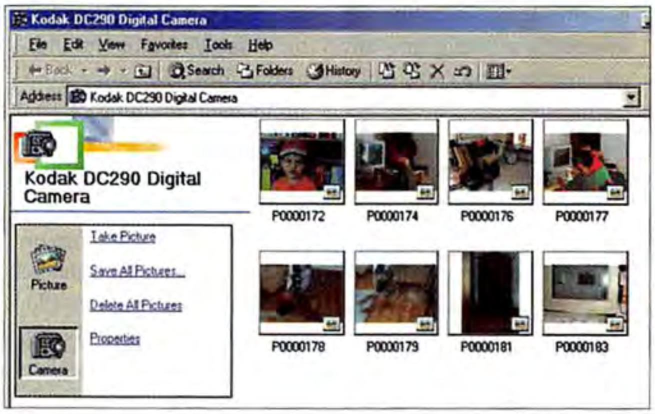
or Rio's MP600, Media Player serves as your music upload hub. Besides copying MP3 and WMA files stored on your PC to the player, it can encode your CDs into WMA files for uploading to compatible playback devices. To upload, simply select files in one window, choose the device in another, and click a button.

Unfortunately for people whose MP3 players don't perform the WMA format, Media Player doesn't do MP3 encoding. That doesn't mean WMA is inferior to MP3 for all uses: 64-kilobit WMA files sound every bit as good as medium-quality (128-kilobit) MP3 files, so you can squeeze twice as much WMA-formatted music onto your portable player. But that won't matter if your player doesn't support WMA; and audiophiles who create 192-kilobit or larger MP3s will probably stick with MP3 encoders rather than accept the demotion to medium-fi recording quality (see October's *Internet Tips* for a more detailed comparison of WMA and MP3). In any case, you can try Media Player 7 at no cost: It works with Windows 98 and 2000, and it's available as a free 7MB download from www.microsoft.com/windows/windowsmedia.

KEEP ME SAFE

ONE PROBLEM that has long plagued Windows is the operating system's lax control over how programs and drivers behave. Windows NT and its successor, Windows 2000 Professional, impose much more stringent standards on program behavior—but as a result, they are less compatible with the thousands of available Windows 9*x* applications and devices. Windows Me is just as easygoing as its Windows 9x predecessors, but it adds a couple of PC Health tools to help you avoid and recover from bugs.

The PC World Test Center tested both the System File Protection and System Restore features, and found that each delivers exactly what it promises. System File Protection monitors key Windows system files, and it instantly and transparently restores them if a program or user deletes or overwrites them. When we deleted a group of system files or overwrote them with earlier versions, SFP reinstated the originals immediately. SFP also sprang into action when we installed drivers for an older USB scanner (the Logitech PageScan USB) that Windows Me doesn't support, restoring the Windows Me version of a USB system file after the Logitech installer overwrote it. People who like maximum control over their computers may object to SFP, but it can't be disabled.



ME'S CAMERA WIZARD lets you view digital photos without moving them to your PC—if your camera supports the new WIA interface.

Another common problem is compatibility: You install a driver or application, only to find that it conflicts with something else in your ▶

Choices Abound: Find the Right Windows for You

If you're currently using...	and...	then...	or...
Windows 95	Your PC has at least 32MB of RAM, a 150-MHz CPU, and 295MB of free disk space	Upgrade to Windows Me for USB and DVD support, System File Protection, System Restore, and Internet Connection Sharing	If you like your existing digital camera software or if disk space is tight, upgrade to Windows 98 SE and download Media Player and IE 5.5
Windows 98	Your PC has at least 32MB of RAM, a 150-MHz CPU, and 295MB of free disk space	Upgrade to Windows Me for USB and ACPI support, System File Protection, System Restore, and Internet Connection Sharing	Buy the $20 Windows 98 Second Edition Updates to get ICS, **or**, with 64MB of RAM and 650MB of free disk space, upgrade to Windows 2000 Professional for better stability and security
Windows 98 SE	Your PC has at least 64MB of RAM, a 300-MHz CPU, and 2GB of free disk space	Upgrade to Windows Me for System File Protection, System Restore, and Movie Maker	Upgrade to Windows 2000 Professional for stability and security, **or** download Media Player 7 and IE 5.5 and wait for Windows.net
Windows NT 4.0	Your PC has at least 64MB of RAM, a 133-MHz CPU, and 650MB of free disk space	Upgrade to Windows 2000 Professional for vastly better hardware support	
Windows 2000 Professional		Wait for Windows.net	

system. But uninstalling the offending software may not correct the situation, since uninstallers don't always remove every trace of a program. System Restore lets you return your computer to the earlier state it was in at a specified moment you choose from a PC-generated list of system checkpoints (the frequency of these system copying operations depends on how much free disk space your PC has and how often you add software). In our tests, System Restore worked as advertised—and quickly, too. Most rollback operations took a minute or less, not including the necessary reboot.

Besides removing shortcuts and Registry entries, System Restore actually removes installed applications. Even better, it lets you undo its alterations if you change your mind about rolling back—or decide to roll back to a different system checkpoint. The utility compresses and stores removed files and settings on the hard disk, and you choose how much disk space to allocate to the compressed files. On one test system with plenty of free space, the setting options ranged from 200MB to 400MB; on an older system with less free space, the range was 25MB to 50MB.

TAKE ME TO THE NET

WINDOWS ME'S OTHER enticements are comparatively lightweight. The most appealing of them may be an improved version of Windows 98 SE's Internet sharing feature, which permitted several networked PCs to share a single Internet connection. Though it worked well, this feature pretty much lacked a user interface. Windows Me's Home Networking Wizard walks you through the various tasks involved in connecting PCs and setting up a shared connection among them.

The new OS comes with Internet Explorer 5.5. This update includes many bug fixes, as well as support for the latest HTML specs, but only one visible new feature: a welcome Print Preview. Like Windows Media Player 7, IE 5.5 is downloadable from www.microsoft.com/ie for free. You may want to try out one of several included Web-hosted games, too. But you don't need Windows Me to play checkers, backgammon, and chess over the Internet: You can find the same games at zone.msn.com.

TO ME OR NOT TO ME?

WINDOWS ME joins a crowded OS field this season (see "Choices Abound," page 59). One serious candidate, Windows 2000 Professional, has several strong points. It's stable; secure; and mostly compatible with newer systems (especially ones that have received BIOS upgrades), peripherals, and applications. But it lacks the easy software compatibility of Windows 98 and Me, and the upgrade from Windows 98 or 95 costs about $110 more. Home users interested in simplicity and unconcerned with security will probably opt for Windows Me. Most businesses will be better off with Windows 2000.

When Windows Me arrives, PC manufacturers will probably let buyers who want a Win 9x–series machine choose between Windows 98 SE and Windows Me. Your decision may come down to whether Windows Me's suite of digital knickknacks and system utilities means more to you than the relative simplicity and familiarity of Windows 98 SE.

If you're trying to squeeze the last drops of performance out of an aging Pentium-90, you should avoid Windows Me's greater system requirements. And digital camera buffs should make sure that a WIA-compatible version of their camera's software is available before they upgrade. Millennium Edition is the latest version of Windows, but that doesn't mean it's necessarily the best for you. ▶

The Business Side of Me

MICROSOFT'S MARKETING message is clear: Windows 2000 Professional is for business PCs, and Windows Me is for the home user. But considering the overlap between their features, you may find the distinction somewhat arbitrary.

Home users who value real log-in security, a superior file system, and rock-solid stability may prefer Windows 2000, if they can live without Me's easygoing compatibility with older peripherals and with PC games. But will some business users, conversely, opt for Me?

In the Office With Me?

NOT IF THEY'VE moved to Windows 2000 or Windows NT already. Many of Windows Me's chief enhancements, including Media Player 7, Internet Explorer 5.5, Movie Maker, and the Home Networking Wizard, either don't have an obvious corporate application or are free to download.

On the other hand, Windows Me's System File Protection and System Restore could encourage small businesses that currently use Windows 95 or 98 to upgrade. Both tools work as advertised to prevent and recover from system configuration bugs and snafus. Windows 2000 actually safeguards system files in much the same way Windows Me does, and its tighter controls on application and driver interactions head off many potential configuration crashes. But Windows 2000 doesn't include Me's valuable rollback feature.

It's still too soon to tell whether Windows Me's new digital-imaging tools will appeal to professionals who rely on cameras and scanners. The Windows Image Acquisition interface does allow users of compatible cameras to walk up to any Windows Me computer—in a remote office, conference room, or airplane—and immediately start working with images. In contrast, Windows 2000's spotty support for cameras and scanners is improving only gradually. In any case, however, you won't be able to use the software that came with your camera until you can upgrade to a WIA-compatible version. -S. S.

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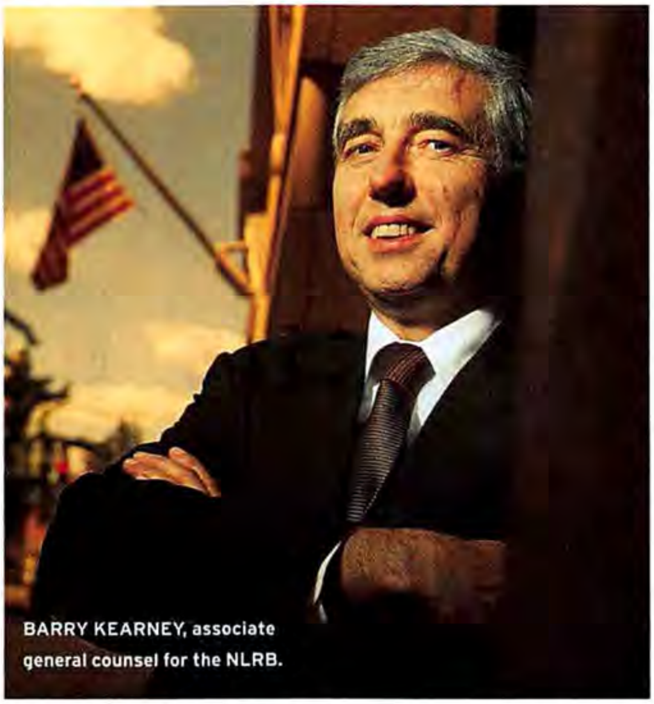
Nosy Bosses Face Limits on E-Mail Spying—Workers Gain New Freedoms

ANALYSIS

BY NOW most of us know that employers may legally monitor or censor messages sent over company e-mail wires. But recently, some workers have successfully challenged blanket e-mail censorship by using, of all things, the 1935 National Labor Relations Act.



BARRY KEARNEY, associate general counsel for the NLRB.

In two cases that could have broad repercussions, the National Labor Relations Board's Office of the General Counsel successfully intervened on behalf of workers fired for using company e-mail in ways that upset their employers.

An Ohio worker fired for sending e-mail critical of a change in vacation policy won back pay and the option of reinstatement. In Florida, an engineer helping organize coworkers into a union was suspended for discussing related issues via e-mail. In an out-of-court settlement, his company rewrote its e-mail policy and rehired him.

Does this mean that employees are free to flame the boss at will? No. Employers have the right to monitor e-mail and set policy on use. But policies that lump communication critical of the workplace with inappropriate—and actionable—behavior (like sexual harassment) are on their way out.

THE E-WATERCOOLER

CREATED TO safeguard workers from unfair labor practices, the NLRA also ensures workers' rights to communicate with each other about their workplace. In today's companies, e-mail is a primary means of communication, especially for employees who telecommute or travel. Even those on-site may do most of their business over a LAN. And just as offices have cafeterias or break areas where people congregate and talk, a company network has protected areas where employees enjoy the right to discuss work, says NLRB associate general counsel Barry Kearney.

> A company network has **protected areas** where employees **enjoy the right to discuss** work.

Businesses may be justified in monitoring e-mail and Internet use to protect themselves from liability in cases of illegal activity, and to ensure that company time and money aren't wasted. According to Kearney, the NLRB's actions don't challenge this prerogative or represent any change in law. Both the issues and the remedies have been around for years—but they're now being applied to new technology. So the NLRB has told regional offices to direct these cases to its main branch in Washington, D.C.

THE LARGER ISSUE

EMPLOYERS MAY be apprehensive about the NLRB's actions. But Barry Steinhardt, assistant director at the American Civil Liberties Union, doesn't think the NLRB goes far enough. In the ACLU's view, the overarching issue is e-mail surveillance, which the NLRA doesn't address.

Steinhardt also points to companies' increasing use of programs such as Webroot's WinGuardian or WinWhatWhere's Investigator to go beyond Net monitoring and record every keystroke an employee makes. The Electronic Privacy Act of 1978 prohibits wholesale monitoring of telephone services, but it does not regulate surveillance of Net and e-mail access. Furthermore, a company has no legal obligation to tell employees if it's doing computer monitoring. "Employees think they have rights they don't have," Steinhardt says.

WHAT TO DO NOW

EMPLOYEES should remember that commonsense rules about e-mail still apply: NLRB officials don't have explicit guidelines for what qualifies as protected workplace communication. Written and oral critiques using strong language have been protected in the past, but context matters.

For employers, this is a good time to review e-mail policy. An overly broad policy that infringes on employees' right to discuss work conditions could provide grounds for an NLRB complaint.

As the NLRB applies old rules to new media, other branches of government are going further. The California state legislature, for example, is working on a bill that would require companies to disclose e-mail monitoring to employees. The ever-blurring line between work and leisure will only increase the complexity of the issue for everyone.

—*Anush Yegyazarian* ▶

PHOTOGRAPH: KATHERINE LAMBERT

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Diary of a Free DSL User: Loved Speed, Ignored Ads

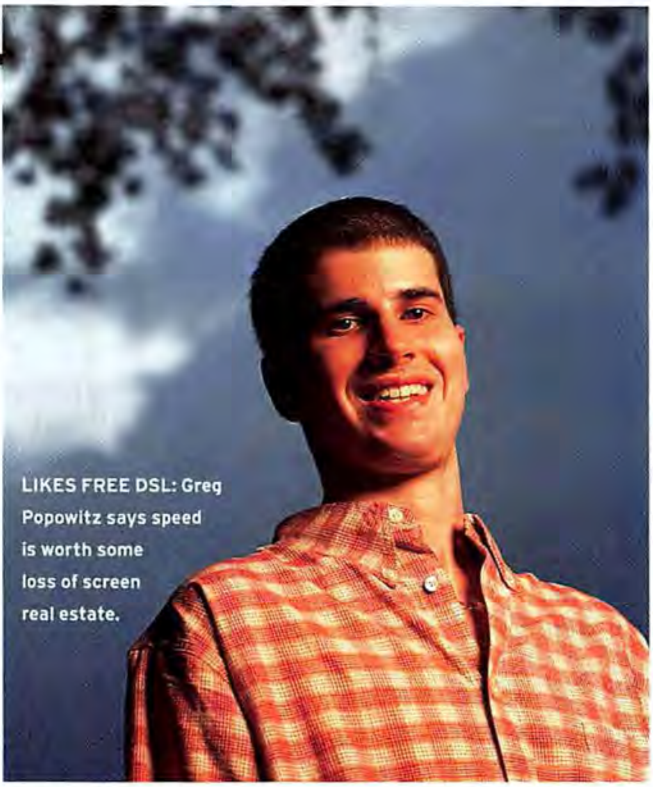
FIRST LOOK

SUDDENLY, in the upper right corner of my monitor, a blue jean–covered butt appeared. No, I wasn't downloading risqué photos from the Web. In return for free high-speed Internet access through a DSL phone line, I had agreed to let a company called Winfire run ads on my desktop—and I was getting an eyeful. The *New York Times* offered to show me its world on the Web. Another advertiser urged me to "make money in minutes!" Others promised links to the friendliest of doctors or the sharkiest of lawyers. A new ad appeared every 15 to 30 seconds.

Broadband Internet access is hot. And since Winfire began offering it for free earlier this year, more than a million people have signed up.

Many of them will have a long wait. The company started connecting customers in Atlanta and Dallas in April, Los Angeles in May, and New Orleans and Miami in June. Winfire plans to expand its FreeDSL service into 16 other cities, but as of early July only a thousand people actually had the service. Co-CEO Ryan Steelberg's most optimistic prediction calls for no more than 500,000 hookups by the end of the year. A Winfire spokesperson said 95,000 customers have accepted ad-free 56-kbps dial-up service as an alternative while they wait.

Not every observer is convinced that Winfire will be able to stay in business, however. Even with ads paying the way, "the cost at this point is too high," says Fritz McCormick of The Yankee Group.



LIKES FREE DSL: Greg Popowitz says speed is worth some loss of screen real estate.

PHOTOGRAPH: bobmahoney.com

Even if you're lucky enough to get to the head of the queue, you'll find a few hidden costs. Users must buy a DSL modem and filters for the phone lines to make them usable for voice service. Winfire will sell you both in a kit that costs $199 up front or about $10 a month for 23 months. Customers must also agree to provide the company with demographic information (used to send targeted ads), and must install software that keeps Winfire's toolbar, with its streaming ads, active on their desktops at all times. Your FreeDSL e-mail goes out ▶

Help for the Unwired: Broadband Beamed to You

IF YOU'RE EAGER for a taste of high-speed Internet access, but don't live within reach of DSL or cable service, help may be on the way. Sprint (www.sprint.com) recently introduced a wireless system that delivers broadband access at up to 256 kbps upstream and between 1 and 5 mbps downstream by bouncing signals between diamond-shaped antennas perched on users' rooftops and a larger antenna on a nearby mountain.

> The system **should appeal** to **anyone who** can't get cable or DSL, just as **satellite TV found early buyers** in areas without cable.

Called Sprint Broadband Direct, the service was in trials in the greater Phoenix area for more than a year before launching formally this spring. Home customers pay $40 a month and get a single IP address; business users pay $90 for five IP addresses and faster callbacks when they need tech support. Installation costs $299, with special price breaks to customers who sign long-term contracts. By year's end, Sprint plans to expand the service to 12 to 15 new markets, including San Francisco and Houston.

The service uses 13.5-inch-square rooftop antennas that connect to a coaxial cable the installers run through a wall (in a setup similar to cable TV installations) and then connect to a modem attached to the user's PC. Radio signals broadcast from the rooftop antenna can travel up to 35 miles, Sprint says. Receiving and broadcast antennas must stand in line of sight, so in areas with hills and tall buildings Sprint uses multiple transmitting towers. The system should appeal to anyone who can't get cable or DSL service, just as satellite TV dish antennas found early buyers in areas without cable.

Early customers in Phoenix are enthusiastic. J. R. Robertson, chief executive of Air Photo USA, says Sprint's service speeds up his company's Web sales of digitized aerial photographs. Shari Leyva, whose home-based business sells promotional products, appreciates how the system lets her place orders online without tying up her phone. "You're always online," she says. "There's no dial-in and no waiting. All you do is hit a button, and you're on the Web." **—Joe Earle**

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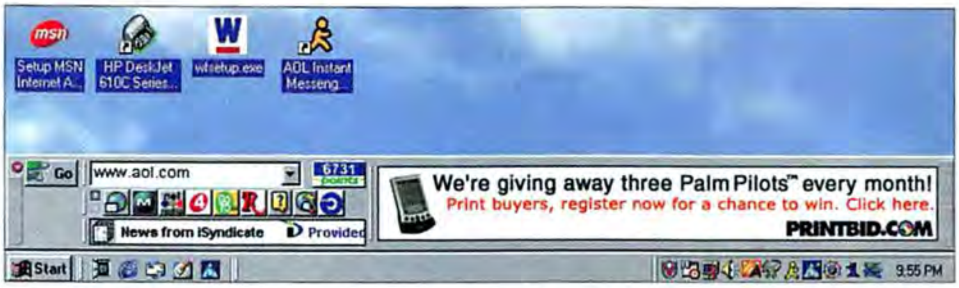

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CONSTANT COMPANION: FreeDSL's Winfire toolbar delivers banner ads and paid-for bookmarks—even when you're not using the Net.

with a short text ad at the bottom. Winfire promises not to sell your personal information to others. And in line with most standard DSL contracts, if you want to drop out before 13 months have expired, you incur a $200 cancellation fee.

After several tech support calls, I had the inch-high Winfire toolbar (which works with any major browser) docked across the top of my screen. It occasionally obscured a key portion of a game or document, but moving it was easy, if a bit inconvenient. Users say they get used to the flashing ads, which resemble the banners on many Web sites (the toolbar has icons you can use to launch the Web sites of Winfire's business partners). "I'm used to the whole advertising idea. It's not a big deal to me," said Jonathan Poon, 22, a research technician at the Centers for Disease Control. Georgia Tech student Greg Popowitz said the service was slower than the campus network, but it sped up submitting homework from his off-campus apartment.

My teenage sons barely noticed the ads—but they did report a marked improvement in download speeds over what our previous 28.8-kbps dial-up connection delivered. In my tests, the bandwidth proved slightly faster than the promised 144 kbps. Want more speed—or fewer ads? Winfire charges just $10 a month for ad-free basic service; $20 a month for 384 kbps; and $35 a month for 1.54 mbps—still slightly less than the $40 most DSL providers charge.

If you don't mind a long wait or a constant barrage of ads, consider FreeDSL. Business users, however, may prefer the ad-free service, if only to avoid sudden distractions from the bottom line.

—*Joe Earle*

FreeDSL
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Bye-Bye, VCR—New DVD-RAM Format Challenges Videotape

UPDATE

GET READY to say farewell to good old VHS videotape. A new generation of 4.7GB DVD-RAM products—offering nearly twice the capacity of older 2.6GB DVD-RAM—can hold a 2-hour movie, store it in nondegrading digital format, and overwrite it up to 100,000 times *without* loss of quality. That makes them perfect new-millennium replacements for your VCR. But there are catches: Introductory prices will be high, and players that can show the movies you tape on DVD-RAM are still several months away—most current DVD players won't do the job.

Despite that, the next year could see the coming of age of DVD-RAM–based products for the mainstream consumer market. InfoTech of Norwich, Vermont, expects vendors to sell roughly 25 million DVD video recorders (which can replace VCRs) by 2005. Panasonic has plans to ship its first DVD-RAM recorder this fall; initial prices should be about $3000. By year's end a digital video camera from Hitachi using new 80mm DVD-RAM discs (1.4GB per side) should be available; cameras will retail for about $2000.

DVD RAM
4.7GB
DVD-RAM
LM-HB47
Panasonic

PANASONIC'S new DVD-RAM drive nearly doubles capacity.

Don't expect prices on these video products to drop quickly—by Christmas 2001, DVD recorders should cost less than $1000, but they're unlikely to drop below $500 until 2002.

Stand-alone DVD players compatible with the new DVD-RAM discs should appear on store shelves soon—and with a more reasonable price tag. Look for the DVD Multi tag on compatible units.

Rival digital media standards such as DVD+RW are vying with DVD-RAM for a spot in your living room and PC. But no competing products have made it to market.

The coming wave of new products, along with the DVD-RAM's higher capacity and performance, should help solidify the format's role as a backup and storage medium. Drives priced at under $600 should be available by the time you read this. We tested one of the first, a production-level Panasonic model. ▶

PHOTOGRAPH: KEN SMITH

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GOING FOR A SPIN

WE TOOK the Panasonic LF-D211N, a $549 internal IDE model, for a spin, employing the same Celeron-400 PC we use in PCWorld.com's *Top 5 CD-RW Drives* reviews. The higher-density 4.7GB-per-side (4.2GB after formatting) media performed at about twice the speed we saw from first-generation drives. With hardware write verification enabled—the default for critical storage apps—the drive averaged almost 730 KBps in writing to disc. That's comparable to writing to CD-Recordable or CD-RW discs at 5X.

Judging from our earlier experience with first-generation drives, you can probably double that rate for noncritical apps such as recording audio and video, after disabling verification. Unfortunately, there was no way to turn off the LF-D211N's write verification; Panasonic assured us that by the time the drives reach market, doing so will be possible via software. The LF-D211N also reads data from DVD-RAM considerably faster than first-generation drives we've seen, delivering roughly 1.4 MBps of throughput on tests.

One underappreciated asset of DVD-RAM drives is their marvelous agility at reading other optical media. The LF-D211N garnered a 3.9X DVD-ROM read rating from Testa Labs' DVD Tach benchmarking software, and a respectable 16.2X CD-ROM read rating from the same company's CD Tach. The LF-D211N easily read every DVD movie, CD-R, and CD-RW disc we threw at it. And like other second-generation DVD-RAM drives, the Panasonic can read and write to older 2.6GB DVD-RAM discs. According to their specifications, the new drives can also read DVD-R, DVD-RW (a forthcoming rewritable disc that's optimized for video), and DVD-Audio discs.

Panasonic's 4.7GB media for the LF-D211N will have a list price of $25. That's about $6 per gigabyte on the formatted disc compared with about $1.15 per GB for bulk 12X CD-Rs (about 650MB per disc), and about $5 per GB for 10X CD-RWs (about 500MB per formatted disc) in small quantities. A double-sided 9.4GB disc cartridge, intended mainly for data applications, will be available soon at a projected list price of $35 ($4.17 per GB, formatted). For some users, the reduction in disc clutter alone will justify the premium price DVD-RAM media currently command.

TODAY AND TOMORROW

AS DVD-RAM technology takes off, prices on drives and media should drop and DVD-RAM should reach the mainstream. In preparation, the movie industry, concerned about rampant piracy at DVD's high copy quality, has implemented safeguards to prevent direct copying of DVD movies onto DVD-RAM discs and competing media. Copy protection schemes will likely be added to cable and satellite services, too, to prevent production of multiple copies of movies recorded off these services, while allowing at least one copy for personal use—much like what we have now.

Today you can buy a DVD-RAM drive for your PC and use it for backup, archiving or to transfer content from old videotapes or TV. To do the latter, you'll need video editing software and a video capture card, which should also allow you to hook up to a TV feed. It's workable, but not yet an elegant solution. With this second generation, however, it looks like DVD-RAM's time is about to arrive.

—Jon L. Jacobi and Anush Yegyazarian ▶

Where Will It Play?

ALL THE DIFFERENT media may leave you confused about what you can use, and where. Here's help.

HARDWARE	2.6GB/4.7GB DVD-RAM	DVD-R	CD-R/ CD-RW	CD-ROM/ CD audio
DVD-ROM drive	●/○[1]	●	●	●
2.6GB DVD-RAM drive	●/○	●	●	●
4.7GB DVD-RAM drive	●/●	●	●	●
DVD-Video player (stand-alone) [2]	○/○	●	●	●
DVD Multi video player (stand-alone) [2,3]	●/●	●	●	●
DVD-RAM video recorder (stand-alone) [2,3]	●/●	●	●	●

[1] A few of the most recent drives can read 4.7GB DVD-RAM. [2] Handles video and audio only, not data. [3] Forthcoming product.

Fast Facts About Formats

- **CD-R and CD-RW:** Standards for optical writable drives and media. CD-R discs are write-once; CD-RW discs allow rewrites. CD-R discs are available in 650MB and 700MB capacities and are used primarily for storing audio, applications, and data. CD-RW discs have a 650MB capacity and are used mostly for backup and archiving.
- **DVD-R and DVD-RW:** DVD-R discs, a write-once version of DVD, are used primarily to create masters of DVD movies or data discs; top capacity is 4.7GB. DVD-RW is an upcoming 1000-rewrite standard, supported by the DVD Forum, that will be optimized for video.
- **DVD-RAM:** Recordable and rewritable DVD standard supported by the DVD Forum. First-generation DVD-RAM discs held up to 2.6GB of data per side; new 120mm discs raise the bar to 4.7GB per side. The new discs also come in an 80mm size (1.4GB per side); these will be used primarily in portable products such as digital camcorders.
- **DVD-ROM:** Standard for optical drives and media that support read-only, double-sided discs used in the distribution of digital data. Capacity per side is either 4.7GB or 8.5GB.
- **DVD+RW (aka +RW):** Rewritable DVD standard promoted by HP, Sony, Philips, and others that competes with DVD-RAM. 3GB drives were promised in 1998, 4.7GB drives are now promised by mid-2001.
- **DVD-Video:** Read-only DVD discs used in digital entertainment distribution, notably commercial movies. Current capacity is 4.7GB per side (about 2 hours and 20 minutes of video encoded in MPEG-2 format). The spec also supports a density of 9.4GB per side.

Panasonic LF-D211N
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Buy Now or Cry Later: Shortages Loom for Hot Products

CONSUMER ALERT

EVEN IN THIS age of e-everything, you can't always get what you want. Shortages of several vital high-tech components have arisen this summer, causing product delays that will probably last through the holiday shopping season. Popular products like Palm handhelds, digital cameras, and top-of-the-line CPUs have been particularly hard-hit.

How bad is it? Popular models of Palm PDAs are in such short supply that shoppers have been buying them at auction on EBay for $30 to $50 dollars above list price to avoid shipping delays.

"There is a shortage of a few key components—flash memory and LCD screens," says Palm spokesperson Marlene Somsak. "We expect that the shortage will begin to abate this quarter."

Palm attributes the rise in demand for its popular PDAs to recent seasonal gift-giving occasions like Father's Day and graduation.

With revenues up a whopping 100 percent from this time last year, Palm faces a marketplace that is, according to Somsak, "insatiable" for its products. "We certainly wish that we could put a Palm in the hands of anyone who wants one," Somsak adds.

IN A FLASH

ANALYSTS SAY Palm's supply problems are due to shortages of handheld-size displays and flash memory. (Unlike standard DRAM, flash memory doesn't require any source of power to retain its data.)

The shortages of flash memory have had widespread repercussions because so many products—from cars to cell phones to MP3 players to digital cameras to Internet appliances—now use it. Analysts blame the shortfall on skyrocketing sales of cell phones and digital cameras, most of which pack at least 8MB of flash.

In fact, AMD and Intel, two of the biggest makers of flash memory chips, say that they are sold out of them for the rest of the year. "We see 18 months before capacity meets demand industry-wide," says AMD's CEO Hector Ruiz.

Prices for flash cards are almost sure to go up, so the sooner you buy, the better. But carefully check configurations on any device that uses flash: Some are changing subtly. In Sweden, for example, some digital camera makers are quietly scaling back the standard amount of flash memory they incorporate, and U.S. vendors won't be far behind. Don't wait too long on cameras as holiday presents, either.

SYSTEM WOES

SEVERAL other problems will pester technology shoppers. A tight supply of capacitors, a key component of many electronic products, could delay the launches of some new products such as Web-enabled cell phones. But you shouldn't have trouble getting a phone, nor are you likely to see higher prices. Cell phone makers are absorbing the extra cost.

Parents who are considering getting a small notebook for their college-bound kids had better accelerate their buying plans. Supplies of displays for smallish 12- and 13-inch notebooks have been tight. The bigger but pricier 14- and 15-inch notebooks should be available.

Some companies have also chosen to delay plans for rolling out their Internet appliances because of the display crunch.

Meanwhile, desktop PC buyers have encountered frustrating delays in their efforts to obtain the latest, fastest CPUs. Intel and AMD have been trying to one-up each other—and to whet the public's appetite for upgrading—by debuting ever-faster CPUs well before they could produce them in volume. Intel's 1-GHz Pentium III chip, announced in March, won't begin shipping in volume until this month, half a year later. And AMD announced its new Duron chip, a rival to Intel's low-end Celeron, in June—a month before shipping it in volume.

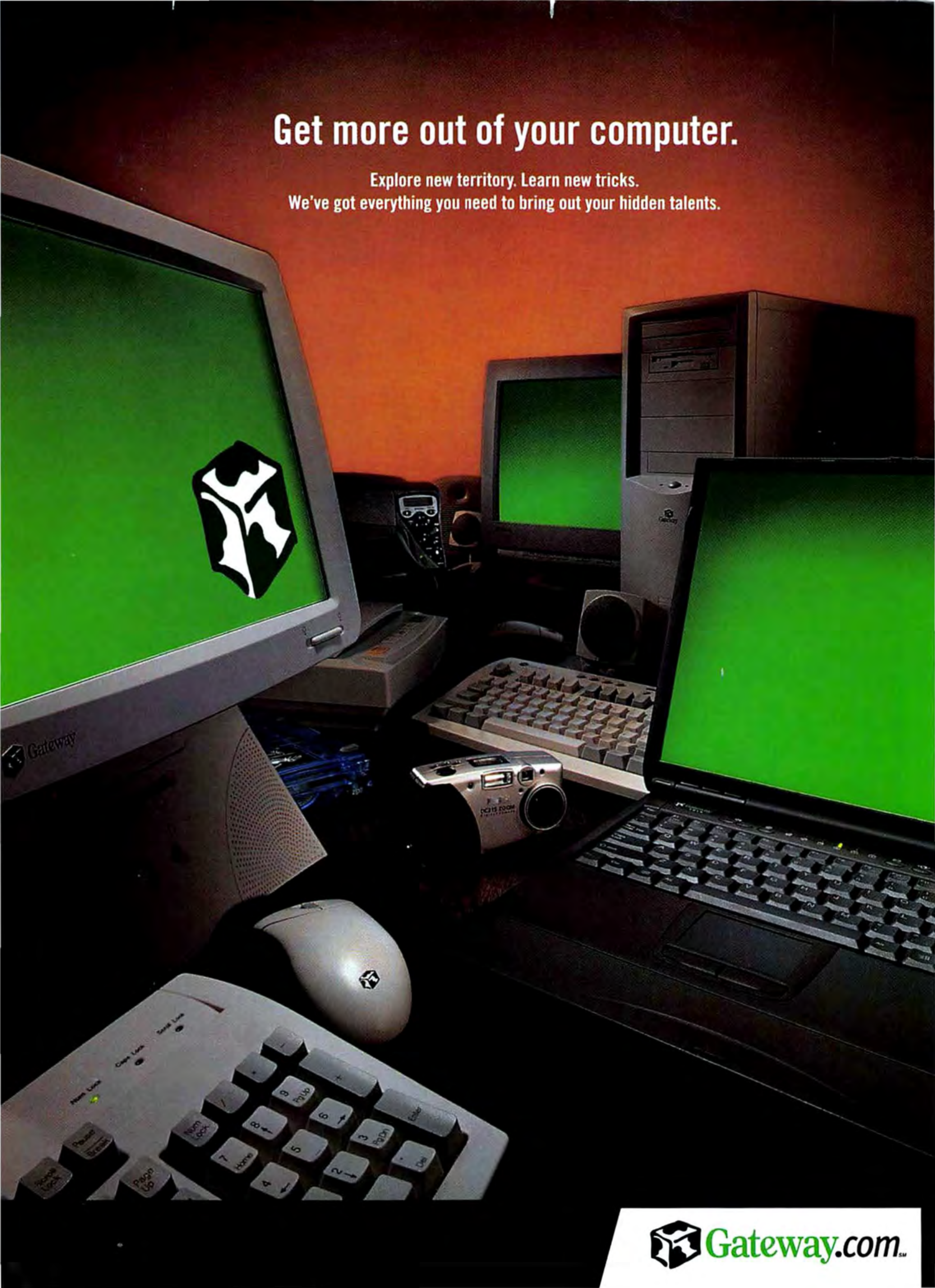
Overall, you should order early and read specs carefully. Waiting for lower prices or more features—usually a wise technology shopping strategy—won't pay this year.

—*Laurianne McLaughlin*

What's Hard to Get: The Inside Scoop

IN TIGHT SUPPLY	Good news	Bad news
Capacitors—basic electronic part for almost any PC product	Vendors will absorb higher costs for this part.	Continued shortage could delay new product launches.
Palm PDAs—today's best selling handhelds	Color models in ample supply.	Other models face shipping delays through end of year.
Flash memory—primary memory for cell phones, digital cameras, and MP3 players	No cell phone shortages expected.	Flash card prices likely to rise; cameras may soon ship with less memory.
12- and 13-inch notebook displays	You can always buy a 14-inch model.	High display prices discouraging Net appliance introductions.

ILLUSTRATION: PETER COATES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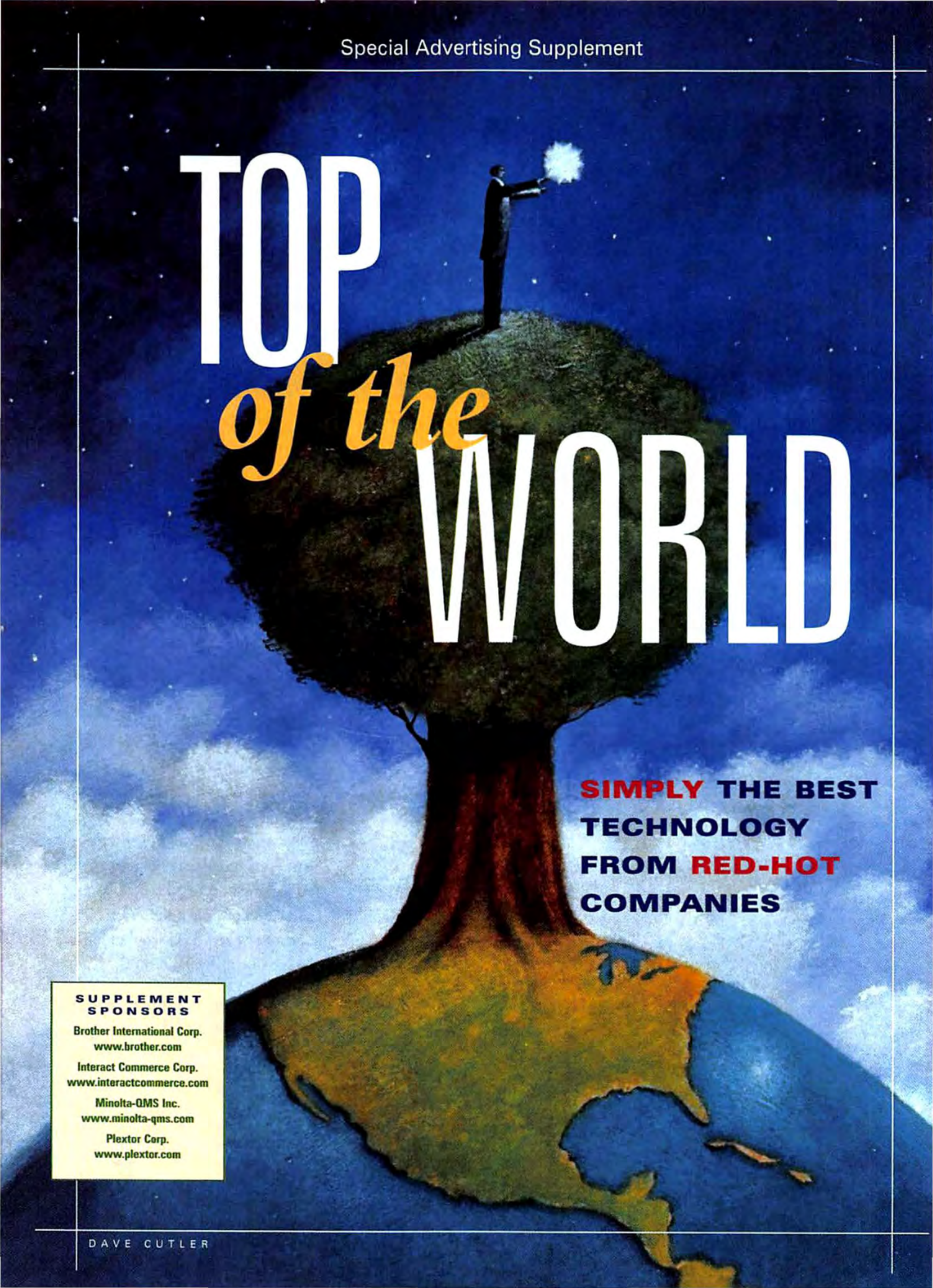

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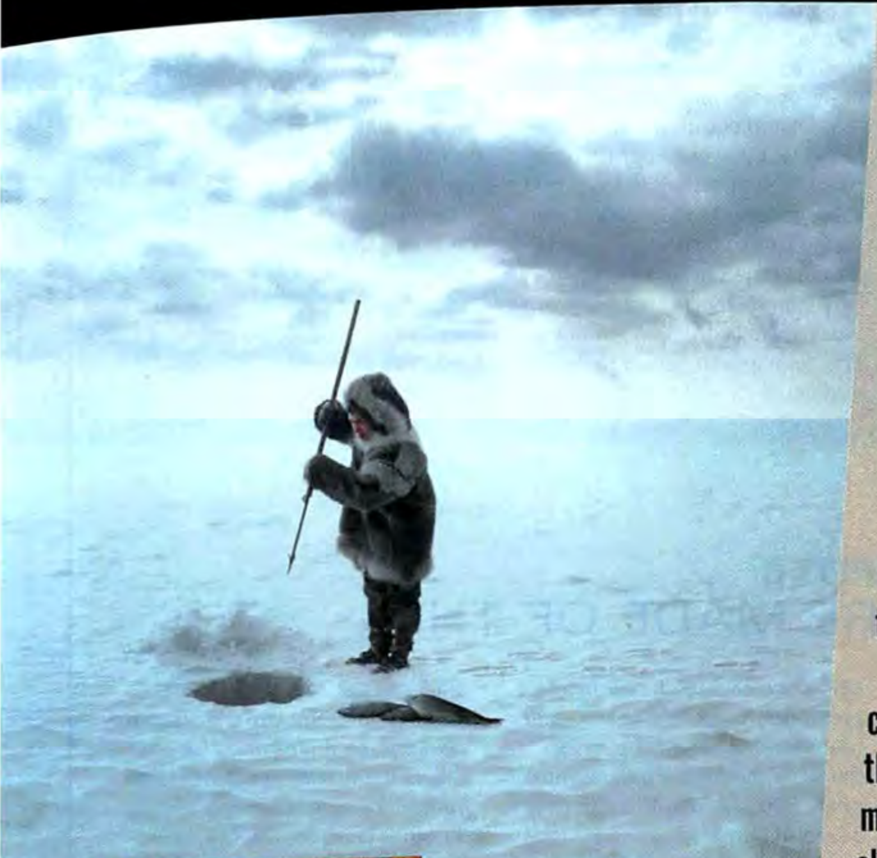

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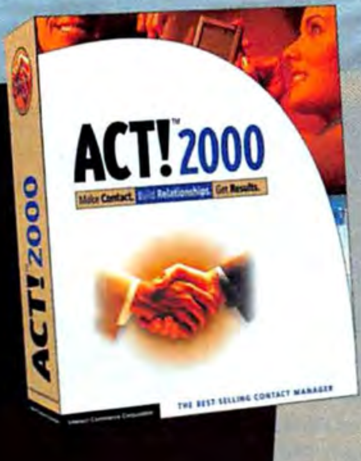
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You may have read a science fiction story featuring a magic box that could hold everything in the world. You could put anything into that small box and extract it later. Twenty years ago that really was science fiction; today it's closer to fact. Multimode CD drives that record, rewrite, and play back data are today's magic boxes. And despite their technical sophistication, using them is easier than ever.

One of the finer examples of multimode CD drives comes from Plextor Corp., a Santa Clara, Calif.-based developer and manufacturer of high-performance CD equipment. Their newly released PlexWriter 12/10/32A E-IDE (ATAPI-4) writes to a blank CD disc at a 12X speed, rewrites to a previously used disc at 10X, and reads data at speeds up to 32X. Plextor's PlexWriter can rewrite an entire 650 MB CD-RW in just over seven minutes.

At this level of performance, coupled with a rapid 150ms average random access time, the 3-in-1 PlexWriter 12/10/32A competently meets the need for total or incremental backups, archiving still or video images, mastering new software, creating exciting multimedia, mixing and creating custom audio discs, CD duplication, and file sharing.

Older CD drives suffered from an irksome shortcoming. If something interrupted the write operation, the CD you were burning could end up as a Frisbee or a drink coaster. Plextor's BURN-Proof technology compensates for slow source drives and also allows the PlexWriter to be used for multitasking, enabling you to do other tasks as you burn a disc—like sending e-mail, or surfing the Web for vintage science fiction stories.

PLEXWRITER 12/10/32A

PlexWriter 12/10/32A from Plextor

How to achieve true Twain.

By Glenn Meadows of Masterfonics, Nashville

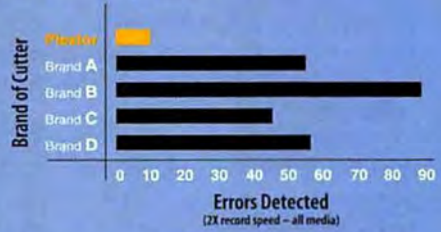
Top recording artists such as Shania Twain depend on the audio masters we create at Masterfonics. The masters we cut are used to make critical judgments about music that will eventually go out to millions of people worldwide. They must be of the highest quality. To find a cutter that offers that caliber of recording, I did a study testing various blank media with different brands of writable drives. My results?

There's a huge difference between cutters.

You can hear the difference, and see it with a CD verifier. Plextor® CD drives have the lowest number of errors of any cutters I've found.

A master cut on a Plextor drive sounds like the original session—whether the cut is played back in real time, 2X or even 4X. That's because Plextor has designed cutters that control all the variables to help produce spectacular audio.

See and hear for yourself.



Take a look at the chart I created of my results. Want more proof? Pick up Shania Twain's *Come On Over* CD, the best-selling country album of all time. It was mastered by our studio on a Plextor drive.

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MINOLTA'S MAGICOLOR 2 DESKLASER PRINTERS:
SHOWING YOUR TRUE COLORS

DO YOU DREAM IN COLOR? OR ABOUT COLOR? And the many ways it can lend eye-catching impact to all of your documents? Sometimes, in the world of computer technology, dreams can come true. With the release of the magicolor 2 DeskLaser printers from Minolta-QMS Inc., Mobile, Ala., the cost of high-quality, high-performance color laser printers has plummeted below $1,600. And, while prices along with the cost of ownership decline, features, ease of use, and reliability increase.

With an estimated 75 percent of today's business documents created on a computer, businesses have to be more competitive, and color improves your chances and opportunities to get your message across and improve readability. Whether it's a bit of spot color to attract attention or increase emphasis, or a color saturated page, people prefer reading documents in color.

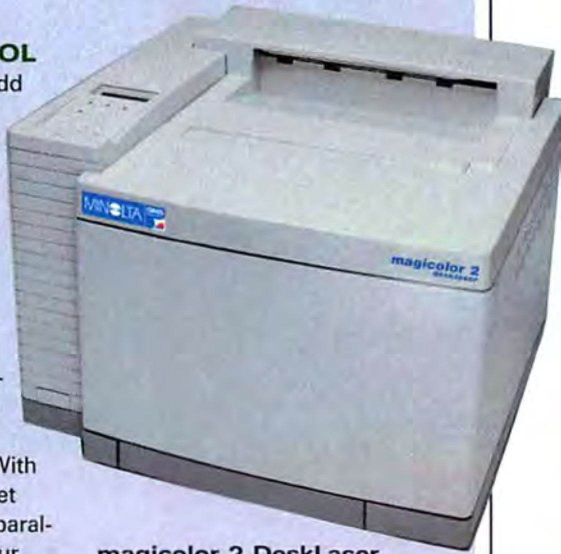
Producing four pages per minute in color, and a blazing 16 pages per minute in black and white, Minolta's magicolor 2 DeskLaser and magicolor 2 DeskLaser Duplex models are affordable alternatives to networked inkjet printers. Well-suited for use in home offices or in departmental, workgroup, and networked office environments, both of these easy-to-live-with printers produce professional-mag looking documents in rich, brilliant colors at 600 dots per inch. At that fine-grained resolution, one of laser technology's unique advantages over other kinds of printing technologies becomes even more noticeable. A laser printer's particle toner tends to adhere to, rather than penetrate, the paper, giving the page an elegant embossed appearance. DeskLaser's toner cartridges (cyan, magenta, yellow) yield up to 6,000 pages at 5 percent coverage; black cartridges yield up to 10,000 copies, making these two powerhouse printers suitable for high-volume environments.

CREDIBLE COLOR, COMPLETE CONTROL

For additional versatility, add the optional SC-200 digital copier attachment and you can make full-color copies with the DeskLaser. This low-cost digital copier attaches via a parallel connection for convenient, walk-up copying. The SC-200 can also operate as a desktop scanner, and includes software for scanning, image editing, and text conversion. With its built-in 10BaseT Ethernet (TCP/IP) and bidirectional parallel interfaces, you have your choice of configuring the DeskLaser as a standalone or a networked printer.

The DeskLaser Duplex model's dual paper trays simplify printing, especially when connected to a network. If you routinely produce legal, undersized, or oversized documents, duplex trays make good sense since that enables you to select the paper from an installed tray, instead of having to go to the printer and swap trays manually.

People do not buy technology or features, they buy solutions, and Minolta's renowned reliability can minimize downtime. In small to large offices, a malfunctioning printer can bring operations to a halt. Minolta's comprehensive one-year on-site warranty service helps assure that the magicolor 2 DeskLaser printers will continue providing you with low-cost, high-resolution images—just the sort of stuff that users who dream in color, dream about.



magicolor 2 DeskLaser from Minolta-QMS

BROTHER INTERNATIONAL: AWARD-WINNING MONOCHROME AND COLOR LASER PRINTERS

When you want no-compromise printers to communicate your ideas and concepts fast, affordably, and reliably, look first to Brother International Corp. and its award-winning family of monochrome and color laser printers.

Brother International's family starts with the award-winning HL-1240. Long known for providing a variety of high-quality technology products, Brother packs its entry level HL-1240 with advanced features typically found in printers costing far more. The HL-1240 is blazingly fast, delivering up to 12 pages per minute (ppm) at resolutions up to 600 dots per inch (dpi). The first page prints in just 15 seconds, fast enough for even the most demanding users. The printer also includes built-in parallel and USB interfaces. Other advanced features include four front-mounted LED indicators that give you instant updates on the printer's status and on-screen interactive help.

It's no wonder that *PC World* bestowed its World Class Award to the HL-1240 as "The best personal laser printer." CNET said it "... serves up the fastest speeds of any laser printer we've tested in its price range"..."the Brother [HL-1240] is the ideal addition to any small or home office." Accolades continued from ZD's Smart Business A-List: "Brother raises the bar with the speediest personal printer for the price."

brother At your side.

Brother also has other champions in its laser product family. These include the HL-1250, which offers up to 12 ppm print speed, 1200 x 600 dpi output resolution for improved text and graphics, and expandability including upgradeable memory and an optional second 250-sheet lower paper tray.

Next in line is Brother's small workgroup monochrome laser, the HL-1270N, which adds 10/100 Base Ethernet connectivity plus PCL6 and BR-Script (PostScript Level 2).

All three of these no-compromise printers include optimized drivers for Windows 2000, NT 4.0, 98, 95, and 3.1x, as well as support for iMac/G3/G4. Finally, each of these printers includes an automatic e-mail printing software utility that can print your e-mail message at prescheduled times.

AFFORDABLE WORKGROUP COLOR

When your proposals, newsletters, brochures, and business documents require the eye-catching impact of color, Brother's award-winning HL-2400CeN (*PC World* Best Buy July 2000) and HL-3400CN provide high-quality, full-color output. Combining razor sharp text and rich color printing at up to 2400 dpi, high-performance throughput, and a variety of user enhancements and upgrades, these color lasers deliver the perfect balance of quality, affordable acquisition cost, and very low cost of ownership.

Designed expressly for use on networks, these two workhorses can meet any challenge right out of the box. Install the optional 6 GB hard drive or a PCMCIA card and you can effortlessly handle advanced functions, including job accounting, electronic form storage and form printing, job spooling, and secure job reprint.

HL-1240 from Brother

The HL-2400CeN and the HL-3400CN raise workgroup color printing to a new level. Exactly what you would expect from Brother International—an innovator and award-winning company with a comprehensive line of award-winning printers.

For more information about these and other award-winning Brother products for workgroups, small offices, and home offices, visit www.brother.com.

MANIPULATED!

It's all the cool things you can do with digital photos *after* taking them that make digital cameras unique.

Dentists have an image problem. They may see themselves as artists, but to their frightened subjects they may look more like the Marquis de Sade than Michelangelo. Still, cosmetic dentists like Boston-based Edward Walk, D.M.D., have been working diligently for years to turn their patients' worried frowns upside down. Walk himself applies digital photography and image manipulation to put patients at ease and to better communicate with other specialists in his field.

Walk says he was first drawn to the idea of shaping teeth as a college undergraduate, when he started looking for ways to connect his academic interests with his desire to improve the lives of other people. "I was majoring in psychology and sculpture," he says, "when it occurred to me that cosmetic dentistry is very much like other forms of sculpture. You are using your hands and your brain to build freeform objects."

Jasc's Paint Shop Pro 7.0

Walk wields lasers and porcelain veneers to brighten dingy and discolored teeth that have been damaged in falls or stained by tetracycline. He uses an array of ceramic buttons to match the color of crowns to his patients' other teeth. "The difference in shade along the spectrum [of buttons] is very slight, and that helps us to get an exact match," Walk says. "Someone with an untrained eye would have a very hard time telling the difference between any of them."

Walk hones his visual acuity through his work as a photographer, in which he is always experimenting with cutting-edge film and digital photographic tools and techniques. "I guess I have always had to be the first kid on the block with the latest camera," he says.

Back at the office, Walk takes pictures of his patients' smiles with a Sony digital camera. He then pulls the images into Adobe Photoshop, where he electronically brightens or straightens teeth and closes gaps in real-time, so his patients can see what he is proposing for their mouths. "I have a 42-inch NEC [PlasmaSync 4210W monitor] on the wall, six feet in front of the patient," he says. "They don't miss a thing."

Few image-editing systems are meeting the responsive, real-time demands of dentists and physicians. But one of them, Jasc Software's Paint Shop Pro 7.0, fits the bill by combining photo-editing, painting, illustration, and Web tools into a single, affordable professional package. Paint Shop Pro 7.0 boasts new, easy-to-use automated photo-enhancement features such as automatic color balance, red-eye removal, and scratch removal.

Imation's SuperDisk diskettes

Jasc has also improved the usability of Paint Shop Pro's drawing and illustration tools. The program's editable vector shapes, lines, text, and brushes now support gradients, patterns, and textures. And professionals can quickly and intuitively store and reuse their custom shapes and other graphics with the program's Preset Shapes library.

Paint Shop Pro boosts productivity with an object-grouping feature, as well as with alignment and distribution, Auto-Save, autoproofing, and snap-to grids and guides for positioning painting and drawing elements. The program helps to reduce user headaches by supporting nearly 50 file formats—more than any other product on the market.

Walk also employees digital photography to make taking X-rays simpler and safer for his staff and patients. For his digital X-rays, he uses something akin to "bitewing" radiographs, except that his sys-

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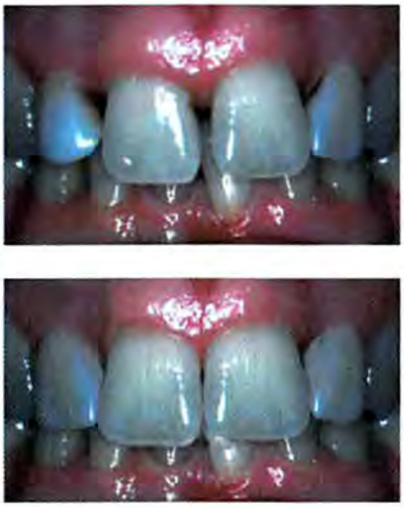
tem captures electronic images. For panoramic radiographs (where the camera revolves around the patient's head), Walk substitutes digital cartridges for traditional film. "It saves us some time in developing, and I can e-mail the X-rays to other dentists and physicians," he notes. "And the [individual radiograph electronic image process] uses 90 percent less radiation [than traditional methods]."

While Walk's approach cuts his businesses' film and file burden, it has generated a need to find safe and accessible storage for digital photos. Imation's SuperDisk technology, which is being incorporated into disk drives from Dell, Hewlett-Packard, Toshiba, and other leading manufacturers, is one possible solution. SuperDisk drives work with both 120MB SuperDisk diskettes and ordinary 1.44MB floppy diskettes. The technology was developed to replace floppy drives, so it looks like a good investment for most users.



Top photo is before treatment. Bottom photo is digitally enhanced to show the patient what the work would look like when completed.

SuperDisk diskettes look and feel the same as floppies and work with the same drag-and-drop simplicity. Users will find the new drives easy to install; there are no new procedures to learn in order to get started. And the preformatted SuperDisk diskettes (for Mac or PC) are a great time-saver for fast-paced professional environments.

Walk now spends much of his time traveling worldwide to teach other dentists and doctors how to use photographic techniques in their work. And digital photography is starting to take up more of his agenda. "Today's [digital cameras] and software are becoming increasingly useful for close-up photography," Walk says. "And that's making them invaluable in clinical settings."

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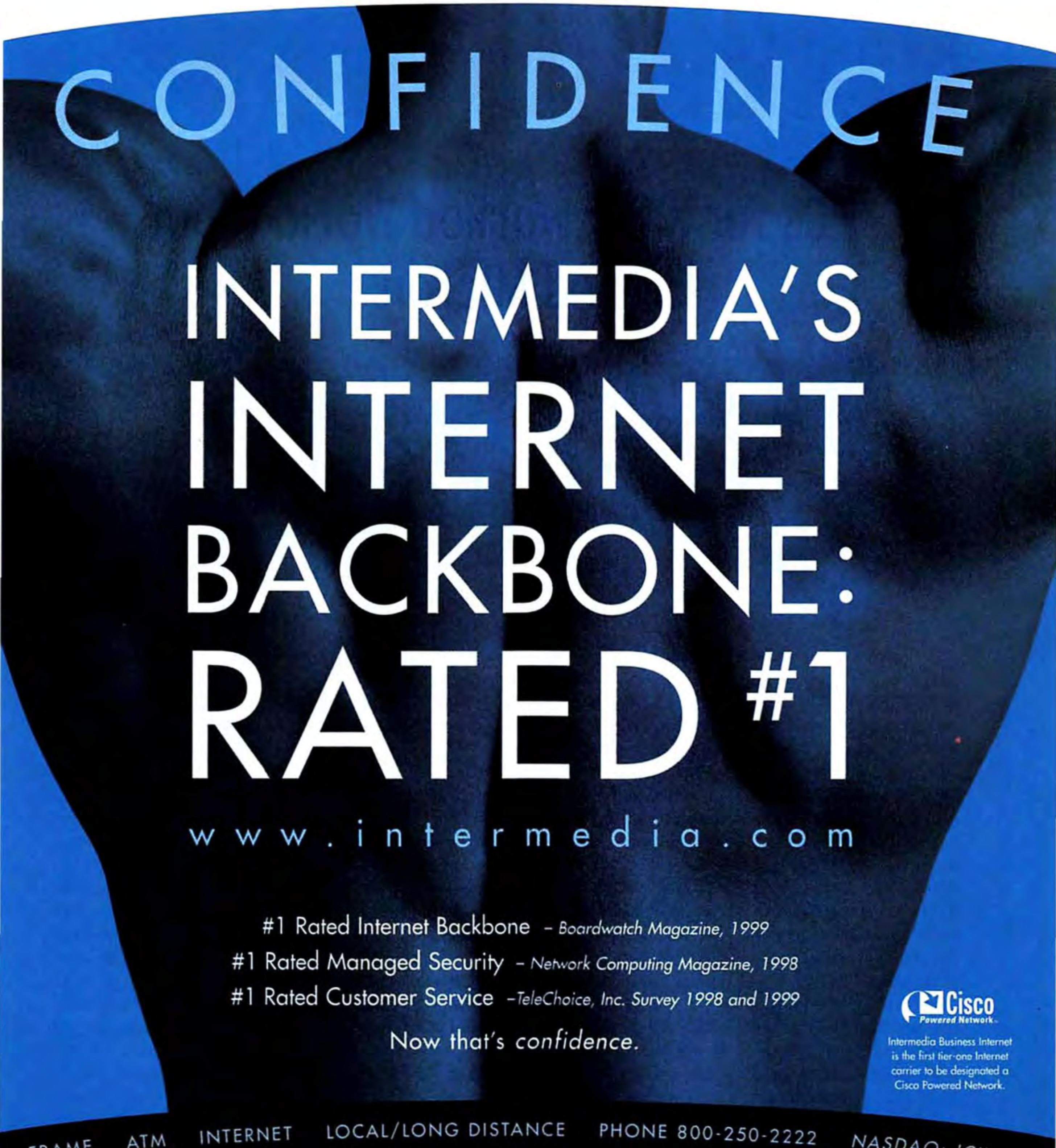

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INSIDE
90 $999 Compaq Laptop
92 Web-Based Print Shops Deliver
98 Cool Palm Alternatives

NEW PRODUCTS

PCs for a Networked World From HP and Micron

INTEL'S NEW 815E chip set powers HP'S Vectra VL400 (left) and Micron's ClientPro Cn.

DESKTOPS

IN A NETWORKED world, PCs must offer security, stability, and enhanced performance. *PC World* tested two new systems that were designed with these features in mind: Hewlett-Packard's **Vectra VL400** and Micron Technology's **ClientPro Cn.** We found that these systems do deliver, although what you get for the price significantly differs.

Both are based on Intel's new 815E chip set—the company's first to support faster PC133 SDRAM memory—and are geared toward midsize and larger companies looking for high-end features (such as integrated network adapter boards, better graphics, and enhanced hard drive support) at a midrange price. Like Intel's 810E chip set, the 815E integrates a graphics adapter, but it also supports an AGP 4X graphics slot and ATA/100 hard drives, so the Vectra and the ClientPro are compatible with the latest technologies.

The Vectra system, loaded with 128MB of PIII-933 memory and Windows 2000 Professional, earned a 188 on our PC WorldBench 2000 tests—one of the highest scores we've seen in our short time testing Windows 2000 systems. The shipping unit offers many security tools, including the HP ProtectTools 2000 smart card kit (which scans a card to grant access to the PC), chassis intrusion detection, a case lock with keys, and the HP Power Protection Device (which takes up a drive bay but provides short-term backup power). It also comes with a 4X/4X/24X CD-RW drive and HP's E-DiagTools for remote management and troubleshooting. This $2569 system would make a powerful and secure addition to any corporate environment.

Accessing the interior of the Vectra is simple: Pop a latch and lift a sturdy side panel. Inside you'll find three open PCI slots (with two ISA slots added on an extension board) and two open drive bays. Both the slots and the bays provide uncomplicated, toolless loading. The 19-inch HP-P910 monitor delivered sharp text up to the maximum resolution of 1600 by 1200 through its Matrox Millennium G450 Dual Head AGP 4X graphics board, which also provides support for two monitors. In our test images, colors did appear a tad light.

The shipping version of the ClientPro Cn we tested offers fewer high-end features than the Vectra, and it turned in a merely so-so performance record: This Windows 98 SE machine, also equipped with 128MB of PIII-933 memory, scored a mediocre 158 on our PC WorldBench 2000 tests—average for similarly equipped PIII-866 systems.

The $2738 Micron does include an impressive software bundle, featuring Microsoft Office 2000 Small Business Edition, Norton AntiVirus 2000, and Intel's LANDesk Client Manager software.

The huge midsize tower lets

PHOTOGRAPHS: MARC SIMON

HP Vectra VL400

PRO: Excellent performance, strong security features.
CON: Expensive, though extras in this system make it worthwhile.
VALUE: Lots of features included in this high-end corporate system.
Street price: $2569
Hewlett-Packard
800/752-0900
www.hp.com

Micron ClientPro Cn

PRO: Decent performer, nice software bundle, expansion room.
CON: Plain CD-ROM drive, no reset button, very pricey.
VALUE: Corporate workhorse.
Street price: $2738
Micron Electronics
800/964-2766
www.micronpc.com

TEST PC WORLD CENTER THESE PRODUCTS have been evaluated using tests designed by the PC World Test Center.

you open the case without tools (it takes some work to reattach the side panel) and has tons of expansion room: six open bays and five open PCI slots on a toolless riser board.

The system's 17-inch 700 Ex monitor produced rich colors and crisp text, but it blurred slightly at the maximum resolution of 1280 by 1024. Micron wasn't content to stick with the 815E's integrated graphics; it also tossed in a Visiontek NVidia RIVA M64 AGP 4X board. There's no reset button, and the PC ships with a plain 20X–48X CD-ROM drive, but you can fill one of the open bays with a CD-RW or DVD-ROM drive.

For corporate buyers, the HP Vectra offers much better performance and polish. The Micron ClientPro is costly and provides far fewer features. Both are a bit pricey, but we think the Vectra (unlike the ClientPro) is worth it.

—Joel Strauch

CONTENTS

88 HP Vectra VL400, Micron ClientPro Cn
89 Canon S100 Digital Elph camera
90 Sys TaskMaster 600D; Compaq Presario 1200XL-450
92 Custom Internet printing; HP DeskJet 648C printer
94 Sony Mavica MVC-CD1000 digital camera
98 IPaq H3650 Pocket PC, RIM 957 Wireless Handheld
99 Milestones Professional 2000, Project KickStart 3, TurboProject Professional 4
101 Axis 2100 Network Camera
103 Peachtree Complete Accounting Release 8
105 Logitech Cordless TrackMan
106 Plextor PlexWriter 12/10/32A; Intelliseek BullsEye 2, ver. 2.5

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Canon's Glamorous, Compact Digital Elph

DIGITAL CAMERA

IT'S SLEEK. It's tiny. Canon's **PowerShot S100 Digital Elph** camera is definitely one of the snazziest gadgets around.

The cigarette box–size Digital Elph has an alluring, svelte design. The camera is conveniently pocketable, and it features a big 2.1-megapixel CCD (charge-coupled device) that delivers sharp, colorful pictures at resolutions up to 1600 by 1200 and vivid 8-by-10-inch printed photos.

But this camera permits only two resolution options: a minimum setting of 640 by 480—ideal for Web posting or e-mail—and a maximum of 1600 by 1200. Most digital cameras have at least low, medium, and high modes.

The Canon does provide useful, though limited, manual settings for white balance and shutter speed—which is handy if you're an experienced shutterbug. It also has 2X optical zoom for closing in on photo subjects.

The $699 camera stores pictures on an 8MB CompactFlash card, which holds only about 15 pictures in high-resolution mode (but more than triple that on low setting).

THE SMALL, sleek Canon PowerShot S100 Digital Elph.

Though the Canon's controls and menus are clear, the tiny optical viewfinder is located too close to the right-hand grip. While looking through the viewfinder during informal tests of this shipping model, I found I couldn't grip the camera firmly without pressing my nose against my thumb. Another drawback is that the built-in flash is small and provides insufficient light. Consequently, some photographs that were taken indoors or at night came out dark, and they lost some background detail.

The Elph forgoes a serial port for a USB connector. The latter is a relatively speedy option for downloading pictures, but if your PC doesn't support it, you'll have to buy a cable separately that has a serial connection.

Still, the overall package is decent. Included are Adobe's PhotoDeluxe, plus a rechargeable NB-1L lithium-ion battery and a recharger. The battery ran out of juice after 2 hours of casual shooting in my tests.

The Canon PowerShot 100 Digital Elph rates very high on the cool-o-meter, and under the right conditions it takes handsome photos. But in my opinion, the list price for this digital camera is a tad high.

—Grace Aquino ▶

Canon PowerShot S100 Digital Elph

PRO: Glamorously compact, takes vibrant photos, easy to use.
CON: Relatively pricey, small optical viewfinder, only two resolution settings available.
VALUE: An eye-catching digital camera that produces color-rich photos–ideal if you want to splurge.
List price: $699
Canon
800/652-2666
www.powershot.com

Duron, Duron: AMD's New Processor Rocks

DESKTOP

OUR FIRST LOOK at AMD's new Duron processor—in a **TaskMaster 600D** system from Sys Technology—shows that this fast and inexpensive CPU will be one to watch.

With Duron, AMD extends the processor war to budget-tier PCs. Duron—a name invoking the Latin root of "durability"—is currently available in 600-, 650-, and 700-MHz versions. Systems with Duron CPUs cost roughly the same as PCs with Intel Celeron chip sets, previously the top dogs in the budget CPU pack.

In PC WorldBench 2000 tests, the no-frills TaskMaster 600D performed impressively (though our test base of Windows 2000 Professional systems is not yet extensive). Running Windows 2000 Pro on a 600-MHz Duron, the Sys scored 159—that's 13 points higher than a comparably equipped PIII-600 system and only 6 points below a comparable PIII-733 machine.

This $1189 Sys shipping model, with a 20.5GB hard drive, contains such business-ready components as an Intel Pro/100+ network card and a case lock. The unit does have a few shortcomings, including a low-end 17X–40X CD-ROM drive and limited expansion room (two open PCI slots and two open bays).

Like AMD's new Athlon, the Duron carries integrated L2 cache. Cache provides limited, quick-access storage space for data most likely to be needed next by the CPU. The size of Duron's total cache (128KB of L1 cache and 64KB of L2 cache) is only slightly greater than that of the Celeron (32KB of L1 and 128 KB of L2), but its three-times-faster front side bus (at 200 MHz versus 66 MHz) should supply a larger performance boost with CPU-intensive applications.

The system comes with a crisp 17-inch OptiQuest Q71 monitor powered by an NVidia graphics card, but it lacks an overall manual and a reset button. Still, the Sys TaskMaster 600D's low price and solid performance make it a good bargain desktop.

—Joel Strauch

Sys TaskMaster 600D

PRO: Nifty new Duron CPU, ready for corporate use, budget price.

CON: No system manual, no reset button.

VALUE: Inexpensive Win 2000 Pro machine with good performance.

List price: $1189

Sys Technology

800/613-9963

www.sys.com

TEST PC WORLD CENTER THIS PRODUCT has been evaluated using tests designed by the PC World Test Center.

$999 Laptop Works Hard for the Money

NOTEBOOK

ON A TIGHT budget but want a notebook for all the basics—e-mail, Web browsing, simple word processing, and personal finance? Check out Compaq's new **Presario 1200XL-450**. At just $999, it packs a good set of features for the price.

The unit's AMD K6-2-450 processor gets the job done, but you may feel constrained by the default 32MB of RAM. Invest a little more ($99), and you can get a beefier 64MB. This Windows 98 SE system also comes with a fairly roomy 5GB hard disk and gives you both a built-in floppy disk drive and a 10X–24X CD-ROM drive. Also included: a built-in 56-kbps modem, plus lots of software from Compaq and trial offers from other vendors to help you get started on the Net quickly. The 12-inch HPA dual-scan screen looks good, though it isn't as sharp as an active-matrix display.

LAPTOP BARGAIN: The Compaq Presario 1200XL-450 costs just under $1000.

Like other notebooks in the Presario line, this one carries a responsive Synaptics touchpad and a comfortable, full-size keyboard. Unfortunately, the latter is a bit clicky, which may take some getting used to. Like other Presario models, the 1200 XL-450 provides lots of buttons for one-touch access to e-mail, Web browsing, online shopping, and other sites. Among the default button settings is Compaq's own My Presario, which links you to support and information about your system that we'd have preferred to find included on the hard disk itself.

Still, the Compaq guide and manual are clear and reasonably comprehensive, walking you through the basics as well as through more sophisticated topics such as upgrades and troubleshooting. Compaq's solid software bundle includes McAfee VirusScan 4.3 and Microsoft Works Suite 2000—with Word 2000, Encarta, and Money Standard Edition.

Weighing 7.8 pounds, this mobile package does make compromises, but it gets you started quickly and can adequately handle most tasks—so it's a pretty good deal at this price point. If you're considering the unit for a college-bound student, however, be sure to get more RAM and an ethernet PC Card.

—Anush Yegyazarian ▶

Presario 1200XL-450

PRO: Low cost, easy to use, good software bundle.

CON: Needs more RAM, could use an ethernet PC Card.

VALUE: Definite compromises, but good features for the price.

List price: $999

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I tested a pair of Web-based services, **Mimeo.com** and **NowDocs.com**, that let you arrange high-quality digital print jobs and blazing delivery, directly from your computer. Mimeo requires installation of special software on your PC; NowDocs is browser-based.

I sent each service a six-page Microsoft Word document bloated with uncompressed graphics files, and ordered six copies with binding and covers. Mimeo handled the job with ease. After loading its software, I hit File•Print for my document and selected Mimeo from the choices its software put in my dropdown printer list. The software compressed the Word file, opened my browser, and sent the file—all in about 13 minutes.

My NowDocs experience was bumpier. Once you reach its Web site, NowDocs asks you to locate your document on your PC and then upload it. That's simple, but it took me five tries to transmit my test file; in fairness, a poor network connection on such a large document could have interfered. The upload took about 18 minutes.

Both services let you Print Preview your document; their interfaces step you through options for covers, binding, paper quality, number of copies, costs, and delivery specs, tabulating expenses as you go. Option selections, plus payment and tracking, are done on screen. It took me less than 5 minutes to enter each order. Both sites offer 24-hour toll-free phone-in customer service seven days a week. As a test, I called to request an option (an extra blank sheet) unavailable on screen. Mimeo delivered. NowDocs didn't.

Delivery service from both sources was impressive. My orders arrived handsomely printed, nicely packaged, and earlier than I paid for. NowDocs currently offers 2-hour service in 15 major U.S., Canadian, and British markets. Mimeo promises next-day delivery if the order reaches it by 10 p.m. Eastern time. Costs at both are comparable to most copy shops', including shipping. My price per copy with shipping was $15.76 at Mimeo; $16.75 at NowDocs. If convenience is a priority, Internet printing is the way to go.

—Anne B. McDonald

Mimeo.com

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CON: Smooth sailing in my test.
VALUE: Great option for harried professionals or understaffed small businesses.
Price: Depends on order size.
www.mimeo.com
800/466-4636

NowDocs.com

PRO: Delivery service is fantastic.
CON: Slight slip-ups in processing and customer service.
VALUE: Good, but not completely reliable in my test.
Price: Depends on order size.
www.nowdocs.com
877/669-3627

HP's Budget Ink Jet Printer Is No Bargain

PRINTER

AT THE RATE manufacturers are pumping out low-cost ink jet printers, every PC in your small office or home could soon enjoy its own. However, Hewlett-Packard's latest entry in the ink jet spritzfest, the **DeskJet 648C**, just misses the mark, in both print quality and performance.

PRINTING IS POKY with HP's $119 DeskJet 648C.

This $119 printer clocked a text speed of 1.9 pages per minute and a graphics speed of 0.3 ppm in *PC World* tests—positively poky. Other printers we have seen are at least slightly faster, and some of them break the $100 price floor.

In our tests of this shipping model, text looked somewhat light; lines were straight, but ink bled and smudged a bit. Gray-scale and color graphics showed smooth transitions and were light enough to keep detail; images looked grainy and dotted. When we printed on photo paper with HP's optional photo ink cartridge, colors looked much richer and transitions smoother, but even the best-looking of the pictures we printed retained some graininess. By comparison, a current Epson ink jet printer, the $89 Stylus Color 670, improved its output quality more dramatically, using just ink jet paper and a regular ink cartridge.

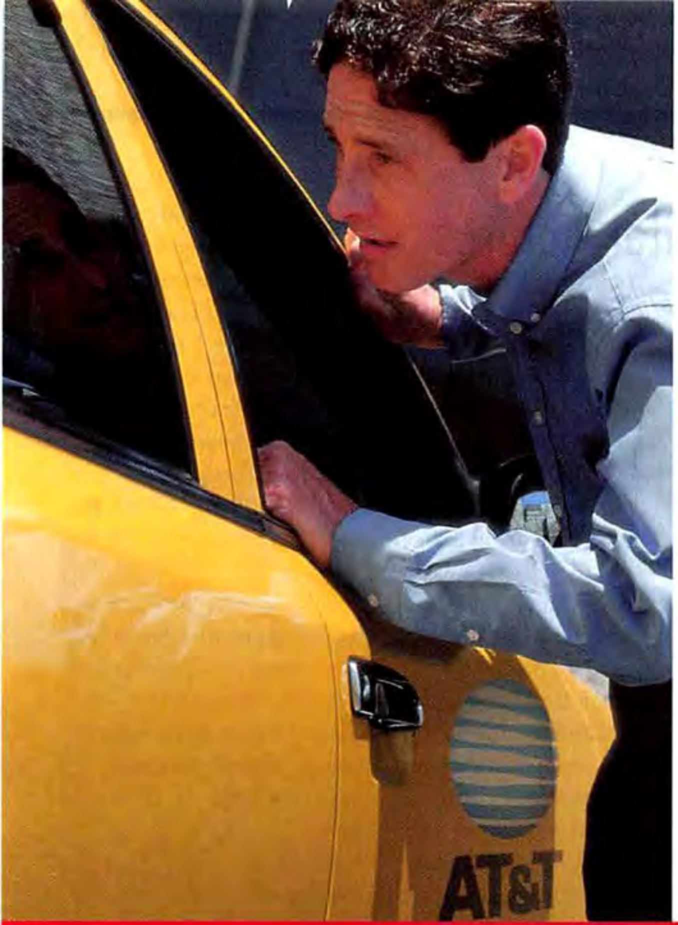
The DeskJet 648C was easy to set up, its drivers were simple to install and use, and it is PC- and Mac-compatible with both parallel and USB ports. But ease of use and a low price don't overcome slow speed and mediocre print quality, especially with so many other low-priced printers available.

—Lisa Cekan ▶

HP DeskJet 648C

PRO: Inexpensive, easy to set up and use.
CON: Very slow output, grainy and dotted images.
VALUE: There are better and cheaper ink jets out there.
Street price: $119
Hewlett-Packard
www.hp.com
800/752-0900

TEST PC WORLD CENTER THIS PRODUCT has been evaluated using tests designed by the PC World Test Center.



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AT&T

Business Services | 1 800 ATT-3199 | www.att.com/business_services

Big CD-R Storage, Improved Digital Pictures

DIGITAL CAMERA

KISS FLOPPIES good-bye with Sony's new Mavica, the first digital camera that saves images to CD-Recordable discs. This allows users to permanently record far more photos and video clips, and the larger file sizes significantly improved image quality.

I tested a preshipping unit of the **Mavica MVC-CD1000** digital still camera, whose 2.1-megapixel CCD yields a maximum resolution of 1600 by 1200. The camera can capture stills, videos, and sound clips. You can save still images as compressed JPEG or, for better quality, as uncompressed TIFF files.

SONY'S Mavica MVC-CD1000 digital still camera is surprisingly light and easy to handle.

Placing the 3-inch, 156-megabyte CD-R into a door at the Mavica's back is as easy as inserting a floppy in earlier models. You must initialize each disc before use, then finalize it after shooting finishes so it can be read. Also, you can't reuse the discs; when one fills up, you must start another one. But this is a convenient way to store permanent image files. Image quality is very good, and most CD-ROM and DVD drives can easily read the discs.

Although larger than many digital cameras, the $1300 Mavica is surprisingly light and easy to handle. It has a 10X optical zoom lens, plus Steady Shot—a built-in image stabilizer that eliminates most blurs from unsteady operation. The buttons and controls are logically placed and well marked, and navigating the ordered menus is relatively simple. While I found the Mavica innovative, it is large and relatively costly—more suitable for businesses than for personal use.

—Daniel Grotta ▶

Mavica MVC-CD1000

PRO: Saves to CD-R discs, good image quality, relatively easy to use.

CON: Expensive, large, long recycling times when saving TIFF files.

VALUE: Many business applications; too pricey for family use.

Street price: $1300

Sony

800/222-7669

www.sony.com

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iomega

Introducing the newly designed high-performance Jaz® 2GB drive.

Lightning-Fast Speed	The Jaz® 2GB drive speeds up transfer rates to 8MBps.
Capacity To Do More	2GB of space lets you store up to 2,000 photos (640x480 pixels), 3.2 hours of CD-quality audio, or 40 minutes of compressed video.
Software Solutions	A complete software suite featuring Iomega's exclusive Quik Sync software which automatically backs up your files without interrupting your work.
Complete Compatibility	The latest Jaz drive is available with USB and FireWire connectivity options. And it's compatible with Mac® OS8, OS9, and Windows® 2000. Plus, the Jaz 2GB drive works with both Jaz 2GB and 1GB disks. With over 2.7 million Jaz drives shipped, you can get your work done almost anywhere.

iomega.

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[1]Actual weight and/or thinness may vary due to vendor components, manufacturing process and options. Weight includes battery. [2]mhz only measures microprocessor internal clock spe
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many factors affect application performance. [3]gb equals one billion bytes when referring to storage capacity; accessible capacity may be less. [4]Estimated reseller price
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the new ThinkPad® A20 and T20

Not only are they available with the power of an Intel Pentium III processor, but they also come with the freedom of wireless. They're built to accommodate industry-standard 802.11b wireless networking options (available from IBM) which means users can roam and still connect easily to email, the network and the internet. Wireless capability. Just one more example of the ThinkPad experience. IBM recommends Windows® 2000 Professional for business. To order the ThinkPad call 800 426 7255 or visit **ibm.com**

A20: about 6.4 lbs[1] / Intel® Celeron™ processor 550mhz[2] / 64mb sdram / 6gb[3] hdd / 12" TFT screen / $2299[4]
T20: about 4.6 lbs[1] / Intel Pentium® III processor 700mhz[2] / 128mb sdram / 12gb[3] hdd / dvd / 14.1" TFT screen / $3999[4]

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IBM

Cool but Costly Palm Alternatives

PDAs

BE HONEST. It's not enough for a personal digital assistant just to keep your address book, calendar, to-do list, and perhaps e-mail handy.

RIM
1:59 PM
TUE, MAR 28
MESSAGES

THE KEYBOARD for the RIM 957 Wireless Handheld is on the small side.

You want one that looks cool. Two of the newest—Compaq's **IPaq H3650 Pocket PC** and **Research In Motion's 957 Wireless Handheld**—definitely score high in this regard. But at $499 each, cool doesn't come cheap.

Still, the IPaq is priced competitively with other devices running Windows for Pocket PC (the operating system formerly known as Windows CE for pocket-size PCs). At 6.3 ounces, it's the lightest Windows-powered color palmtop we've seen to date, and it's also impressively svelte. The Jetsonesque silvery case is accented by a black stylus that pops up from the top when you press a button.

PEPPY WINDOWS CE

THE IPAQ device is based on a fast 206-MHz Intel StrongARM 32-bit RISC processor, so in this handheld, Windows CE doesn't drag (compared to the Palm OS). A generous 32MB of SDRAM is available for apps, documents, and data, and there's a handsome 4096-color touch screen.

The stylish cradle, consisting of a silver ring and a black plastic holder, hooks up to a USB port for synchronization with your desktop contact information and documents, once you install a special USB driver. To add an expansion slot, however, you have to slide the device into an optional $39 Compact Flash or a $149 PC Card jacket (the first kit carries a $30 rebate coupon).

In addition to the usual pocket versions of Windows apps and the new Microsoft Reader for displaying books, Compaq throws in its own utilities, with some useful features. One lets you sort program icons into customizable category screens (a longtime Palm OS feature); another automatically backs up your Outlook contact data into the device's 16MB of ROM, so you don't lose them even if your batteries run out of juice.

As with other color palmtops, you have to recharge the IPaq H3650 every few days via the syncing cradle. If that's not a problem for you, and you want the extra functionality of a Windows CE palmtop, this is the best one yet.

MESSAGE IN A POCKET

THE RIM 957 shares the general dimensions of a palm-size PDA; at 5.3 ounces, it's lighter than most. But it is really a mobile e-mail and text messaging device equipped with PDA features. You enter data on a petite keyboard that is adequate for only very brief messages.

A small rock-and-click wheel on the side navigates menus; the escape button is even smaller. You can set the monochrome screen—crisper than those found on devices with a stylus—to 16 or 20 lines.

The RIM 957 comes with software for forwarding POP3 e-mail from a properly configured Internet account (it also has 5MB of RAM for storing e-mail); you can't forward the mail without support from your ISP, which may sell you the device as an add-on to your service. Alternatively, an IT department can set it up to work with Microsoft Exchange Server. The device also comes with IntelliSync software for synchronizing with most popular desktop information packages. Unlimited e-mail service is $40 per month.

The RIM 957 is worth a look if your ISP or IT department supports it, if you want a basic PDA, and if you are willing to pay a premium to get e-mail on a device that's always on, alerting you as messages arrive. But you'll get little enjoyment from composing on that teensy keyboard.

If you don't need wireless messaging, Palms and Windows CE devices can do more and be equally cool.

—*Yardena Arar* ▶

COMPAQ
pocket pc
Start
09:51
25. Januar 2000
today
Owner: Maxime Ayel
Meeting with Compaq
Multi-day event
No unread messages
No unsent messages
4 Active tasks
New

THE COMPAQ IPAQ H3650 is more than just another pretty face in the PDA parade.

IPaq H3650 Pocket PC

PRO: Most lightweight and cool-looking color Windows CE palmtop to date.

CON: Expansion kit required for Compact Flash or PC Card slot.

VALUE: Not cheap, but fairly priced for the best Windows CE palmtop yet.

Street price: $499

Compaq Computer
800/345-1518
www.compaq.com

RIM 957 Wireless Handheld

PRO: Crisp, monochrome screen; lightweight; always-on e-mail.

CON: Pricey; tiny keyboard; requires IT or ISP support.

VALUE: Worthwhile for timely e-mail arrival on the go.

Street price: $499 (e-mail service $40 per month)

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digital
photography
the color
of a sunset
internet

"The [SM-Series] includes all the trappings one would expect in a high-end PC." *Computer Shopper, 2/00*

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Peripheral Upgrades: Lexmark Z52 Color Printer...add $179. 36-bit USB Color Scanner...add $49 (after rebate). MS Sidewinder Precision Pro Joystick...add $49.

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QUANTEX SM933x
Cutting-Edge Performance Desktop

Intel® Pentium® III Processor 933MHz
128MB PC133 SDRAM Memory
40GB 7200rpm Ultra ATA-66 Hard Drive
19" High-Resolution Digital Monitor (18" vis)
nVidia GeForce2 GTS 32MB DDR 4X AGP Graphics
CD-ReWritable Drive
10/100 PCI Network Card—Broadband Ready
Advanced Creative Labs Sound
Cambridge SoundWorks FPS2000 5-Piece Speakers
Microsoft Office 2000 SBE
3-Year Limited Warranty
One-Year Limited On-Site Service[1]
MS® Windows® Millennium Edition Upgrade Coupon[2]
Add 12x Max Variable Speed DVD-ROM Drive for $99

$2399

Business lease:$87/Mo., 36 Mos.
Q-QUOTE: pcw09s33

QUANTEX SM866s
Cutting-Edge Performance Desktop

Intel® Pentium® III Processor 866MHz
128MB PC133 SDRAM Memory
30GB 7200rpm Ultra ATA-66 Hard Drive
17" High-Resolution Digital Monitor
nVidia GeForce 256 4X AGP Graphics w/32MB
12x Max Variable Speed DVD-ROM Drive
10/100 PCI Network Card—Broadband Ready
Advanced Creative Labs Sound
Altec Lansing ACS-33 Speakers w/Subwoofer
Microsoft Office 2000 SBE
3-Year Limited Warranty
One-Year Limited On-Site Service[1]
MS® Windows® Millennium Edition Upgrade Coupon[2]
Upgrade to nVidia GeForce2 GTS 32MB DDR for $149

$1799

Business lease:$65/Mo., 36 Mos.
Q-QUOTE: pcw09s22

QUANTEX M800t
Affordable Desktop Solution

Intel® Pentium® III Processor 800MHz
128MB High-Performance SDRAM Memory
20GB Ultra ATA-66 Hard Drive
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Intel 2D/3D Graphics Accelerator
12x Max Variable Speed DVD-ROM Drive
Dynamic Wavetable Stereo Sound
3-Piece Stereo Speakers w/Subwoofer
Corel WordPerfect Office 2000
3-Year Limited Warranty
One-Year Limited On-Site Service[1]
MS® Windows® Millennium Edition Upgrade Coupon[2]

$1299

Business lease:$47/Mo., 36 Mos.
Q-QUOTE: pcw09m40

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Quantex SM933x Performance Desktop Pictured

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- **Intel® Pentium® III Processor 800MHz**
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- **17" High-Resolution Digital Monitor**
- **nVidia TNT2 AGP Graphics w/32MB**
- 56K V.90 Internet Fax/Modem[1]
- 10/100 PCI Network Card—Broadband Ready
- **12x Max Variable Speed DVD-ROM Drive**
- **Internal Zip Drive**
- Advanced Creative Labs Sound
- Altec Lansing ACS-21W Speakers
- Corel WordPerfect Office 2000
- 3-Year Limited Warranty
- One-Year Limited On-Site Service[+]
- MS® Windows® Millennium Edition Upgrade Coupon[2]

$1499

Business lease: $54/Mo., 36 Mos.
Q-QUOTE: pcw09s15

QUANTEX M733v

Affordable Desktop Solution

- **Intel® Pentium® III Processor 733MHz**
- 64MB High-Performance SDRAM Memory
- 10GB Ultra ATA-66 Hard Drive
- **17" High-Resolution Digital Monitor**
- Intel 2D/3D Graphics Accelerator
- **12x Max Variable Speed DVD-ROM Drive**
- Dynamic Wavetable Stereo Sound
- 2-Piece Power Stereo Speakers
- Corel WordPerfect Office 2000
- 3-Year Limited Warranty
- One-Year Limited On-Site Service[+]
- MS® Windows® Millennium Edition Upgrade Coupon[2]

Upgrade to 128MB SDRAM for $99

$1099

Business lease:$40/Mo., 36 Mos.
Q-QUOTE: pcw09m24

QUANTEX M600c

Affordable Desktop Solution

- **Intel® Celeron™ Processor 600MHz**
- **64MB High-Performance SDRAM Memory**
- **10GB Ultra ATA-66 Hard Drive**
- **15" Digital Monitor w/On-Screen Display**
- Intel 2D/3D Graphics Accelerator
- 48x Max Variable Speed CD-ROM Drive
- Dynamic Wavetable Stereo Sound, Speakers
- Corel WordPerfect Office 2000
- 3-Year Limited Warranty
- One-Year Limited On-Site Service
- MS® Windows® Millennium Edition Upgrade Coupon[2]

Upgrade to 17" High-Resolution Digital Monitor for $69

$899

Q-QUOTE: pcw09m03

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[Solid Specs

W-Series Notebook Pictured w/Optional Mini-Docking Station

"If you need a laptop that can handle any task you might throw at it, and can serve as an excellent desktop replacement, you'll find the [W-Series] an outstanding value." *Laptop Buyers Guide and Handbook*, Best Buy Award, 04/00

Standard Notebook Features: 3.5" 1.44MB Floppy Drive, Smart Lithium Ion Battery, USB/Fast IR Ports, Personal Touchpad, 3-Year Limited Warranty on CPU & Memory, 1-Year Parts and Labor Limited Warranty on all other components, Toll-Free Technical Support

Standard Desktop Features: Floppy Drive, 2 USB Ports, ATX Mid-Tower Case, Chassis-lock, Removable Hard Drive Chassis & Power Supply, 104-Key Keyboard, MS Mouse, Toll-Free Technical Support

QUANTEX W-1500 **Desktop Replacement Notebook**	**QUANTEX W-1400** **Desktop Replacement Notebook**	**QUANTEX W-1400** **Desktop Replacement Notebook**
Mobile Intel® Pentium® III Processor 700MHz featuring Intel® SpeedStep™ Technology	Mobile Intel® Pentium® III Processor 650MHz featuring Intel® SpeedStep™ Technology	Mobile Intel® Pentium® III Processor 600MHz featuring Intel® SpeedStep™ Technology
15" XGA TFT Active Matrix Display	14.1" XGA TFT Active Matrix Display	14.1" XGA TFT Active Matrix Display
128MB PC100 SDRAM Memory	64MB PC100 SDRAM Memory	64MB PC100 SDRAM Memory
12GB Ultra ATA Hard Drive	12GB Ultra ATA Hard Drive	6GB Ultra ATA Hard Drive
Modular 8x Max Variable Speed DVD-ROM Drive	**Modular 8x Max Variable Speed DVD-ROM Drive**	**Modular 24x Max Variable Speed CD-ROM Drive**
ATI Mobility P Graphics w/8MB, **TV-Out**	ATI Mobility P Graphics w/8MB, **TV-Out**	ATI Mobility P Graphics w/8MB, **TV-Out**
Quantex **Deluxe Carrying Case** Included!	Quantex **Deluxe Carrying Case** Included!	Quantex Carrying Case Included!
MS Windows 2000 Professional	**MS Windows 98 Second Edition**; Corel Office 2000	**MS Windows 98 Second Edition**; Corel Office 2000
Corel Office 2000	MS® Windows® Millennium Edition Upgrade Coupon	MS® Windows® Millennium Edition Upgrade Coupon
Upgrade to Microsoft Office 2000 SBE for $129	*Upgrade to Microsoft Office 2000 SBE for $129*	*Upgrade to Microsoft Office 2000 SBE for $129*
$2599	**$2199**	**$1999**
Business lease:$94/Mo., 36 Mos.	Business lease:$80/Mo., 36 Mos.	Business lease:$73/Mo., 36 Mos.
-QUOTE: pcw09w39	**-QUOTE**: pcw09w01	**-QUOTE**: pcw09w18

Peripheral Upgrades: W-Series Mini-Docking Station...add $179. Smart Lithium Ion Battery...$119. PCMCIA Network Card...$129. Quantex Deluxe Carrying Case...$89. Targus Defcon1 Security Lock...$49. Canon BJC-85 Portable Color Printer...$299. APC Notebook Pro Surge Protector...$29

Spec for spec, Quantex Notebooks and Business Desktops are configured for success at prices that are much less than you'd expect. Plug a Quantex W-Series Desktop Replacement Notebook into our mini-docking station and utilize all the power and capabilities of a desktop—with the added bonus of taking it with you. Looking to do e-business on a budget? Quantex SB-Series Business Desktops offer a reliable and stable platform at a sensible price. In addition, both series feature Intel® Pentium® III processors and run best with Windows 2000 Professional, which offers a 99.95% uptime rate. Extreme reliability, proven features and a great price. That's everything your business needs to move ahead in the e-business age.

Quantex W-Series Notebook Pictured w/Optional Mini-Docking Station

W-Series BEST BUY

Desktop Replacement Notebook

- *New* Mobile Intel® Pentium® III Processor 750MHz featuring Intel® SpeedStep™ Technology
- 15" XGA TFT Active Matrix Display
- 128MB PC100 SDRAM Memory
- *New* 20GB Ultra ATA Hard Drive
- Modular 8x Max Variable Speed DVD-ROM Drive
- ATI Mobility P Graphics w/8MB, **TV-Out**
- Quantex **Deluxe Carrying Case** Included!
- Microsoft Windows 2000 Professional
- Microsoft Office 2000 SBE

$2999

Business lease: $109/Mo., 36 Mos.

Q-QUOTE: pcw09w04

QUANTEX SB800t

Sensible Business Desktop

- Intel® Pentium® III Processor 800MHz
- 128MB High-Performance SDRAM Memory
- 15GB 7200rpm Ultra ATA Hard Drive
- 17" High-Resolution Digital Monitor
- nVidia TNT2 Vanta 16MB AGP Graphics
- 48x Max Variable Speed CD-ROM Drive
- 10/100 PCI Fast Ethernet Controller w/RJ-45
- Advanced Creative Labs Sound
- Microsoft Windows 2000 Professional
- 3-Year Limited Warranty
- One-Year Limited On-Site Service
- *Upgrade to nVidia TNT2 32MB Graphics for $59*

$1299

Business lease:$47/Mo., 36 Mos.

Q-QUOTE: pcw09b36

QUANTEX SB566c

Sensible Business Desktop

- Intel® Celeron™ Processor 566MHz
- 64MB High-Performance SDRAM Memory
- 10GB Ultra ATA-66 Hard Drive
- 15" Digital Monitor w/On-Screen Display
- Intel 2D/3D Graphics Accelerator
- 48x Max Variable Speed CD-ROM Drive
- Dynamic Wavetable Stereo Sound
- 10/100 PCI Fast Ethernet Adapter w/RJ-45
- MS Windows 98 Second Edition
- 3-Year Limited Warranty
- One-Year Limited On-Site Service
- MS® Windows® Millennium Edition Upgrade Coupon

$799

Q-QUOTE: pcw09b10

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There's never been a more affordable, no-fuss solution for businesses looking to deploy new e-business servers. Rack-mountable with innovative "headless" installation (no VGA, keyboard or monitor necessary) for quick, high volume deployment, new Quantex IS-Series Servers come bundled with the rock solid Red Hat Linux operating system and also offer robust remote management capabilities. They feature industry-leading hardware components built on superior open platforms based on Intel Architecture for seamless integration into your current network. And with innovative new 1U and 2U Rack Dense form factors, Quantex IS-Series Servers will easily grow with your business.

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1U: 1.75"H x 22"L x 16.75"D
Quantex IS1000
Quantex IS2000
2U: 3.5"H x 24"L x 16.75"D

QUANTEX QX4100

Reliable E-Business Server

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- Dual-Processor Upgradable
- **Tower Case (5U Rack-Mount Upgrade Available)**
- **128MB ECC SDRAM (2GB Max)**
- 9GB Ultra2/LVD SCSI Drive (360GB Max.)
- Intel EtherExpress Pro 100 Ethernet Adapter
- Dual Channel Ultra2/LVD SCSI Controller
- 3.5" 1.44MB Floppy Drive
- 48X Max Variable Speed CD-ROM
- Dual Peer PCI Buses: 6PCI, 1 ISA Slot
- **5 Hot-Swap RAID Capable Drive Bays (upgradable to 10)**
- **300 Watt Power Supply (Redundant P/S Available)**
- *Add MS Windows 2000 server for $799*

$1999

Business lease starting at: $73/Mo., 36 Mos.

Ɛ-QUOTE: pcw09q53

QUANTEX IS2000

2U Scalable Internet Server

- **Intel® Pentium® III Processor 800MHz**
- Dual-Processor Upgradable
- **Compact 2U Rack-Server Design**
- 128MB ECC SDRAM (2GB Max)
- 9GB Ultra2/LVD SCSI Drive (220GB Max.)
- **Dual Intel Pro/100 NICs w/Adapter Fault Tolerance and Adaptive Load Balancing**
- Ultra2/LVD SCSI Controller
- 3.5" 1.44MB Floppy Drive & Slimline CD-ROM
- Two Full-Size 32-bit PCI Slots
- **4 Hot-Swap RAID Capable Drive Bays**
- 275 Watt Power Supply
- **Red Hat Linux w/Apache Web Server**

$2599

Business lease starting at: $94/Mo., 36 Mos.

Ɛ-QUOTE: pcw09q72

QUANTEX IS1000

1U High-Density Internet Server

- **Intel® Pentium® III Processor 700MHz**
- Headless Installation for Mass Server Deployment
- **Compact 1U Rack-Server Design**
- **128MB ECC SDRAM (1GB Max)**
- 10GB 7200rpm Ultra ATA-66 Hard Drive
- **Dual Intel Pro/100 NICs w/Adapter Fault Tolerance and Adaptive Load Balancing**
- 3.5" 1.44MB Floppy Drive
- Two 32-bit PCI Slots (1 Low-Profile)
- Single Screw Access to Top Cover; Tool-Less Access to Hard Drives
- 125 Watt Low-Consumption Power Supply
- **Red Hat Linux w/Apache Web Server**

$1799

Business lease: $65/Mo., 36 Mos.

Ɛ-QUOTE: pcw09q62

intel inside pentium® III

Aditional Features: ISC Management Console on QX4100 & IS2000. ASM Management Console on IS1000. Emergency Management Port on QX4100 & IS2000. 3-Year Limited Warranty with Lifetime Toll-Free Hardware Support. 30-Day Conditional Money Back Guarantee

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Manage Your Complex Projects—Simply

PROJECT MANAGERS WITH ANY complicated project, you need to design, organize, and schedule. Three newly updated software packages can give you exactly the help that you need.

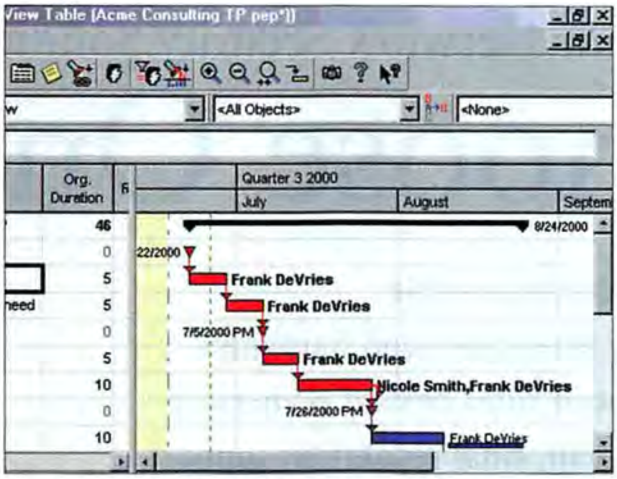
We looked at a beta version of **Project KickStart 3**, $130 from Experience in Software. This is a great tool for novices to use to get a project off the ground. Think of it as a brainstorming wizard that asks for project details—phases, goals, resources, obstacles, and tasks. You provide answers step-by-step, or if stymied, you can choose from a predefined list. If your project is similar to one you've already set up or to a Project KickStart sample, you can save time by dragging and dropping components.

Project KickStart lays out project tasks only in simple Gantt bar charts. For more-intensive project tracking and scheduling, transfer Project KickStart's data into a beefier product, such as Microsoft's Project or Primavera Systems' SureTrak Project Manager.

PLENTY OF OPTIONS

FOR SOPHISTICATED drawing tools for creating Gantt charts, try KIDASA Software's $259 **Milestones Professional 2000**. Enter your tasks (usually using the mouse); quickly schedule tasks; create interrelationships and constraints; keep track of start, finish, and duration times; and indicate task progress.

Task length can be shown in units that range from minutes to weeks, and all dates may be shifted by mouse or by entering a specified number of days. You can also add hyperlinks between schedules or to documents or URLs.



TURBOPROJECT PROFESSIONAL 4 shines at tracking multiple aspects of complicated projects.

With the software's extensive options, you'll find something to like. Shade weekends or date ranges; draw shapes, paste clip art, or add text anywhere; and associate lengthy notes with any symbol.

Scheduling columns allow you to enter custom information (and perform calculations on numeric data). You can import from Microsoft Project 2000 (but not export to it), and an Internet Publishing Wizard helps you create schedules as HTML pages. Generally, however, the improvements in this shipping upgrade appear to be minor.

For full capabilities rivaling those of Microsoft Project, IMSI's $350 **TurboProject Professional 4** is perfect for careful creation and control of projects and progress communication (we saw a beta version).

While suitable for simple projects, TurboProject really shines at scheduling (you can create recurring activities), handling task and resource relationships (Task 2 starts when Task 1 completes), and tracking costs. Set up your scheduling so you can see when more resources may be needed, or select Activity-Driven. This option could let you see, for example, that management approval of drawings would take time, regardless of additional resources assigned to complete the drawings.

POWER PROJECT NEEDS

TURBOPROJECT uses spreadsheets to display both resources by activity, and activity by resources—a particularly versatile strength. You can opt to view the resources in a collapsible hierarchy (by department, for example).

The Resource Profile pane shows when you are overallocated. Import and export to Microsoft Project, including Project 2000. There also is an HTML output option. TurboProject Pro can't, however, schedule in time blocks as small as hours.

To build a simple task list, Project KickStart is all you need. If communicating project status is critical, check out the extensive illustrative possibilities that come with Milestones Professional. But if your needs extend beyond illustration, TurboProject is the software to consider.

—Joel T. Patz ▶

Milestones Professional 2000

PRO: This software has extensive graphical capabilities.

CON: User interface is not intuitive.

VALUE: Best for communicating project scope and status in a graphical manner.

List price: $350

KIDASA Software

800/765-0167

www.kidasa.com

Project KickStart 3

PRO: Easy-to-use tool to get your projects started; predefined lists make data entry simple.

CON: No illustration tools; beefier programs better for intensive work.

VALUE: Excellent choice for novices to use for clarifying ideas.

List price: $130

Experience in Software

800/678-7008

www.projectkickstart.com

TurboProject Professional 4

PRO: Has comprehensive project planning and tracking.

CON: Can't schedule in units as small as hours.

VALUE: A good alternative to Microsoft Project.

List price: $350

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Put One Anywhere: PC-Free Webcam From Axis

WEB CAMERA

I'VE SEEN THE future of reality TV, and it's not *Survivor* or *The Real World*—it is the humble Webcam.

Take the **Axis 2100 Network Camera** from Axis Communications. Its built-in Linux-based server chip needs only power and an Internet connection to deliver continuously updated images. The camera works best with an ethernet network and a broadband connection.

Not much larger than a paperback book, it takes about 5 minutes to set up and configure. After downloading a tiny program to assign an IP address, you can set every other parameter in the $499 camera via its built-in Web interface. To make changes, just enter the camera's address, and log into the device itself. Then, there's no need to have a computer at the camera's location.

PLAY "I Spy" with the Axis 2100 Network Camera.

The Web interface lets you set up the camera to capture images hosted on built-in Web pages (just enter the camera's IP address to view) or send the images off-site (via e-mail or FTP to the Web server of your choosing). You can configure the camera's software to take pictures continuously or when the unit detects movement via an added motion detector.

The Axis 2100 Network Camera produces better-than-average images for a Webcam—but think high-speed slide show, not movie. With the camera set to upload 13KB medium-quality, 640-by-480-pixel images to a Web server, my tests showed about 1 to 2 frames per second on a T1 connection.

But what frames! In the *PC World* conference room, the dullest meeting became fascinating, viewed through the hidden camera's eye, even without sound. Pair the Axis 2100 with a speakerphone for an inexpensive videoconferencing system.

—Andrew Brandt ▶

Axis 2100 Network Camera

PRO: Hassle-free, quick setup; no permanently connected PC needed.

CON: Internal Web server can't handle many requests; grabs only a few frames per second.

VALUE: Great all-purpose camera for security, meetings, or just fun.

Axis 2100 Network Camera
List price: $499
800/444-2947
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The Business Internet

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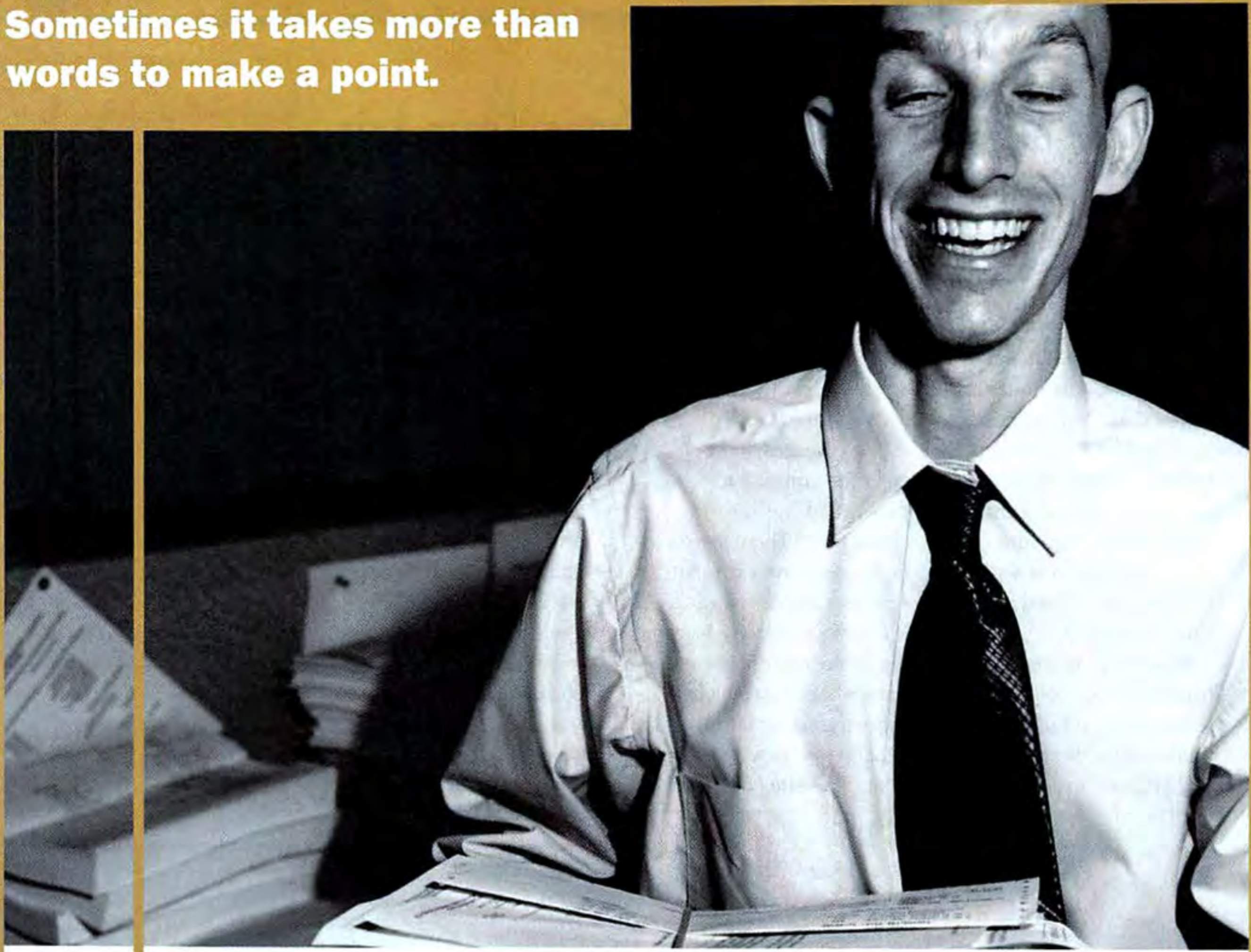

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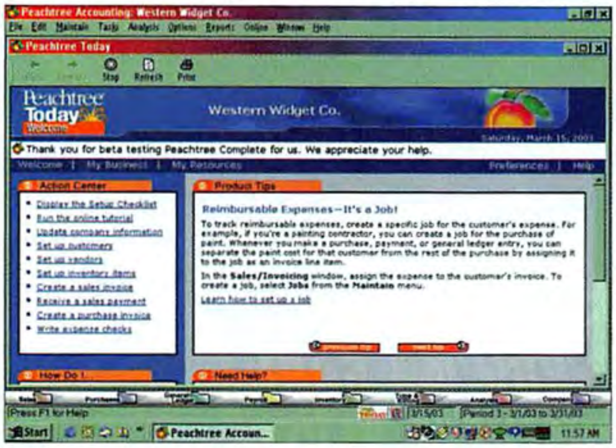
Peachy Update of Powerful Office Software

ACCOUNTING SOFTWARE

A NEW UPDATE of the popular small business software, **Peachtree Complete Accounting Release 8**, offers improvements for both novices and veterans. Its Peachtree Today tool eases navigation and includes tips for quick orientation. Upgraders will enjoy better reporting capabilities. We looked at a beta version.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- Display the Setup Checklist
- Run the online tutorial
- Update company information
- Set up customers
- Set up vendors
- Set up inventory items
- Create a sales invoice
- Receive a sales payment
- Create a purchase invoice
- Write expense checks

Reimbursable Expenses—It's a Job!

To track reimbursable expenses, create a specific job for the customer's expense. For example, if you're a painting contractor, you can create a job for the purchase of paint. Whenever you make a purchase, payment, or general ledger entry, you can separate the paint cost for that customer from the rest of the purchase by assigning it to the job as an invoice line item.

In the **Sales/Invoicing** window, assign the expense to the customer's invoice. To create a job, select **Jobs** from the **Maintain** menu.

Learn how to set up a job

PEACHTREE TODAY'S Welcome page offers helpful tips for new users.

Peachtree Today contains three sections: a Welcome page with program tips; My Business, which displays snapshot graphs and reports on key financial details such as receivables, payables and revenues; and My Resources, with Internet links to information and services from Peachtree and others. A new Financial Report Wizard allows easier design of financial statements for business management. The improvements make this $270 application from Peachtree Software almost as easy to use as Intuit's QuickBooks. (The upgrade is $200.) However, Peachtree's e-commerce and fixed-asset capabilities give the program an edge over the $220 QuickBooks Pro 2000 for businesses that require that power.

—*Richard Morochove* ▶

Peachtree Complete Accounting Release 8

PRO: Neophytes can easily understand; a new wizard helps create more-complex financial reports.

CON: Costs more than QuickBooks.

VALUE: A powerful accounting program well suited for use by most small businesses.

List price: $270, upgrade $200

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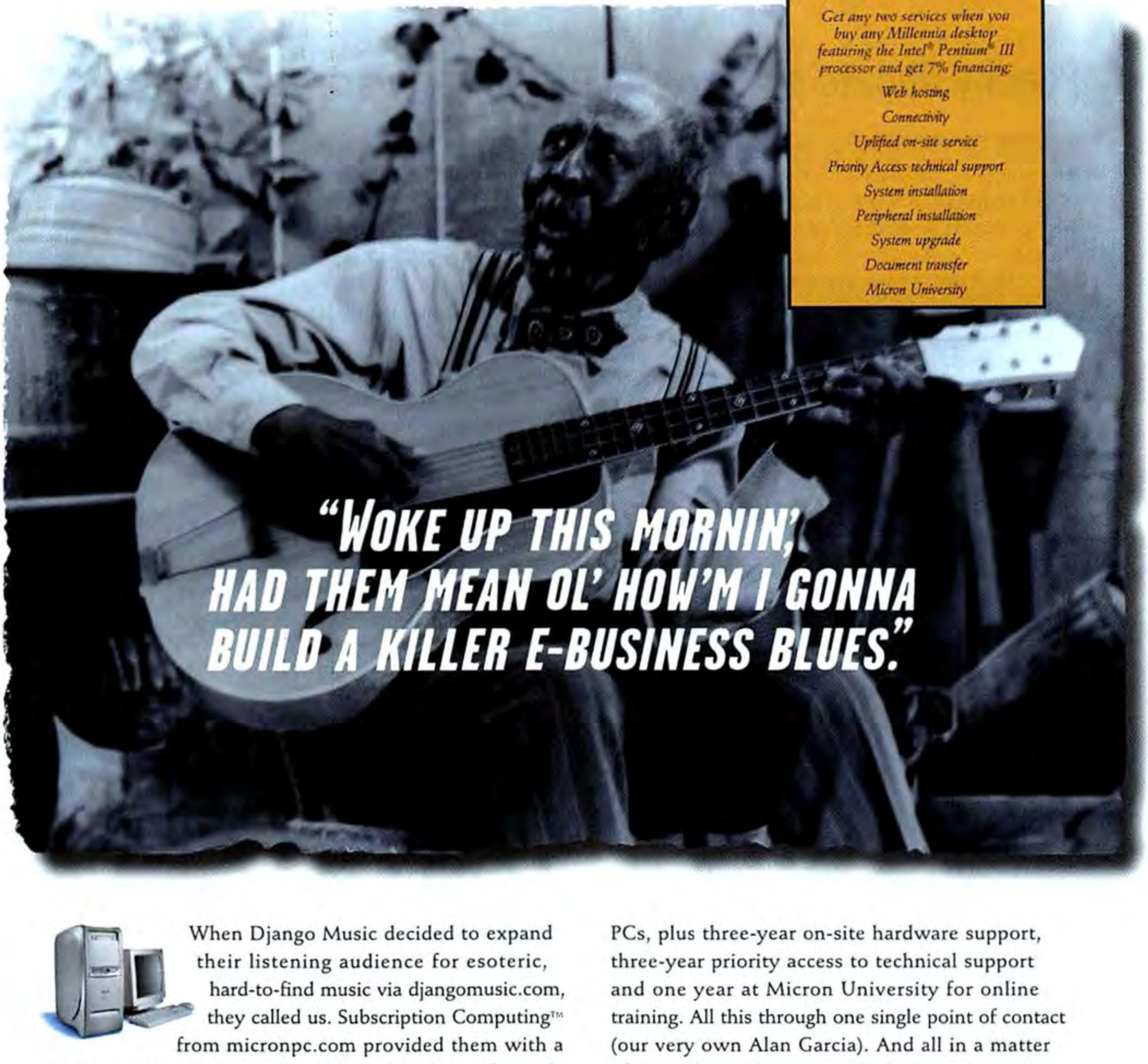
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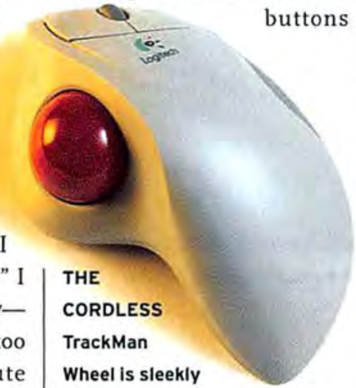
On the Ball: The Cordless TrackMan Wheel

INPUT DEVICE

LOGITECH'S CHALLENGE? To improve upon its acclaimed, ergonomically designed MouseMan Wheel device. The answer? Logitech subbed a trackball for the Wheel's thumb-rest button, then made this super-duper hybrid device cordless for total freedom. The result: the **Cordless TrackMan Wheel.**

After testing a shipping version of this $80 mouse, I can say I am "on the ball." I find most trackballs clunky—either the gliding ball is too loose to calibrate minute screen movement, or the overall design is uncomfortable. That changed with the MouseMan Wheel line, a past PC World Class Award winner; this trackball has a sculpted-to-the-hand foundation.



THE CORDLESS TrackMan Wheel is sleekly ergonomic.

PHOTOGRAPH: MARC SIMON

You get a mouse with three buttons and a wheel, plus a perfectly sized trackball placed where most right-handed users rest thumbs. This allows precise cursor navigation that combines the convenience of scrolling with left- and right-clicking. The package includes a plug-and-play USB radio frequency base unit and a battery-powered cordless pointing device. It uses RF, not the typical infrared—no line of sight needed.

Included MouseWare software adds a customizable WebWheel function when you press on the scroll wheel. Designed for Web surfing, it allows quick forward, back, home, and e-mail navigation and one-click access to favorite sites via an on-screen "wheel" that pops up when activated. This works great—*if* you are right-handed. That limitation aside, this device definitely gets my thumbs-up.

—*Michael S. Lasky* ▶

Logitech Cordless TrackMan Wheel

PRO: Comfortable, convenient navigation with clever combination of cordless wheel mouse and trackball.

CON: Lefties need not apply.

VALUE: Two pointing devices in one, well-designed package—a great buy.

List price: $80

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Plextor's CD-Rewritable Speed Demon

CD-REWRITABLE

AFTER BEING socked in at 4X for well over a year, CD-Rewritable speeds have suddenly soared, climbing recently to 8X, and now to loftier 10X heights with Plextor's **PlexWriter 12/10/32A**—an all-around barnstormer of a drive.

The $329 PlexWriter's overall performance is remarkable. This shipping unit garnered the fastest CD Tach speed rating in the history of *PC World*'s Online Top 5 (21.6X); wrote our 430MB test image to CD-R in 5 minutes, 14 seconds; and copied 100MB worth of files to CD-RW in a record-setting 1 minute, 32 seconds. The PlexWriter set another record by extracting our 250MB audio test file in only 1 minute, 52 seconds. One caveat: To achieve the higher CD-RW write speeds, you'll need 10X-rated media.

THE PLEXTOR PlexWriter 12/10/32A turned in several record-breaking performances in our tests.

The PlexWriter incorporates a new technology licensed from Sanyo called BURN-Proof, which can realign the write laser at the precise position where writing was interrupted by a buffer underrun. This capability virtually eliminates discs ruined because of data streaming problems, according to the company.

The device ships with two utilities: Adaptec's Easy CD Creator 4.02 mastering software and DirectCD 3.01 packet-writing software. Toll-free tech support is available on weekdays.

—Jon L. Jacobi

PlexWriter 12/10/32A

PRO: Fast 12X CD-R and 10X CD-RW write speeds, ultrafast digital audio extraction.

CON: Technical support is not available on the weekends.

VALUE: The time this drive saves you easily justifies its price.

Street price: $329

Plextor

970/635-1000

www.plextor.com

Look, Ma, No Wires

IF YOU'VE CONSIDERED babbling to your PC but don't like headsets, there is an alternative—IBM's unique **ViaVoice Pro Elite** hardware and software combo. For $249 you get IBM's latest ViaVoice Millennium speech software with Andrea Electronics' DA-400 Desktop Array microphone, a stand-alone device that sits atop your monitor or keyboard tray. In our tests, it did a pretty good job of filtering out background noise. Training the software on a Pentium II-333 system took about 10 minutes (ViaVoice's minimum requirement is a PII-233). Initial performance was a little sluggish, but it improved over time. IBM; 800/825-5263; www.ibm.com/software/voice.

—Aoife McEvoy

Search-Engine Searcher Delivers the Goods

WEB SEARCHING

I HAVE A LOVE/HATE relationship with search engines, though it's skewed more towards hate recently. Most just don't work very well, primarily because their original mission—finding links to relevant information—has been supplanted by selling stuff.

But I think I've found a workable alternative: search-engine searchers. (For more about search engines, see "How to Stop Searching and Start Finding" on page 129).

My search tool of choice is Intelliseek's **BullsEye 2, version 2.5**. Originally for professional researchers, BullsEye 2 is simple to use and incredibly fast and accurate—it sweeps through more than 800 search engines and sources to find answers.

Searching is a breeze. Type keywords into a box, wait seconds (your Internet connection matters here), and, voilà, up comes a list, sorted by relevance. Click an entry you like, and the interface transforms into a browser that displays the Web page found. If you like the find, just Save, and refer to it at will.

My complaints about BullsEye 2 stem from the program's behavior once you open up a page in its browser. First, the results list disappears. To recover it, you must click on a Layout button—this gets annoying.

Also, it's difficult to understand how to do a new search once you're in the browser area. You must click open a button labeled Refine, then check a radio button for either Web searching or searching within results. BullsEye 2 is free, as it's supported by advertising. But, with the payoff possible from this software and at this price, who cares?

—Ramon G. McLeod ■

BullsEye 2, Version 2.5

PRO: Very powerful search abilities.

CON: Confusing interface elements.

VALUE: Strong tool to use for fast Web research.

Price: Free

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BUSINESS LEASE: $31/MO., 36 MOS.[11]

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$1499 E-VALUE CODE 03785-390814a

BUSINESS LEASE: $52 /MO., 36 MOS.[11]

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THREE STEP-BY-STEP **PROJECTS** TO **TRANSFORM** YOUR SLUGGISH PC INTO A DESKTOP **POWERHOUSE**.

By Stan Miastkowski & Kirk Steers

ARE YOU OLD ENOUGH TO remember when car buffs could really soup up an automobile? In those bygone days, grease-spattered amateur mechanics spent weekends tinkering, tweaking, and twiddling under the hood. The end result: a finely tuned hot rod that left stock vehicles in the dust.

Those days may be fading away for cars, but they're in full swing for PCs. In fact, your current PC—whether getting a bit long in the tooth or hot off the conveyor belt—is probably a bit of a compromise. Most of today's PCs are designed for garden-variety computing such as word processing or Web browsing. Fortunately, myriad available add-ins, add-ons, and accessories offer seemingly infinite upgrade possibilities. You can customize that boring beige ▶

PLEXWRITER 8/4/32A
8X

Photography by Marc Simon

box, whether it's your office workhorse or your family's e-mail gateway, and transform it into the millennium equivalent of a 1960s hot rod. To show you some of the possibilities, we've developed a few upgrade scenarios that you can use as jumping-off points.

No matter what route you decide to take in the supercharging of your computer, we're here to help. We'll start out with three sample upgrade projects. In addition, we provide a step-by-step guide to making some common upgrades—tasks such as installing add-in cards, more RAM, or a new hard drive.

Starting with a bare-bones, off-the-shelf system, we created a sound and media center worthy of any home-theater buff, a state-of-the-art digital darkroom for photography hounds, and a screaming game PC for serious players.

Each of the projects had a common starting point—a Dell Dimension XPS T600r system with a Pentium III-600 processor, 64MB of RAM, and a 9.5GB IDE hard drive. Your upgrading needs may vary, but even our fairly capable base system needed some significant enhancements to meet our project specifications.

For each of these projects, we provide a summary of the minimum system requirements, a shopping list of components, a price range, the expected upgrade time and expertise level, and some power tips. And we have left enough wiggle room to give you a range of choices for each project. So you can get started with lower-end components and then upgrade later, or you can lay down the bucks for the best right off the bat.

You can mix and match upgrade components from each of our projects, too. And though our example projects are geared more toward a home environment than to the business realm, many of the individual components we use will produce great results on a PC used in a small office or home office. When it comes to upgrades, nothing is set in stone.

Stan Miastkowski and Kirk Steers are contributing editors for PC World.

HOW TO PROCEED

THERE ARE THREE basic steps to take when you use our project guide.

1. Take stock of your PC. If most of your system's components meet our minimum requirements, your upgrade will be that much simpler. In other cases (such as when your CPU does not meet the specified minimum), buying a new system is a more sensible first step.

2. Decide what upgrades you really need (or want). To help you decide, we provide advice on how each upgrade will benefit your computer. Consider the price, the time, and the difficulty of each upgrade—and be honest with yourself about how comfortable you feel handling an advanced-level upgrade. If you have misgivings, think about paying a computer dealer to do the upgrade, or call on a trusted friend who is more experienced.

3. Refer to the "How to Upgrade" section. After you have made your choices and purchased the components, the "How to Upgrade" material will walk you through installing your upgrades. The end result: You'll have a task-specific hot rod ready to chase the checkered flag. And you won't even need to get your hands greasy.

UNDER THE HOOD: Our base system, a Dell Dimension XPS T600r, came equipped with a Pentium III-600 CPU, 64MB of RAM, a 9.5GB IDE hard drive, a 16MB ATI Rage 128 graphics board, a 48X CD-ROM drive, a sound card, and a 56-kbps modem.

HOW TO UPGRADE

BEFORE YOU BEGIN

ANY TIME YOU UPGRADE, you must consider some tasks and perform some housekeeping before rolling up your sleeves and getting to work.

–If you're not running Win 98 SE or Millennium, consider upgrading to one of these OSs, which offer the latest sound and graphics support.

–Check for the most current software updates (windowsupdate.microsoft.com).

–Check for system hardware errors. Go to *Start•Settings•Control Panel,* choose the System icon, and click the *Device Manager* tab. If you see a yellow exclamation point next to any of the entries, highlight the entry, click the *Properties* button, and follow the directions for fixing the problem.

Defragmenting Dri
47% Complete
Stop

–Scan and defragment your hard drive. In My Computer, right-click the hard drive icon, and choose *Properties.* Next, click the *Tools* tab, and then click the *Check Now* button. After the system has completed that operation, click the *Defragment Now* button.

–Back up all of your programs and all of your data. (It's also not a bad idea to review the replicated files so you can double-check that the backup operation succeeded.)

CPU CONSIDERATIONS

IF YOUR CURRENT PC doesn't meet our minimum processor requirement, you'll probably get a better value by starting with a new system. Many of the components in our projects—especially advanced software—work best with a Pentium III, Athlon, Pentium II, or Celeron CPU. Older Pentiums can't be upgraded to these classes of processors, though owners of the oldest Pentium II computers aren't completely out of luck. Companies like Evergreen Technologies offer kits for upgrading to a fast Celeron processor for around $130 to $230. (For details on upgrading CPUs, see our April *Upgrade Guide,* www.pcworld.com/apr00/upgrade_guide.)

If you're really ambitious, consider upgrading your entire motherboard—but only if you have experience working with hardware and are comfortable poking around extensively inside a PC case. A typical motherboard costs about $100, but the total price depends on the type of CPU and how much RAM you equip it with. The full upgrade will usually set you back $300 to $600. (For details, see our December 1999 *Upgrade Guide,* www.pcworld.com/dec99/upgrade_guide.)

ESSENTIAL UPGRADES

UNLESS YOU HAVE A brand-new computer with more RAM and a bigger hard drive than you can imagine needing, those are most likely the first components you'll want to upgrade.

Make sure you have the right tools for each job. Most projects require a Phillips-head screwdriver, and many call for a pair of needle-nose pliers. You'll also want to avoid destroying components with static electricity. Don't leave a PC that is less than three years old plugged into the wall while you work on it: Even if it's turned off, some low voltage remains on the motherboard. It won't hurt you, but if you accidentally short something, it could damage your PC. The solution is to wear an antistatic wrist strap, which you can find at your local electronics store, such as Radio Shack. If your PC is more than three years old, you can safely leave it plugged into the wall to provide a ground to dissipate static charge.

Opening the case of a modern PC is generally easy, but virtually every one is different. Read your manual carefully before you open the case. Always leave plenty of time for all upgrade projects, too. And before you start, read the manuals that come with your new add-ins and peripherals.

BOOSTING RAM

ADDING RAM IS AMONG the most common upgrades, and it's generally easy to do. If your PC was manufactured in the past three or four years, its RAM chips are probably mounted on DIMMs—dual in-line memory modules. RAM chips in older PCs are typically mounted on SIMMs—single in-line memory modules. The procedure for upgrading is virtually identical for both, though the modules fit into their slots differently. Be careful, though; while most PCs use standard DIMMs, some require special, costlier memory. Memory suppliers such as Crucial Technology (www.crucial.com) and Kingston Technology (www.kingston.com) can help you find what you need with their online memory-finder applications.

1. Turn off and unplug your computer, remove the cover, and locate the memory sockets. If you have to remove any cables in order to get to the sockets, use masking tape to mark the connections so you can put everything back together correctly when you're done.

2. To remove an old memory module, carefully and gently push apart the clips on each side of the module that hold it in place, and then pull the old memory out. If it doesn't come out easily, very gently rock it back and forth.

3. Carefully insert the new module, and check to make sure that it's firmly seated in its socket. (Note that a DIMM has two notches, allowing it to be inserted only one way.) The clips on either side of the module should automatically click into place, indicating that the module is correctly installed.

4. Plug in and restart your PC. You should see the new memory size displayed on your screen at start-up. If not, double-check that the module is firmly seated. The chances of getting a bad RAM module are very small; modules are thoroughly tested before they leave the factory.

INSTALLING A HARD DRIVE

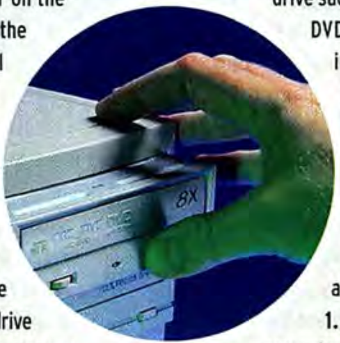
MULTIGIGABYTE DRIVES ARE inexpensive these days, and adding a new one can boost storage capacity on an older PC. Though installing a new drive may seem intimidating, anyone with basic mechanical smarts can do it. The following directions apply to the most common situation, where your main hard drive is the only component connected to your system's primary IDE channel. If you ▶

Seagate
Barracuda ATA II

open your PC and find that a CD-ROM or other drive is connected to the same cable as your main drive, you'll need to follow a slightly different procedure; the steps are usually covered in the instructions that come with drives.

1. Turn off and unplug your PC, remove the cover, and locate your existing hard drive.

2. If you see a free connector on the wide ribbon cable connected to the drive, that's the spot where you'll hook up the new drive. If not, don't worry: Most new drives today come with a cable.



3. Reset the jumpers on the old drive to Slave, and set the jumpers on your new drive to Master. Most drives have the jumper positions marked on the drive case, although you may have to remove your existing drive in order to access that information or to set the jumpers.

4. Mount the new drive in the case, and then hook up the new drive to the free connector on the ribbon cable and to a free power connector, making sure that everything is connected correctly. The colored (usually red) wire on the ribbon cable goes to pin 1 (usually marked) on the new drive. It does not matter which drive is connected to which connector on the ribbon cable. If you cannot find a free power connector, you will need to purchase a Y-connector (which makes two power connectors out of one) from a computer parts supplier.

5. Plug in your computer and restart it. Enter the setup program (pressing <Delete> during start-up usually will do the trick, though details will vary by manufacturer—your own start-up screen should display the correct keystrokes). Make sure all drives are set to Auto in the BIOS.

6. Use the software accompanying your new drive to format it, and then copy the data from the old drive to the new one.

7. Once you are confident that everything is now working correctly, consider reformatting the old drive to receive new data.

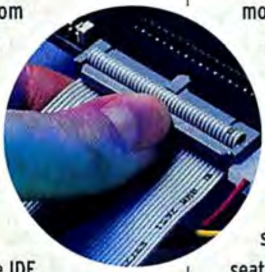
INSTALLING A REMOVABLE-MEDIA DRIVE

THE PROCEDURE FOR adding a removable-media drive such as a CD-RW, DVD-ROM, or DVD-RAM drive is similar to installing a hard drive, but somewhat simpler. You may want to leave your PC's existing CD-ROM drive in place. Having it available will make copying CDs much easier if you are adding a CD-RW drive.

1. Turn off and unplug your computer, and remove the cover.

2. Locate your existing CD-ROM drive. You should see a free connector on its wide data cable. If not, use the cable that came with the new drive. (DVD-ROM drives also use a special cable that connects to the decoder board.)

3. If you're installing a CD-RW drive, set the jumper on it to Slave. For DVD-ROM drives, see the manufacturer's directions.



4. Remove the cover from the front of a free 5.25-inch drive bay. Carefully slide the drive in and mount it. (Some PCs require special mounting hardware, which usually is included with the PC in its box.)

5. Hook up both the wide IDE data cable and the colored power connector to the new drive.

6. If you are installing a DVD-ROM drive, you will need to plug in an MPEG decoder add-in card (see "Installing an Add-In Card," below) and make several additional connections. Follow the directions from the manufacturer.

7. Enter your PC's setup program at start-up, and make sure all drives are set to Auto.

8. Install the software that came with the drive, and test it. If you have problems, recheck all connections. If you still have problems, consult the drive maker's technical support.

INSTALLING AN ADD-IN CARD

MANY UPGRADES REQUIRE installing or replacing add-in cards. The two main types of these boards are AGP (for graphics cards) and PCI (for others, such as sound cards). You can still find older ISA cards around, but they are rapidly being phased out. Any procedure that entails opening your PC qualifies as an intermediate-level task, but installing cards isn't difficult, as long as you work carefully. And the Plug and Play capabilities of today's cards make fiddling with jumpers, switches, and other card settings a thing of the past. Most of the time, cards work as soon as you plug them in and install their software.

1. If you are replacing an existing card, uninstall any software that's specific to that card. Go to *Start•Settings•Control Panel* and choose *Add/Remove Programs.* You can also check the software that came with the card. The software that's bundled with some cards—especially graphics boards—often includes an uninstaller program. Check under *Start•Programs.*

2. Turn off and unplug your PC, and remove the cover. Locate the card you're removing (or a free slot if there was no card previously).

3. If you are taking out an existing card, remove the screw that holds it in place and carefully pull out the card.

4. If you're installing a new card, remove the screw that holds the metal cover in place behind the empty slot. Then remove the cover.

5. Carefully insert the card into the slot, make sure that the card is firmly seated, and then screw it down securely.

6. Have the software that came with your new card handy. Plug in and start your PC. Windows should detect the new card and start the Add New Hardware Wizard automatically. Check the *Search For The Best Driver* box, insert the software, and follow the directions to install it.

7. If after the installation your computer won't start up—or if it behaves strangely in other ways—double-check to be sure that the card is firmly seated in its slot. ▶

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* Source: PC Data U.S. Distribution and Retail Hardware Reports, May 2000

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PROJECT 1: SOUND AND MEDIA CENTER

AS PCS HAVE BECOME more powerful, sound and pictures have come into their own. Our sound and media center creates a lively home entertainment system built around your PC. Here's a brief summary of the parts you audio enthusiasts and home theater buffs will need. (Typical street prices are noted.)

For optimum sound, you need a top sound card. Fortunately, these cards have come a long way in the past few years—from low-fi to hi-fi, with lower prices. In a field of strong alternatives, Creative Labs' Sound Blaster cards are the market leaders. We chose the midrange ($100) Sound Blaster MP3+, which delivers lifelike sound and is chock-full of special features for listening to MP3 music files and CD audio, and for working with them as well.

You will also want a CD-Rewritable drive for burning your own music CDs. The $200 Plextor PlexWriter 8/4/32 that we chose offers fast 8X CD-R writing, 4X performance on rewritable discs, and a respectable read speed of 32X. And Plextor has a reputation for producing top-of-the-line, ruggedly built drives.

To access the full excellence of video available on DVDs, you need a capable drive. And while many graphics cards will help decode the compressed video on a DVD, a hardware MPEG decoder (add-in board) produces the best results. A complete upgrade kit—like our choice, Creative Labs' $250 PC-DVD Encore 8X with Dxr3 decoder board—makes the most sense.

It wouldn't be a media center if you couldn't watch TV on your screen, and stand-alone TV boards are now available for around $100. We went high-end and chose a new graphics board with TV features built in. Our pick, the $299 Matrox Marvel G400-TV, offers connections for external TV monitors and for analog video in.

Top-quality components won't mean much if you use cheap speakers—and most units shipped with PCs are abysmal. We suggest you lay down the bucks for top-notch speakers. Excellent models are available in the $100-to-$150 range, but we aimed higher—Klipsch's $250 ProMedia v.2-400 THX system.

On the software side, you'll need programs to decode MP3s, edit audio, and burn CDs. Most upgrades you can buy include their own software, but you can find other options. For working with MP3 files, MusicMatch Jukebox (www.musicmatch.com) is a capable and popular choice. A free basic version is available on the company's Web site; a full-featured version costs $30. Sonic Foundry's Sound Forge (www.sonicfoundry.com) is the industry standard for audio editing. The professional version costs $499, but Sound Forge XP, a limited $60 version, has enough features for casual users. And for creating CDs, Adaptec's Easy CD Creator (www. adaptec.com) is the justifiably popular choice. A basic version comes with most CD-RW drives, but you can purchase a deluxe version with advanced capabilities for $89. ▶

Tip: Experimenting with speaker placement can pay dividends in great sound.

Speakers
Time: 15 minutes
Expertise level: Beginner
Comment: Don't skimp on your speakers. They're the primary component in audio reproduction. Your ears will thank you.

SOUND AND MEDIA CENTER UPGRADE SPECS

WE REVAMPED THE AUDIO PORTION of our base system, adding a sound board and THX-certified speakers for amazing 3D sound. For video, we added a DVD drive and decoder board, plus a video card with a TV tuner. Finally, no sound and media system would be complete without a CD-Rewritable drive for burning CDs and storing collections of MP3 files.

PRODUCT	Minimum requirement	Upgrade price range	Our project upgrades	Price
CPU	Pentium II-333	[1]	[2]	not applicable
RAM	64MB	$1-$2 per MB	[2]	not applicable
Hard disk	10GB	$150-$250	[2]	not applicable
Sound card	3D sound support	$70-$200	Creative Labs Sound Blaster MP3+	$100
Speakers	subwoofer and four satellites	$100-$250	Klipsch ProMedia v.2-400 THX	$250
DVD-ROM drive	4X DVD-ROM	$100-$250	Creative Labs PC-DVD Encore 8X	$250
Graphics board	supports video in/out	$200-$300	Matrox Marvel G400-TV	$299
CD-RW drive	4X/2X/24X	$200-$300	Plextor PlexWriter 8/4/32	$200
Total cost		**up to $1678**		**$1099**

[1] If your system's CPU doesn't meet our minimum requirement, we recommend that you consider buying a new system. See the "How to Upgrade" section for more advice. [2] Since our base system's CPU, RAM, and hard disk space met our minimum requirements, we chose not to upgrade those components.

Hard Drive
Time: 1 hour
Expertise level: Intermediate
Comment: A big hard drive lets you store lots of MP3 files, and the extra space can help when you burn music CDs as well. Aim for a capacity between 10GB and 25GB. High speed isn't crucial in this area.

Tip: Consider using your new drive for data storage only, instead of as an all-purpose replacement for your existing drive.

DVD-ROM Drive Upgrade Kit
Time: 60–90 minutes
Expertise level: Intermediate
Comment: A fast drive and a hardware MPEG decoder card are essential for a great DVD experience.

CD-Rewritable Drive
Time: 1 hour
Expertise level: Intermediate
Comment: Whether you want to archive MP3 files or burn audio CDs, a CD-RW drive can be your best friend.

Graphics Card/TV Tuner
Time: 30–45 minutes
Expertise level: Intermediate
Comment: You'll want high-performance graphics for the best DVD picture possible—and why not buy a graphics card with an integrated TV tuner so that you can watch TV shows in a window on your PC screen?

Tip: Drivers for graphics cards are updated frequently. Always download the latest one from the manufacturer's Web site before you install your new card.

Sound Card
Time: 30–45 minutes
Expertise level: Intermediate
Comment: Great sound requires something better than an entry-level sound card. The best upgrade cards come with tons of software and extras like MP3 support and built-in 3D audio.

PROJECT 2: DIGITAL DARKROOM

DARKROOMS USED TO BE tucked away in the cellar, the garage, or a gloomy corner of a home—and they required running water; smelly, expensive, and dangerous chemicals; and lots of time and patience. But digital cameras, photo-quality printers, and PCs have changed that equation. Though not quite perfect, the latest cameras and printers can deliver images that are nearly indistinguishable from those produced by your local photo-finishing shop. And you can manipulate digital images in ways that are unimaginable in the darkroom—not to mention sending them through e-mail or putting them on your Web site.

The first tool that you'll need for a digital darkroom is a digital camera. Over the past year, they've declined in price while dramatically improving in quality. Now 1-megapixel models (referring to the maximum number of dots that make up an image) are readily available for $200 to $300 and produce excellent snapshot-size images. We chose the $299 Olympus D-360L, a 1.3-megapixel camera that captures images at resolutions up to 1280 by 960.

The next essential is, of course, a printer. You would be hard-pressed to distinguish between a commercial photographic print and the output of the latest generation of photo-quality, color ink-jet printers. The $199 Kodak/Lexmark PM100 ink jet, for instance, has a print resolution of 1200 by 1200 dpi and includes slots for accepting memory cards directly from digital cameras.

Everyone has shoe boxes stuffed with old photographs and slides. Bring them into the computer age by scanning them and storing the digital images on your PC. Today's scanners, such as the $249 Epson 1200U, have high resolutions and are easy to hook up (many use a USB interface). You can even scan old slides and negatives by using the optional adapters that are available for most scanners. (Figure on spending another $100 or so for this feature.)

Are you looking to remove the red-eye from a photograph of your kids? Or do you want to completely expunge your former brother-in-law from a family portrait? Today's image-editing software can do all that, and much more. Although Adobe Photoshop remains the number one choice of graphics professionals, the package is expensive ($609) and too complex for the majority of casual users. Products like Ulead's $80 PhotoImpact 5 can do many of the same things for hundreds of dollars less. ▶

CAMEDIA
DIGITAL CAMERA
D-360L
OLYMPUS
1.3 Megapixel

Digital Camera

Time: 15–30 minutes

Expertise level: Beginner

Comment: Make sure that the camera supports a resolution of at least 1 megapixel; it should be able to handle 2 or 3 megapixels if you plan to print pictures that are 8 by 10 inches or larger.

Tip: Buy extra memory cards for easy picture storage when you're traveling.

DIGITAL DARKROOM UPGRADE SPECIFICATIONS

ADDING A DIGITAL CAMERA, SCANNER, AND PRINTER as we did for this project isn't much more difficult than hooking up a VCR. You'll also need software to edit the images you acquire. Boosting RAM and hard disk space adds complexity to the project, but if you'll be working with lots of large files, you'll appreciate the additional speed those upgrades deliver.

PRODUCT	Minimum requirement	Upgrade price range	Our project upgrades	Price
CPU	Pentium III-500	[1]	[2]	not applicable
RAM	128MB	$1–$2 per MB	64MB	$80
Hard disk	17GB	$150–$250	Seagate Barracuda ATA II 20.4GB	$195
Digital camera	1 megapixel	$200–$300	Olympus D-360L	$299
Photo-quality printer	1200 by 1200 dpi	$100–$200	Kodak/Lexmark 100	$199
Image editing software	not applicable	$50–$150	Ulead PhotoImpact 5	$80
Scanner	1200 by 1200 dpi	$100–$300	Epson 1200U	$249
Total cost		up to $1456		$1102

[1] If your system's CPU doesn't meet our minimum requirement, we recommend that you consider buying a new system. See the "How to Upgrade" section for more advice. [2] Since our system's CPU met our minimum requirement, we chose not to upgrade that component.

Ulead PhotoImpact 5
Seagate
Barracuda ATA II

RAM
Time: 30–45 minutes
Expertise level: Intermediate
Comment: Upgrading to 128MB of RAM can make an impressive difference in the performance of image editing software.

Tip: Keep your existing RAM modules if you can, but you may have to discard one if all of your memory sockets are filled.

Photo-Quality Printer
Time: 15 minutes
Expertise level: Beginner
Comment: Some printers allow you to plug a camera's memory card directly into a slot, bypassing the PC for faster prints.

Tip: Drives in the 30GB–40GB range are becoming common and are great values for their storage space.

Hard Drive
Time: 1 hour
Expertise level: Intermediate
Comment: You'll need a fast, high-capacity hard drive for working with digital image files, which can take up huge amounts of space.

Image Editing Software
Time: 15 minutes
Expertise level: Beginner
Comment: A program of this type is essential for manipulating images.

Scanner
Time: 15 minutes
Expertise level: Beginner
Comment: Higher-end scanners produce better images.

Tip: Most scanners have a shipping lock. Before installation, be sure to remove it.

PROJECT 3: HOME GAMING SYSTEM

WHETHER YOU'RE EVADING a MIG 29 over the Korean peninsula or ambushing a coworker in a subterranean labyrinth, one rule applies: Victory belongs to the swift. So no matter how quick your reactions or how clever your strategy, playing games on a slow PC puts you at a severe disadvantage.

Fortunately, there are lots of ways to speed up your PC's gaming performance, even if you're stuck with an older CPU. For many PCs bought in the last few years, adding a faster processor—or buying a new system—isn't necessary. Many current games run comfortably on systems with PII or Celeron processors—if you add the right upgrades to your system.

Often the biggest bottleneck in gaming performance is the graphics card. The hottest new games—especially those that use 3D graphics—require graphics cards with 2D and 3D graphics capability and *gobs* of on-board memory—at least 32MB. If your PC has an AGP slot, get an AGP card. If it doesn't, don't worry: Many graphics cards come in both AGP and PCI versions. We chose the $299 AGP-based Hercules 3D Prophet II GTS for our project, though budget-conscious shoppers can find capable 2D/3D cards in the $150 to $200 range.

The second-most-important upgrade involves system RAM. It's easy to add, relatively inexpensive, and critical for running demanding games. Fast animation moves vast amounts of data. And data that isn't stored on your graphics card ends up in RAM. Before you buy extra RAM, however, check your system's documentation to determine the right type for your PC (see "Boosting RAM," page 117).

You'll also want a big hard drive. Some games let you copy large blocks of data—like scenery—from the CD-ROM to the hard drive, where your system can access it more quickly.

And if you're planning to play games online in head-to-head competition, a fast Net connection can give you a big edge over competitors shackled with slower links. A 56-kbps modem can do the job, but your best bet is high-speed cable or DSL. In many areas, both technologies are just a phone call and an ethernet card away.

A first-rate gaming PC demands a top sound system. You can buy decent speakers and a subwoofer for under $70. But a 3D, four-channel sound system like the $149 Creative Labs/Cambridge SoundWorks FourPointSurround FPS2000 adds another dimension. If you decide to go with four-channel sound, make sure you have a sound card like Creative Labs' $100 Sound Blaster Live X-Gamer, which supports all four channels and positional 3D audio.

And finally, when picking out a joystick, game pad, or other game controller, spend a little extra on a superior product like Microsoft's SideWinder Force Feedback Pro joystick ($130) or SideWinder Game Pad Pro ($40). Either will last longer than a bargain-basement controller and provide superior game play. ■

Speakers
Time: 15 minutes
Expertise level: Beginner
Comment: Getting pelted with sounds from all directions makes for an amazing gaming experience.

GAMING SYSTEM UPGRADE SPECIFICATIONS

AN EXTRA 64MB OF RAM and a state-of-the art video card pump up the 3D gaming muscle of our project system. We added a new sound card and speakers to bring audio into the 3D world. A game pad and joystick round out our upgrade, controlling the action in any type of game.

PRODUCT	Minimum requirement	Upgrade price range	Our project upgrades	Price
CPU	Celeron-500	[1]	[2]	not applicable
RAM	128MB	$1-$2 per MB	64MB	$80
Hard disk	10GB	$150-$250	[2]	not applicable
CD-ROM drive	40X CD-ROM	$50-$100	[2]	not applicable
Graphics board	2D and 3D, 16MB	$150-$300	Hercules 3D Prophet II GTS	$299
Sound card	four-channel sound, 3D audio	$100-$200	Creative Labs Sound Blaster Live X-Gamer	$100
Joystick, game pad	not applicable	$50-$130, $20-$50	Microsoft SideWinder Force Feedback Pro, SideWinder Game Pad Pro	$130, $40
Internet connection	56 kbps, V.90	$20-$60 per month	Covad DSL-Telesurfer service	$49 per month
Speakers	subwoofer and four satellites	$100-$250	Creative Labs/Cambridge SoundWorks FourPointSurround FPS2000	$149
Total cost		**up to $1546 [3]**		**$847 [3]**

[1] If your system's CPU doesn't meet our minimum requirement, we recommend that you consider buying a new system. See the "How to Upgrade" section for more advice. [2] Since our system's CPU, hard disk space, and CD-ROM drive met our minimum requirements, we chose not to upgrade those components. [3] Includes first month of Internet service.

DSL/Cable Modem
Time: 1 hour
Expertise level: Beginner/Advanced
Comment: Online gaming gains a new look and feel on a high-speed Internet connection.

Tip: Many DSL and cable providers offer complete on-site installation, including the modem and an ethernet card. (Configuring an ethernet card and modem settings is a job for the truly computer savvy.)

RAM
Time: 30 minutes
Expertise level: Intermediate
Comment: Adding RAM is a cost-effective way to improve your system's gaming and overall performance.

Hard Drive
Time: 1 hour
Expertise level: Intermediate
Comment: With many games taking up 400MB to 500MB of disk space, even a 10GB hard drive can quickly run out of space.

Graphics Card
Time: 30 minutes
Expertise level: Intermediate
Comment: A good graphics card is the most important upgrade you can make for gaming performance.

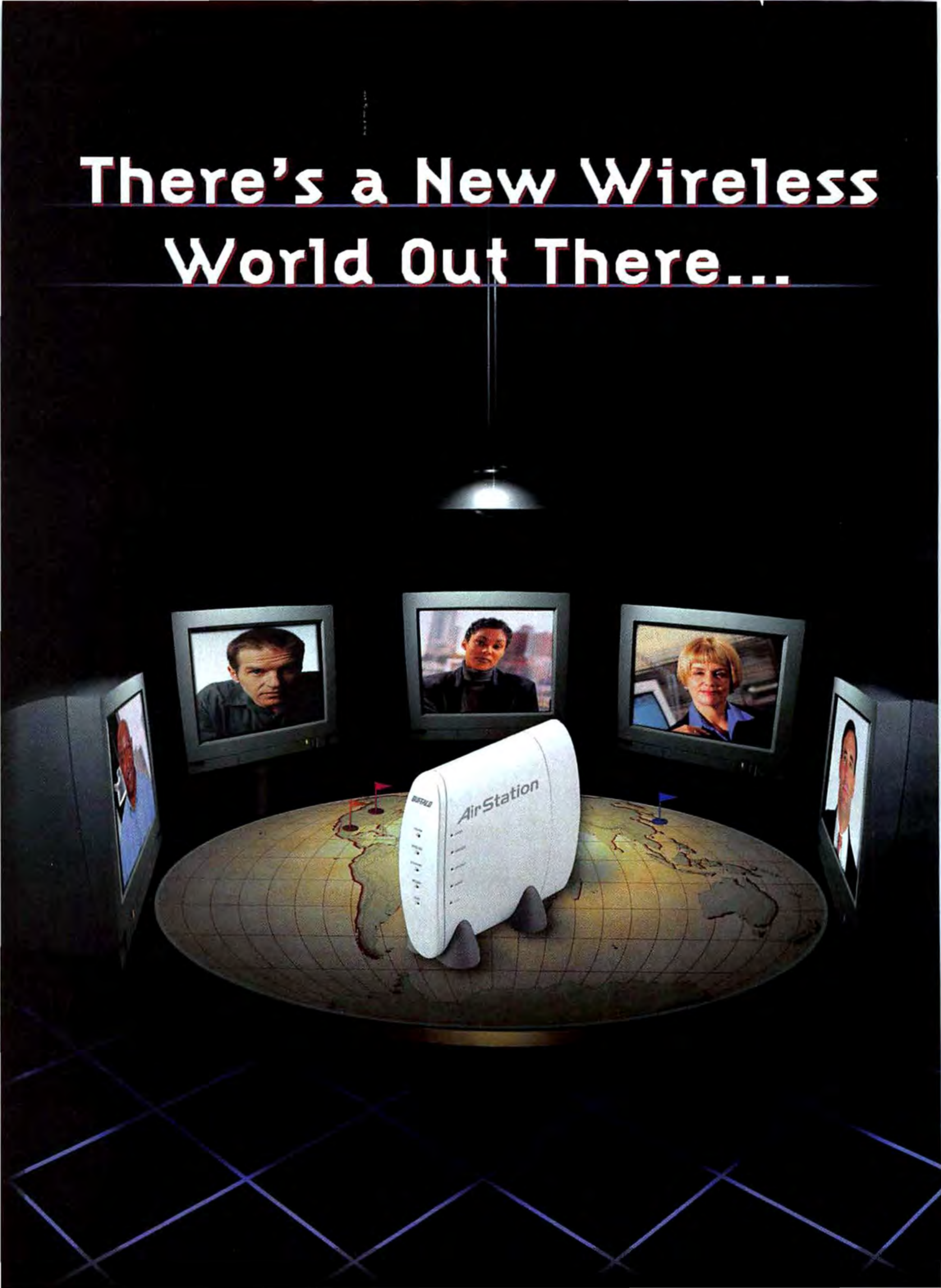
Tip: Always check the card vendor's Web site for the most recent driver before installing the hardware.

Sound Card
Time: 15 minutes
Expertise level: Intermediate
Comment: Most of today's sound cards are adequate for gaming. If you aren't investing in four-channel, 3D speakers, save your money.

Tip: If your PC has an integrated audio chip instead of a sound card—as many Celeron systems do—make sure it can be disabled in the CMOS setup program. If it can't, you may not be able to add a new sound card.

Joystick/Game Pad
Time: 15 minutes
Expertise level: Beginner
Comment: If realism is the name of the game, the more you spend on a joystick, the better the experience.

Tip: Keyboards and game pads that use USB connectors eliminate having to swap connections to the game port on your sound card.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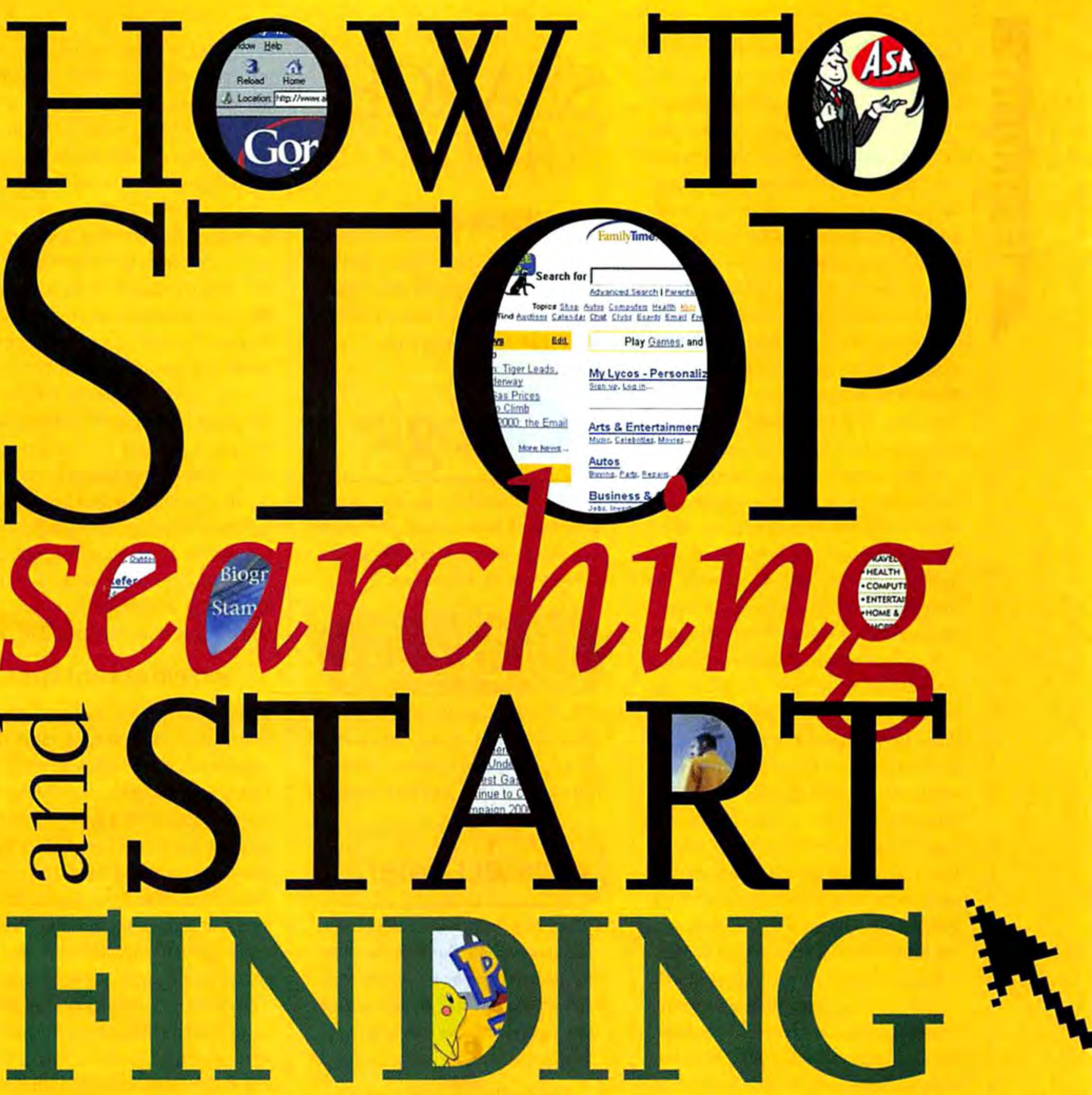


HOW TO STOP *searching* and START FINDING

Tired of wading through useless search-engine results? We test 20 engines to pinpoint the ones that really deliver the goods.

BY KIM ZETTER AND HARRY McCRACKEN

ASK A COUPLE of strangers for street directions, and you never know what you'll get. They may be rushed and give you only partial instructions; they may lead you astray with incorrect information; or they may not know the way at all and simply shrug you off with a smile. Still, when you find yourself going past the same mini-mart for the seventh time, you may have no choice but to ask for guidance. But who do you approach: The twenty-something gas-station attendant? The woman washing her car? The man walking his dog?

Searching for anything on the Web carries the same uncertainty. You may know exactly what you're looking ▶

for, but you don't know where to find it or who to ask. And when you do ask, you can't be sure you'll get the right answer.

The Web is crawling with search sites vying to show you the way. Conservative estimates put the number at over 8000, including pure search engines, general- and special-interest directories, and metasearchers (which query multiple search sites at once). In addition, there are numerous alternative search methods you could opt for, including utilities that work with your browser to mine the Web for information (see "Search Utilities," page 143) and "expert" sites where real people field your questions.

With so many choices, how do you decide which search site to use, and when? We tested over 20 engines, directories, and expert sites to see which ones produced the best results—that is, the most relevant links in the most logical ranking, with the least effort on our part.

We ran a series of queries, ranging from broad to specific, on each site. Some were business-related, such as one that tried to track down certified public accountants in California; others were scholarly, including one that sought information about a lost Hemingway manuscript (his wife left it on a train in 1922). We also hunted for information on pop-culture topics ranging from Pokémon to Queen (Freddie Mercury's band, not Victoria, Elizabeth, or Latifah).

Some sites did surprisingly well; others forced us to wade through swamps of irrelevant links or pointed us to pages that no longer existed. (For highlights of what we found, see "Search Superstars" at right and the features chart on page 131.) Overall, we discovered that search technology, while far from perfect, has made great advances in helping us find our way efficiently through the Web.

Engines and Directories: *The Basics*

DESPITE THE PROFUSION of methods for searching the Net, the most common tools remain search engines and directories, each of which has its own merits. The main difference between the two is human intervention. Search engines use automated software "spiders" that crawl through the Web to collect and index the full text of pages that they find.

SEARCH *superstars*

YOU'VE GOT QUESTIONS. Who's got answers? Start your quest at these sites—our picks as the best options in five key categories of search tools.

SEARCH ENGINE: Google (www.google.com). Sleek, simple, and fun to use, Google promises the Web's most relevant results—and delivers.

DIRECTORY: Open Directory Project (www.dmoz.org). Sorry, Yahoo—this site's breadth, descriptions, and clean feel make it the top Web card catalog.

METASEARCHER: MetaCrawler (www.metacrawler.com). Our favorite all-in-one searcher combines results from top engines such as Google with a friendly, customizable interface.

SPECIALTY DIRECTORY GUIDE: InvisibleWeb.com. This "search engine of search engines" catalogs 10,000 special-interest search sites on everything from auto racing to zoology.

EXPERT SITE: AskMe.com. Call on this site's community of real people for information and advice with a decidedly human touch.

Directories, by contrast, rely on human editors to sift through pages, winnowing out inappropriate ones and categorizing sites by subject. Nothing goes into the directory unless an editor approves it, so you're unlikely to find Christmas recipes in a Yahoo category about ham radios. But since directories are crafted by hand, they are far less comprehensive than search engines. Conservative estimates put the current size of the Web at a billion pages (and gauge its growth at a million pages per day). Most engines don't come close to indexing the whole Net, but at press time Google claimed to have indexed a billion pages either partially or completely. The largest directory, called the Open Directory Project (www.dmoz.org), is tiny in comparison, with a current index of only about 2 million sites.

HYBRID SEARCH SITES

DIRECTORIES AND SEARCH engines have different virtues, so most major search sites meld aspects of each. AltaVista, for example, supplements its search engine with a directory that uses listings from the LookSmart (www.looksmart.com) and Open Directory indexes. Similarly, if you search at LookSmart or Yahoo, the site first provides results from its own directory, and then passes your query to a search engine.

Of course, many search sites do a lot more than provide an engine and a directory—Excite, Go.com, Lycos, Yahoo, and others have morphed into portals offering an array of services, including stock quotes, news, e-mail, shopping, and anything else to dissuade you from going elsewhere on the Web. That scattershot strategy keeps visitors glued to pages long enough to notice the banner ads, helping the sites make a buck. But while much of the stuff portals offer is useful or fun, these sites can become so cluttered with peripheral features that the search tools seem an afterthought.

Some search sites are returning to the basics. Google started the trend last year: Its sleek home page consists of little

Search Engines and Directories: *The Quest for the Best*

SEARCH SITE	Features	Ease of use	Relevant links[1]	Broken or duplicate links[1]	Comments
AltaVista www.altavista.com	Portal. Searches news, newsgroups, audio, and more; advanced features include Boolean queries and sorting.	Fair	92%	7%	Powerful engine returns high-quality results; advanced features take time to learn. Lots of clutter, but you can use Raging.com instead.
Direct Hit www.directhit.com	Engine/directory. Incorporates Open Directory; personalized search option tailors results to your age, gender, etc.	Good	55%	5%	Relevance ranking, based on past searches, doesn't always hit the target; minimal number of broken links and duplicates; few advanced features.
Excite www.excite.com	Portal. Searches news, images, audio, and more; advanced features include logical queries and sorting.	Fair	77%	13%	Busy home page makes search engine seem like an afterthought; help section is vague; doesn't specify how many links it found.
Fast Search www.alltheweb.com	Engine. Searches files, images, and audio; can perform logical queries.	Good	87%	13%	Fast and relevant, but lacks Google's uncanny accuracy; simple and streamlined; has relatively few advanced features; no directory.
Go.com www.go.com	Portal. Searches news, audio, video, and more; includes site reviews; can restrict searches to family-friendly sites.	Good	72%	7%	Less cluttered than some portals; middle of the pack for relevance in our tests; directory's star ratings for sites are a nice extra.
Google www.google.com	Engine/directory. Incorporates Open Directory; "I'm Feeling Lucky" button takes you to engine's top pick for most relevant site.	Excellent	100%	0%	Returns highly relevant results; very easy to use; few advanced features, but you may not need them to find what you're looking for.
HotBot www.hotbot.com	Engine/directory. Includes modified version of Open Directory; advanced features include Boolean queries and much more.	Good	67%	1%	Good choice for serious searchers who like lots of options; basic queries may not return super-relevant results; few broken links or duplicates.
LookSmart www.looksmart.com	Engine/directory. Catalogs and describes over a million sites; LookSmart Live provides advice and info from real people.	Good	not applicable[2]	15%	Solid directory with better descriptions than Yahoo, but it seemed slower than most in our tests, with more broken links.
Lycos www.lycos.com	Portal. Searches news, audio, weather reports, and more; can restrict searches to family-friendly sites.	Fair	45%	17%	Lots of features, but relevance of results was erratic in our tests; more broken links and duplicates than most; few advanced search options.
Northern Light www.northernlight.com	Engine. Sorts results into folders by topic; searches fee-based databases; many advanced features, including Boolean queries.	Good	60%	7%	Powerful and unique, but the topic folders don't always sort results effectively; better for business searches than for fun stuff; no directory.
Open Directory www.dmoz.org	Directory. Catalogs and describes over 2 million sites; passes searches on to AltaVista, Google, GoTo, and Yahoo.	Very good	not applicable[2]	0%	Volunteer-staffed directory is comprehensive and easy to use, with clear descriptions and well-organized links to many worthwhile sites.
Yahoo www.yahoo.com	Portal. Catalogs over 500,000 sites; returns results from both directory and engine; searches audio, video, and newsgroups.	Good	not applicable[2]	0%	Still the best portal, and easier to use than most; flagship directory has fewer site descriptions than the similar Open Directory.

Best Bet

HOW WE TEST We ran a series of identical queries at each search site, checking each link for relevance. Queries ranged from broad (*world beat*) to specific (*Hemingway's lost manuscript*).

[1] Based on first ten results for each of our test searches.

[2] Directories include links that are hand-chosen by editors, so relevance isn't an issue.

more than the Google logo, the field where you type in your queries, and a couple of buttons. More recently, AltaVista launched Raging Search (www.raging.com), which offers the AltaVista search engine without the clutter of the AltaVista site. AltaVista says that searches on the two sites can yield different results, but our tests produced identical listings each time. In any event, pure search sites are excellent news for Web surfers who want to avoid the distractions of a full-service portal.

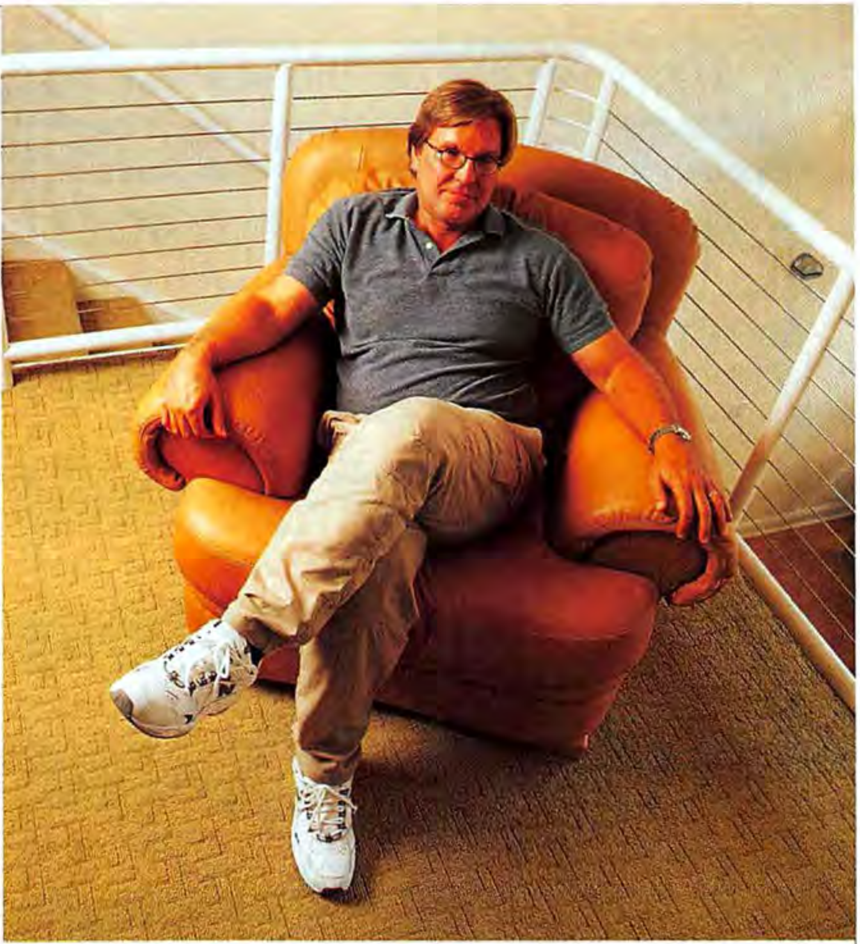
Search Engines: *The Race for Relevancy*

LOGICALLY YOU'D EXPECT the search engine that indexes the most pages to have the best chance of finding what you need. But if an engine doesn't properly organize the sites it finds, the one you want may be buried beneath thousands of irrelevant links. What good does it do for an engine to deliver 6000 environmental links when you really want a site for the rock group Green Day?

At Lycos, for example, we searched for *Ford Motor Company*: The first three links consisted of one to Lycos's own motorcycle section, one to the Nature Company, and a third to Living.com, an online furniture store. At Ask Jeeves, which lets you pose queries in the form of a full statement or question, we asked *Who is John Kerry?* in hopes of finding a biography of the Massachusetts senator. But Jeeves' first link led to geographical information on Kerry, Ireland.

Of the sites we tested, Google provided the most consistently pertinent results—one reason it's our favorite engine overall. The site uses "page rank" technology to track the number of pages that link to a site. If a lot of pages link to a particular site on a specific topic, the reasoning goes, that site must be relevant to that subject. Consequently, Google gives it higher placement in the results.

Google has such confidence in this theory that it offers an "I'm feeling lucky" button you can click to go directly to the site Google thinks is most relevant to your search. But it might more appropriately be called "*We're* feeling lucky," since Google is gambling that the site it selects is the one you want. In our testing, Google's optimism was justified in some cases. We searched for Al Gore's official campaign site using the keywords *Al Gore campaign site*. Google ▶



listed algore2000.com as the first item, whereas GoTo.com buried it beneath nearly 70 other links.

Google was less fortunate when we searched with the keywords *world beat*, hoping for information on music; the engine sent us to the Web site of travel publisher Rough Guides. However, when we put quotation marks around the query (*"world beat"*), Google's luck (and ours) improved: It sent us to the highly relevant world beat page at the Internet Underground Music Archive—proof that subtle differences in how you enter a query can have a big impact on the results you receive.

Another Google plus: Below each link it finds, Google provides a snippet of text with the word or words you searched for highlighted in bold. That helps you eyeball the results and gauge the relevance of each link quickly. (Most engines simply display the first line or two of text from each linked page, whether the text contains your search terms or not.)

Direct Hit takes a different approach to maximizing the relevance of results by organizing them based on their popularity with previous searchers. For instance, if few searchers clicked the first link for a search about computer chips (say, because it is actually for a site about *potato* chips), that link will sink lower on the list. Several engines, including HotBot, Lycos, and MSN Search, have adopted Direct Hit's technology. Our tests of Direct Hit itself, however, produced mixed results. When we searched for Pokémon and Queen, the engine served up the official site first in each case. But of ten results for "world beat," only four were relevant. Most of the others weren't related to music at all.

Directories: *Yahoo vs. Its Rivals*

IN 1994 WHEN THE World Wide Web first took off, your choices for searching the Net were pretty limited: Yahoo and, uh... Yahoo. The site remains a cornerstone of Web research, but as a directory it faces stiff competition from the Open Directory and from LookSmart.

All three are useful, but on balance, we like the Open Directory Project best. Spearheaded by Netscape, this project relies on more than 24,000 volunteer editors worldwide who have indexed nearly 2 million sites in over 200,000 categories. Any other search site can license Open Directory and use its database for their own search results, and many of them do: AltaVista, HotBot, Lycos, MetaCrawler, and some 100 other sites dip into it for links.

> “I use HotBot for general, quick searches. It has a simple, clean feel, and pages load quickly. When I need muscle, I use MetaCrawler for broad category searches. When I want to drill down, I use AltaVista for specific topics.”
>
> **—Kari Ujanen, San Francisco network consultant**

You might expect the quality of the Open Directory's results to be erratic, since the site relies on the work of volunteers. But in our tests, it produced well-organized lists of pertinent sites, with clear descriptions of each link. (In some cases, Yahoo offered only cryptic descriptions, or none at all.) And the www.dmoz.org site has a pure-search feel similar to that of Google, with no shopping links or other distractions.

The descriptions at LookSmart are also superior to those at Yahoo. But LookSmart seems to have fewer listings for business sites than either Open Directory or Yahoo—a problem if you're trying to track down an office design firm in Detroit. And though it's not a full-service portal, LookSmart sometimes lards ▶

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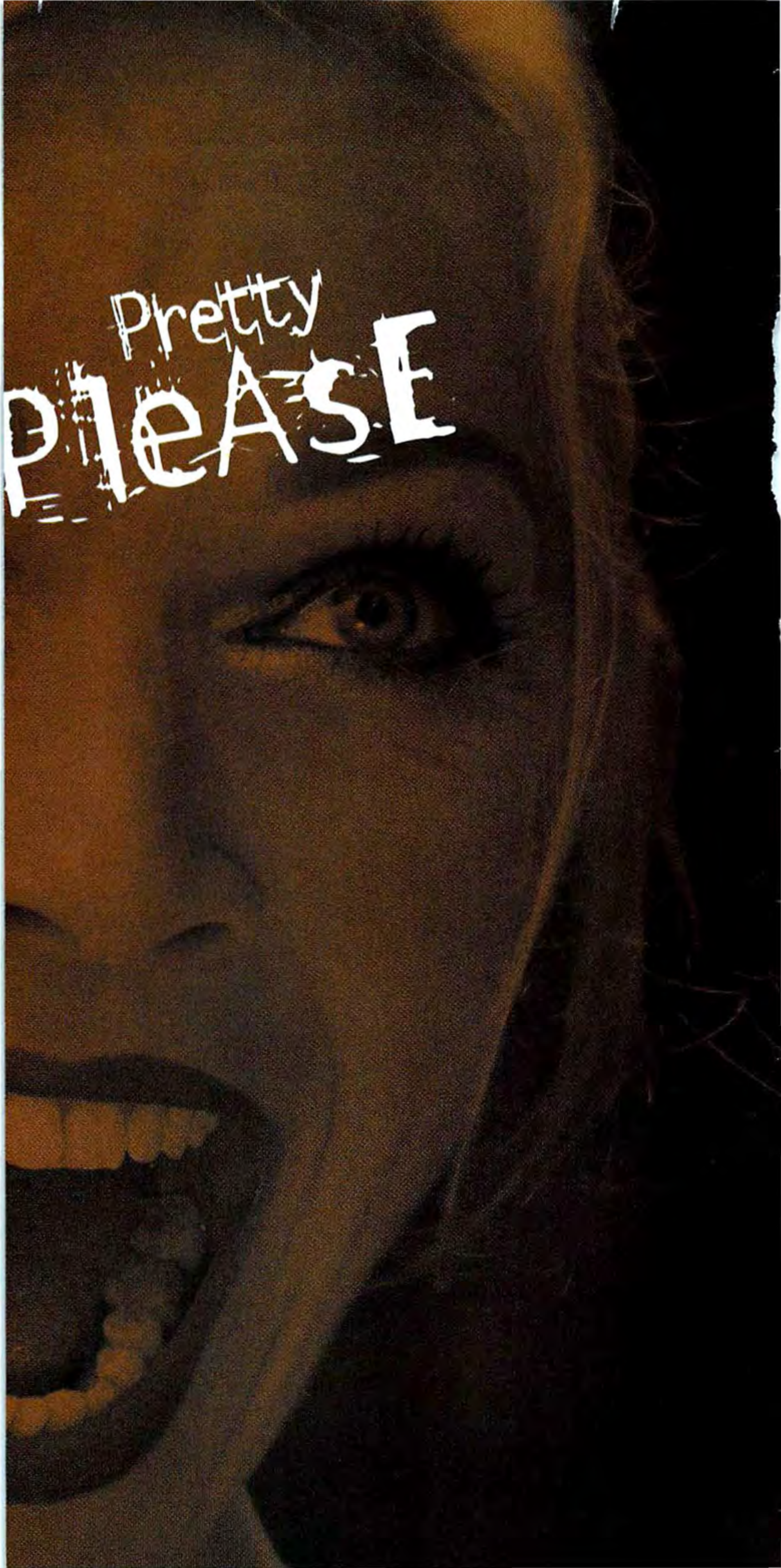
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Then post your query and wait for answers from site visitors ("experts") who claim knowledge in that subject.

Much of the time, this system delivers savvy, personalized assistance of a sort no search engine can. When we asked about buying a commuting bike, for instance, an AskMe expert shared his favorite urban biking links, and a seasoned cyclist at Abuzz provided a checklist to bring to the bike shop. Though response times from such sites are not instantaneous, we often received answers within an hour or two.

WHERE ARE THE EXPERTS?

IN THE END, we liked AskMe.com's easy interface and friendly, responsive community of experts best. But even there, some queries went unanswered, and pop-culture fans greatly outnumber literary historians. We asked one user who touted her expertise on Hemingway about the author's lost manuscript. She had never heard of it and then admitted she could name only two of his works.

When we asked the same question at LookSmart Live and Exp.com, we got accurate responses the same day. (At Exp.com, the answer cost us $3, but LookSmart performed just as well for free.) The lesson: No expert site has authorities on everything, so it makes sense to bookmark several sites.

In fact, that's essential advice for Web searching of all sorts: Don't depend on one site, or even two. Bookmark a bunch of them, get to know their strengths and limitations, and use them all. Even then, they won't always know the shortest route to the knowledge you seek: The Web is rife with detours and dead ends. But with the right sites to guide you, you'll spend less time driving aimlessly on the information highway.

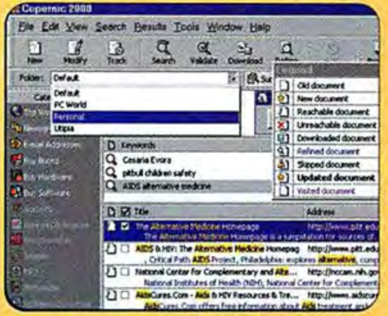
online *Find files from this article at www.fileworld.com/magazine. Kim Zetter is an associate editor, and Harry McCracken an executive editor, for* PC World; *Yael Li-Ron is a California-based technology writer. Liz Garone, a California-based freelance writer, also contributed to this article.* ■

SEARCH *utilities*

BESIDES using search sites on the Web, you can install search utilities on your hard drive. Here are three we recommend. (You can download free versions of the first two utilities at www.fileworld.com/magazine.)

Copernic 2000 4.5

THOUGH COPERNIC isn't a search engine per se, it raises online research to new heights by offering impressive organization and collaboration tools. You can save results to custom folders, e-mail results to others, eliminate broken links by clicking on the Validate button, and sort entries by relevance and other criteria. Like a metacrawler, the free version submits your query to dozens of search engines simultaneously. The Plus and Pro versions ($40 and $80, respectively) work with hundreds of general and specialized engines, and let you perform such advanced options as removing banner ads from results pages and (in the Pro version) running unattended, scheduled searches.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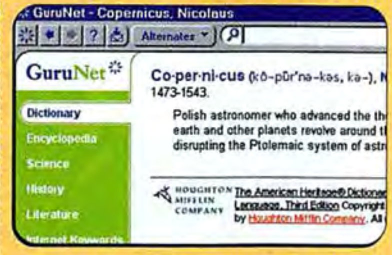
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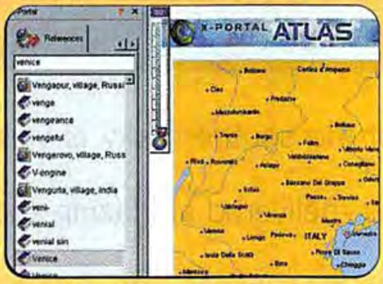
CLICK A WORD on your screen and GuruNet retrieves definitions and other info.

X-Portal

COMBINING THE TIMELINESS of online data and the speed of accessing 22 localized reference tools (dictionaries, encyclopedias, almanacs, and an atlas), X-Portal is ideal for the avid researcher. The $60 CD-ROM program needs about 200 megabytes of hard disk space; it integrates into Internet Explorer (version 4.01 or higher). X-Portal queries multiple search engines and its built-in reference works, then sorts results by relevance. The program weeds out many superfluous and not-so-relevant links from the list it presents to you at the end of the search. —Yael Li-Ron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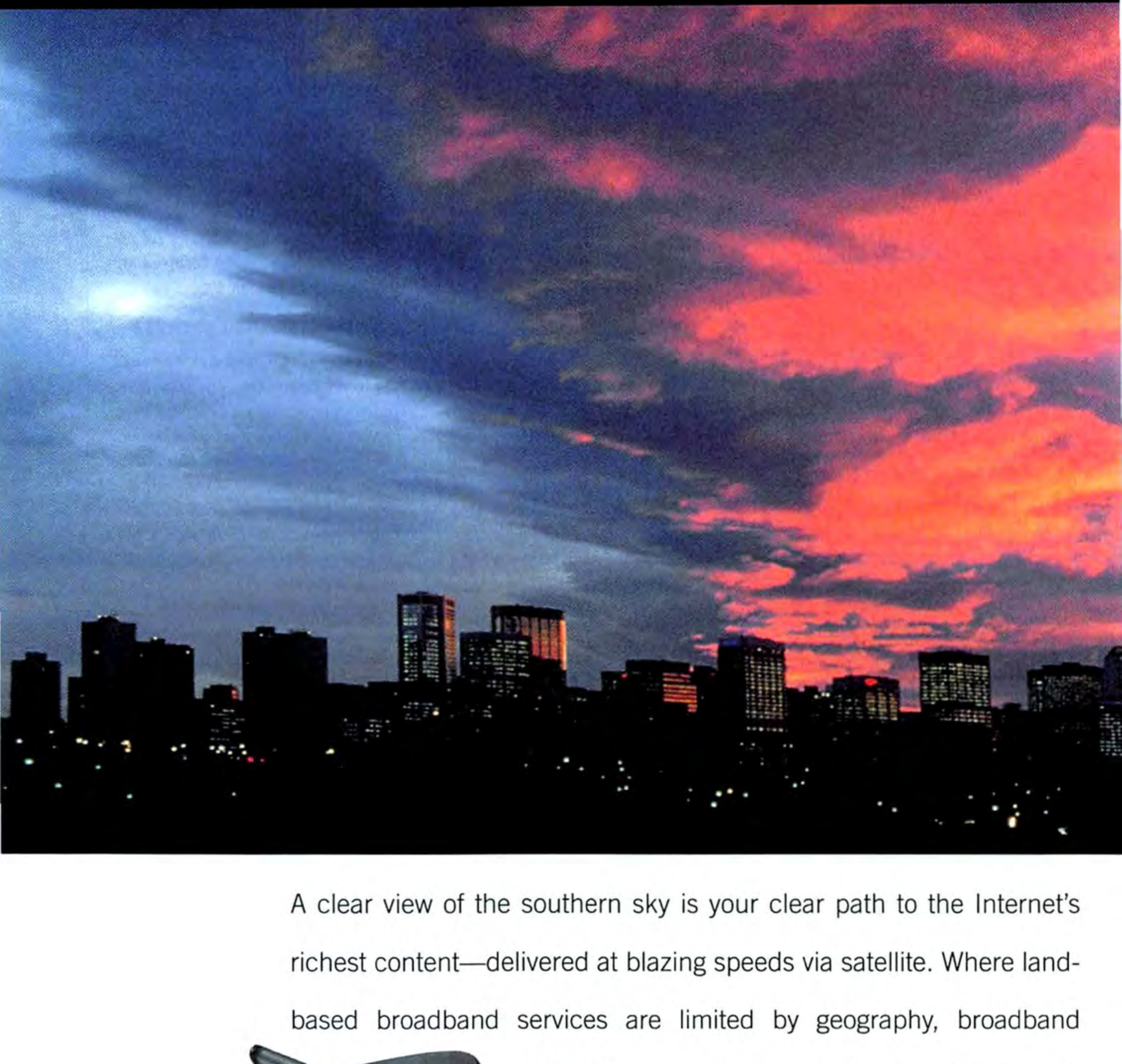

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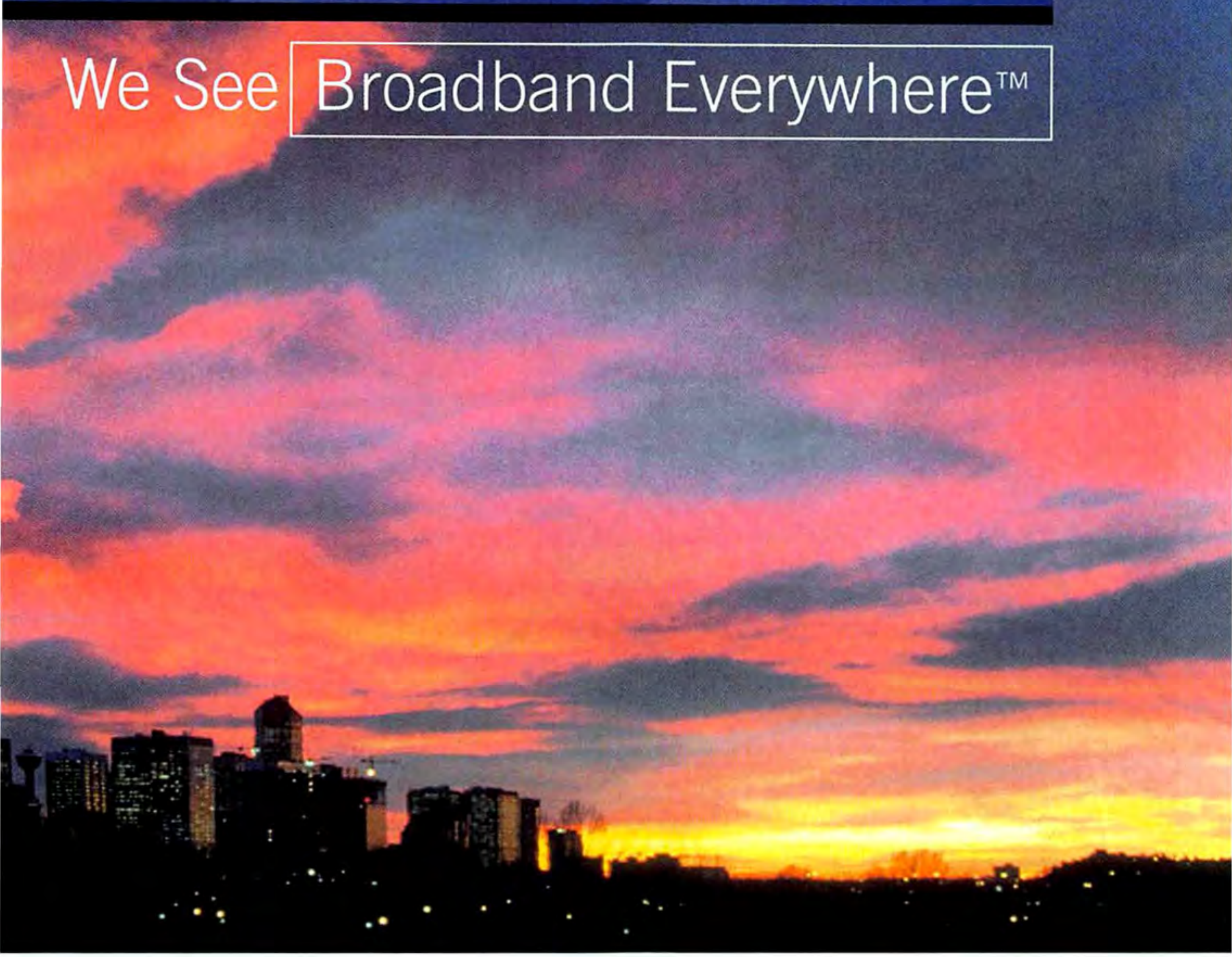

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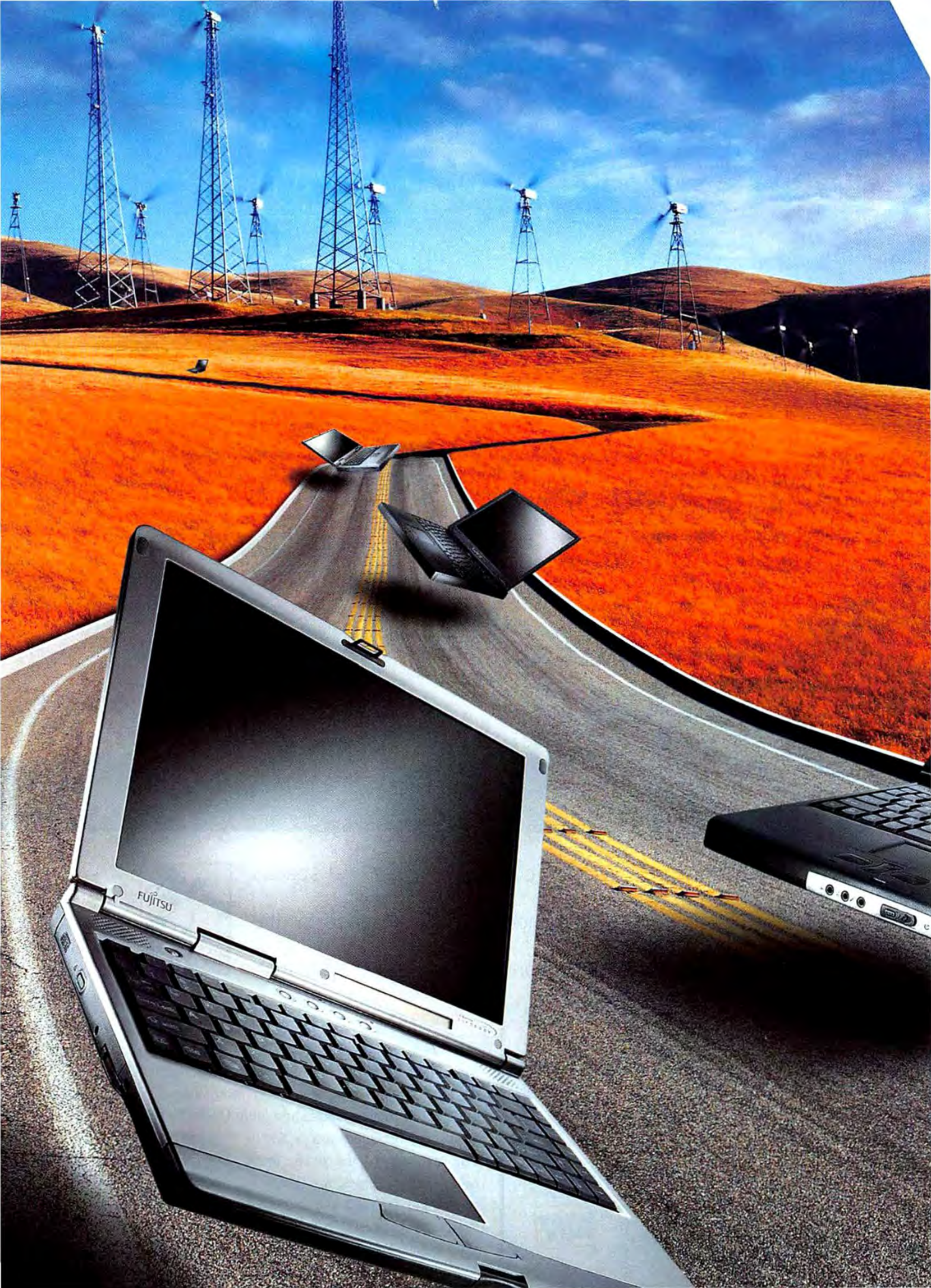
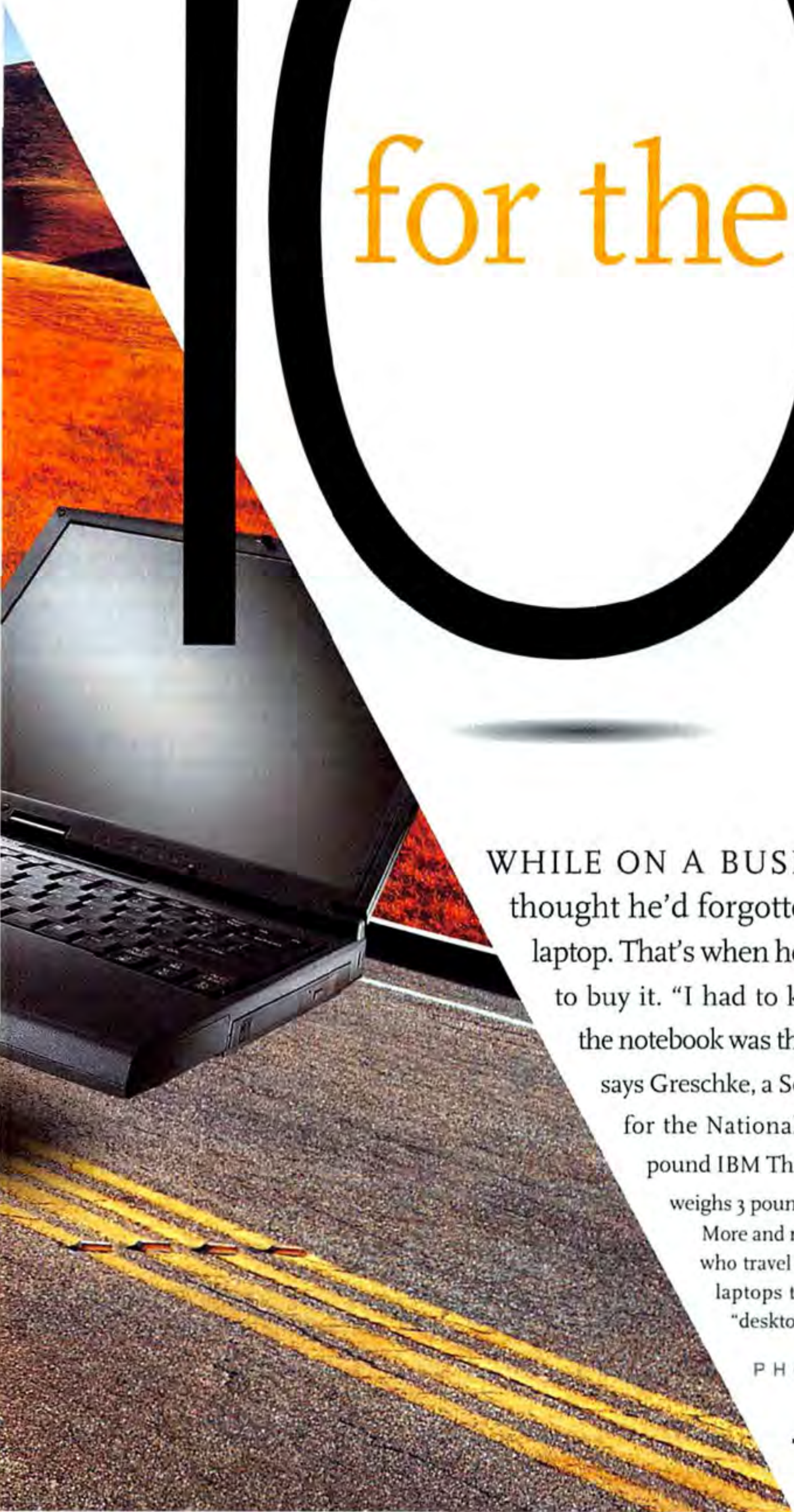

FUJITSU

10 for the Road

Fix that dent in your shoulder: Here are light, comfortable laptops with DVD-ROM or CD-ROM drives, the power to run business applications, and Oxnard-to-Orlando battery life.

BY CARLA THORNTON



WHILE ON A BUSINESS TRIP, Bob Greschke thought he'd forgotten to pack his new, lightweight laptop. That's when he knew he'd made the right decision to buy it. "I had to keep checking the bag to make sure the notebook was there—the bag was so light, it felt empty," says Greschke, a Socorro, New Mexico–based programmer for the National Radio Astronomy Observatory. The 5-pound IBM ThinkPad 600X that Greschke bought in April weighs 3 pounds less than his old Toshiba 730XCDT notebook. More and more corporate "road warriors"—men and women who travel often for business—are arming themselves with laptops that weigh considerably less than an all-in-one "desktop replacement" but still retain much of the lat- ▶

PHOTOGRAPHS BY MARC SIMON

ter's flexibility. Ken Dulaney of the Gartner Group, a San Jose–based technology consulting firm, says 60 percent of corporate laptops bought this year will be "two-spindle" notebooks (units that accommodate one internal drive in addition to the hard drive) like Greschke's ThinkPad.

Weighing approximately 4 to 6 pounds with a weight-saving module (or plastic insert) in place, these midsize travel notebooks strike a practical balance between weight and convenience. Each offers an internal bay where one drive goes; this bay can handle a CD-ROM, DVD-ROM, floppy disk, or other drive. The hard drive serves as the other spindle. Their design makes midsize notebooks more versatile than 3-pound superslim laptops like Sony's VAIO Z505, which has no internal bay. Meanwhile, they're significantly lighter than traditional all-in-one notebooks, which come with built-in CD-ROM and floppy drives (that is, three spindles).

Travel notebooks do suffer from several drawbacks that plague other small laptops. If you still use a floppy drive, you'll have to attach it via an external module or swap it with other devices in the expansion bay. Like superslims, some two-spindle notebooks lack such standard notebook connections as a built-in parallel port. And in general you'll pay from $300 to $500 more for the svelte design than for a heavier, three-spindle notebook.

But the latest two-spindle laptops have a lot to offer in return. They're small enough to pick up with one hand and carry in a briefcase, yet they sport 14.1-inch screens, 12GB hard drives, near-full-size keyboards, and cutting-edge processors. What's more, they work with an array of internal add-in devices, providing a level of flexibility most all-in-one notebooks lack. You can insert a second battery instead of a DVD-ROM drive, for instance, use

Best Buy
Setting a New Standard

WHAT'S THE FIRST word that pops into your head when we say "laptop"? *Anchor*? *Albatross*? If so, IBM's ThinkPad T20, our Best Buy travel notebook, can put the spring back into your step on those long jaunts between home and hotel. The ThinkPad offers everything a top-notch travel notebook should have, including good performance, strong battery life, easy-to-use electronic documentation, and a terrific 4.6-pound design that features a comfortable keyboard, a beautiful 14.1-inch screen, a 12GB hard drive, and a full set of built-in connections. Though the $3699 ThinkPad is a bit pricey for a Pentium III-700/550, it is worth every penny for travelers who can afford the best.

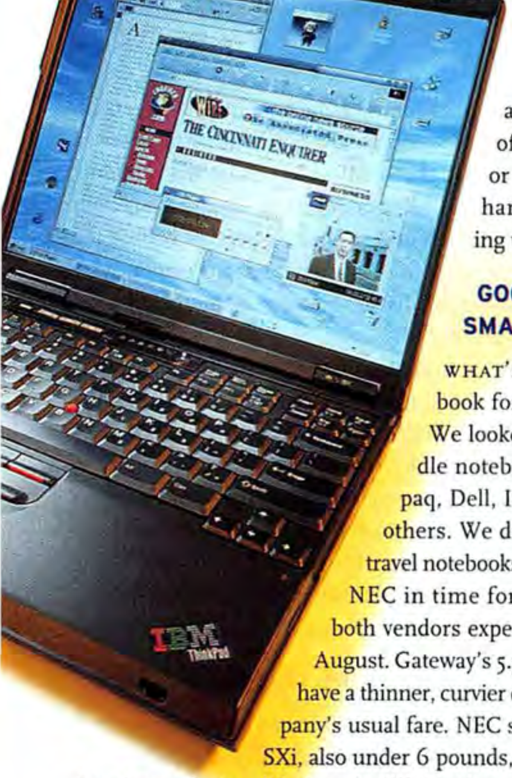
TRAVELING NOTEBOOKS

	PRODUCT	★ Overall rating	Street price (6/2/00)	PC WorldBench 2000 performance score (Faster ▶)	Base configuration
1	**IBM ThinkPad T20** 800/426-7255 x4751 www.ibm.com/pc/us/thinkpad	96	**Expensive:** $3699	Good 136	**Very good:** Pentium III-700/550, 14.1-inch active screen, eraserhead, 128MB of SDRAM, 12GB hard drive, Windows 98 SE
2	Acer TravelMate 602TER 800/733-2237 www.acer.com/aac	95	**Average:** $2799	Good 127	**Very good:** Pentium III-650/500, 13.3-inch active screen, touchpad, 128MB of SDRAM, 12GB hard drive, Windows 98 SE
3	Micron TransPort LT 800/642-7667 www.micronpc.com	95	**Expensive:** $3599	Very good 146	**Very good:** Pentium III-650/500, 13.3-inch active screen, touchpad, 128MB of SDRAM, 12GB hard drive, Windows 2000
4	HP OmniBook 6000 800/462-8947 www.hp.com	95	**Average:** $2999	Good 129	**Very good:** Pentium III-600/500, 14.1-inch active screen, touchpad, eraserhead, 64MB of SDRAM, 12GB hard drive, Windows 2000
5	Dell Latitude CPx J750GT 800/388-8542 www.dell.com	95	**Expensive:** $3502	Outstanding 153	**Very good:** Pentium III-750/600, 14.1-inch active screen, touchpad, eraserhead, 128MB of SDRAM, 12GB hard drive, Windows 2000
6	Chem USA ChemBook 8200B 800/866-2436 www.chemusa.com	91	**Inexpensive:** $2099	Good 127	**Good:** Pentium III-650/500, 13.3-inch active screen, touchpad, 128MB of SDRAM, 6.4GB hard drive, Windows 98 SE
7	Fujitsu LifeBook S-4510 877/372-3473 www.fujitsu-pc.com	90	**Inexpensive:** $2399	Satisfactory 101	**Good:** Pentium III-400, 12.1-inch active screen, touchpad, 64MB of SDRAM, 6GB hard drive, Windows 2000
8	Toshiba Tecra 8100 800/867-4422 www.buy.toshiba.com	89	**Expensive:** $3599	Good 133	**Very good:** Pentium III-700/550, 14.1-inch active screen, eraserhead, 128MB of SDRAM, 12GB hard drive, Windows 98 SE
9	Sony VAIO PCG-XG19 888/315-7669 www.sony.com/pc	87	**Expensive:** $3999	Good 128	**Very good:** Pentium III-650/500, 14.1-inch active screen, touchpad, 128MB of SDRAM, 18GB hard drive, Windows 98 SE
10	Compaq Armada M700 800/345-1518 www.compaq.com	86	**Very expensive:** $4588	Satisfactory 117	**Very good:** Pentium III-750/550, 14.1-inch active screen, eraserhead, 128MB of SDRAM, 12GB hard drive, Windows 98 SE
	Best Buy	Percent of overall rating ▶	Price: 10 percent	Performance: 15 percent	Base configuration: 5 percent

[1] Unless otherwise noted, all notebooks come with a lithium ion battery.

[2] Travel weight includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive. Minimum weight includes computer and media bay filled with weight-saver.

[3] Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.



a Zip drive instead of the floppy drive, or swap in a second hard drive for backing up data.

GOOD THINGS IN SMALL PACKAGES

WHAT'S THE BEST notebook for business travel? We looked at 10 two-spindle notebooks, from Compaq, Dell, IBM, Micron, and others. We didn't receive new travel notebooks from Gateway or NEC in time for testing, though both vendors expect to sell them by August. Gateway's 5.5-pound entry will have a thinner, curvier case than the company's usual fare. NEC says its new Versa SXi, also under 6 pounds, will be faster and have longer battery life than the SX it replaces.

Our ten contenders run the gamut in features, weight (from 3.7 to 6.2 pounds), and price (from $2099 to $4588). We tested performance and battery life and conducted hands-on evaluations of each unit to pick the ideal replacement for your old, shoulder-sagging ball-and-chain portable. And because these little laptops may be more vulnerable to breakage and thieves, we tell you how to protect them with insurance and security products.

To settle on a Best Buy travel notebook, we looked for the best combination of size, features, price, and performance. Our pick, the IBM ThinkPad T20, is the successor to IBM's popular ThinkPad 600 series of notebooks. The T20 sets a new standard for lightweight laptops by fitting a 14.1-inch screen into a 4.6-pound package. Equally impressive, the T20 achieves these numbers without skimping on features: It packs almost every standard item found in an all-in-one notebook—and then some. You get a 12GB hard drive; parallel, serial, and USB ports; two PC Card slots; and built-in network and modem jacks. The T20 even manages to squeeze in such features as the ThinkLight LED, which lights up the keyboard for typing in dark rooms, and the new UltraPort Bluetooth connection, which enables the laptop to communicate with a mobile phone or other wireless devices.

Not surprisingly, this well-designed IBM travel machine costs plenty: With a Pentium III-700/550 SpeedStep processor, the $3699 T20 carries the third-highest price tag here. But if money is no object, look no further. On performance and features, the T20 earns its title as the crème de la crème of travel notebooks.

For itinerant folk on tighter budgets, we recommend Acer's $2799 TravelMate 602TER. It weighs about the same as the ThinkPad with its bay filled (with a standard CD-RW drive), and at only 11.7 inches wide and 9.3 inches deep it occupies less ▶

FEATURES COMPARISON

Extra features [1]	Design and ease of use	Battery life (hours:min)	Travel weight/ minimum weight (lb) [2]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Good: 6X DVD-ROM drive, V.90 modem	**Very good:** newest ThinkPad adds Bluetooth port, network jack, and one-button access to a great electronic manual	**Good:** 3:21	**Average:** 6.5/4.6	Good	Good/ Fair	24/7, toll-free	3/3
Very good: 4X/4X/20X CD-RW drive, V.90 modem	**Very good:** LAN-ready lightweight with ultrasoft, quiet keyboard replaces standard floppy with CD-RW drive	**Very good:** 4:21	**Average:** 6.7/4.7	Fair	Good [3]/ Fair	24/7, toll-free [4]	1/1
Good: 6X DVD-ROM drive, V.90 modem, Microsoft Office 2000 Small Business Edition	**Average:** lightweight travel laptop can use optional $20 USB floppy drive	**Satisfactory:** 2:45	**Average:** 6.1/5.4	Good	Good [3]/ Fair	24/7, toll-free	Varies [5]/1
Good: 12X-24X CD-ROM drive, V.90 modem	**Excellent:** Bluetooth-ready; dual pointing devices; lots of add-in options available, including security Smart Card	**Good:** 3:30	**Average:** 6.8/6.0	Good	Good [3]/ Poor	24/7, toll call	3/3
Good: 10X-24X CD-ROM drive, V.90 modem	**Excellent:** dual pointing devices and a smorgasbord of possible add-ins highlight travel notebook's flexibility	**Good:** 3:15	**Very heavy:** 7.6/6.1	Good	Good/ Outstanding	24/7, toll-free	3/3
Good: 12X-24X CD-ROM drive, V.90 modem	**Average:** accommodates fewer add-ins than other travel notebooks and requires extra cable for built-in modem	**Very good:** 4:13	**Average:** 6.3/5.0	[6]	Fair [3]/ Fair	24/7, toll-free [7]	1/3
Good: 12X-24X CD-ROM drive, V.90 modem, Microsoft Works 2000	**Very good:** lightest laptop here; relies on bundled port replicator for some standard connections	**Satisfactory:** 2:41	**Very light:** 5.1/3.7	Good	Fair [3]/ Fair	24/7, toll-free	1/1
Good: 6X DVD-ROM drive, V.90 modem	**Very good:** modular bay takes any one of eight different devices	**Good:** 3:03	**Very heavy:** 7.7/5.4	Good	Fair/ Outstanding	24/7, toll-free	3/3
Good: 4X DVD-ROM drive, V.90 modem	**Average:** includes IEEE 1394 port, unique ventilating flap, and programmable JogDial for launching applications	**Satisfactory:** 2:21	**Very heavy:** 7.9/6.2	[6]	Good [3]/ Good	24/7, toll-free [4]	1/1
Good: 8X DVD-ROM drive, V.90 modem	**Average:** somewhat cramped keyboard and plain looks, but full set of connections and good sound	**Good:** 3:25	**Heavy:** 7.3/5.1	Fair	Fair/ Good	24/7, toll-free	3/3
Extra features: 10 percent	Design and ease of use: 10 percent	Battery life: 10 percent	Weight: 15 percent	Reliability: 15 percent	Support and warranty: 10 percent		

[4] For first year only.

[5] Five years on CPU and main memory, one year on other parts.

[6] Insufficient data to give a rating.

[7] Toll-free during regular business hours only.

tray-table space. The TravelMate includes fewer features than the ThinkPad: It has a smaller (13.3-inch) screen, a single PC Card slot, and a miniconnector that uses a split cable instead of built-in ports to support parallel and serial connections.

Still, this handsome laptop clobbered the ThinkPad and most other units we tested in battery life, lasting 4.3 hours on one charge, more than an hour above average. And the Acer has the best keyboard in the group, topping even the ThinkPad. Except for their smaller-than-average function keys, both keyboards are easy to type on, but the TravelMate is much softer and quieter, a feature your next airplane seatmate might appreciate. The TravelMate is the only notebook here that comes standard with a CD-RW drive, which Acer pitches as a floppy drive replacement.

PORTABLE WORKHORSES

SEVERAL OTHER NOTEBOOKS in our roundup might make a good match with your mobile lifestyle, depending on your particular computing needs. Peripatetic number crunchers will be happy with Micron's 5.4-pound TransPort LT, our third favorite, thanks to its polished, lightweight design. Though it is less compact than the ThinkPad and almost as pricey, the $3599 TransPort LT blew past every notebook other than the Dell Latitude CPx J750GT in our speed tests. Running Windows 2000 Professional, the Micron turned in a PC WorldBench 2000 score of 146—making it the speediest system we saw with a PIII-650/500 and 128MB of RAM. Another plus: The TransPort LT is the only notebook we tested that shipped with Microsoft Office 2000 Small Business Edition.

Professionals whose job requires them to take digital snapshots on the road could find happiness with the 3.9-pound Fujitsu LifeBook S-4510. At a modest 11.3 inches wide and 8.9 inches deep (not much bigger than a standard sheet of typing paper) and a scant 1.2 inches tall, the diminutive LifeBook may be the smallest laptop capable of holding an internal device. A small digital camera ($229) is among the add-ins the Fujitsu can carry inside its slim expansion bay.

The LifeBook cuts many of the same corners as a superslim laptop, however, with fewer standard notebook connections, a narrower keyboard, and the smallest screen in this roundup. Available only with Intel's PIII-400 processor designed especially for subnotebooks, the LifeBook lagged 24 percent behind the group average in performance. Still, it comes well equipped for its size, sustained a respectable 2.7-hour life in our battery tests, and costs a reasonable $2399.

The Pentium III-650/500–equipped ChemBook 8200B offers budget minders a slightly larger comfort margin than the LifeBook, at a bargain-basement price ($2099). The ChemBook is every bit as compact as the Acer TravelMate (measuring 11.7 inches wide by 9.3 inches deep), almost as frugal with a battery (chugging along for 4.2 hours on one charge), and a terrific performer for the money. With all this going for it, you may not mind its plain looks, springy keyboard, and lack of a built-in modem jack (the jack sits on the end of a separate cable).

ACCOMMODATING DESIGN

TO AVOID THE EXTRA WEIGHT, most travel portables don't offer dual pointing devices, but such a combo is worth considering if you buy notebooks for a workforce that divides its loy- ▶

Stack 'Em Up

THIN DOESN'T ALWAYS MEAN LIGHTWEIGHT or limited in expandability. Compared with an all-in-one desktop replacement laptop (the NEC Versa LXi at the bottom of the stack), these travel notebooks manage to fit a media bay into a compact case.

	Weight[1] (pounds)	Thickness (inches)
Compaq Armada M700	5.1	1.1
Fujitsu LifeBook S-4510	3.7	1.2
Acer TravelMate 602TER	4.7	1.3
Micron TransPort LT	5.4	1.3
HP OmniBook 6000	6.0	1.4
Chem USA ChemBook 8200B	5.0	1.4
Toshiba Tecra 8100	5.4	1.4
IBM ThinkPad T20	4.6	1.5
Sony VAIO PCG-XG19	6.2	1.5
Dell Latitude CPx J750GT	6.1	1.7
NEC Versa LXi	*8.0*	*2.0*

[1] Weight includes computer and media bay filled with weight-saver.

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alties between the touchpad and the eraserhead. Of the ten laptops we looked at, only HP's $2999 OmniBook 6000, a Pentium III-600/500, and Dell's $3502 Latitude CPx J750GT, a PIII-750/600, come with both pointing devices. Though either the HP or the Dell would make a serviceable corporate notebook, we slightly preferred the OmniBook's design overall. It takes up more desk space than the Latitude, at 12.4 inches wide by 10.4 inches deep, but it weighs slightly less, a reasonable 6 pounds including CD-ROM drive (HP doesn't provide a weight-saving module). It performed well in our speed tests, ran for 3.5 hours on one battery charge, and includes both network and modem connections. And like the ThinkPad, it comes Bluetooth-ready.

Despite being the fastest unit in the group, the Latitude does not have the best design. After the Sony VAIO PCG-XG19, it is the heaviest notebook we tested, tipping the scales at 6.1 pounds with a weight-saving module in place. And Dell is the only vendor that doesn't offer its notebook with built-in modem and network connections—a drawback for companies that don't want to hassle with PC Cards or docking stations.

DOLLARS AND SENSE

THE THREE NOTEBOOKS that landed at the bottom of our list—Toshiba's $3599 Tecra 8100, Sony's $3999 VAIO PCG-XG19, and Compaq's $4588 Armada M700—are overpriced for what they offer. The Tecra 8100 is a reasonable choice for Toshiba-standardized companies, because it performs well and offers a big, comfortable, eraserhead-equipped keyboard and a 14.1-inch active matrix screen. But the ThinkPad, another eraserhead-equipped notebook, provides a 14.1-inch screen in a smaller, lighter package for only $100 more.

With its built-in IEEE 1394 port, 18GB hard drive, and truckload of Sony software for digital video editing, the funky purple-and-gray VAIO PCG-XG19 may appeal to video pros looking for a midsize laptop with plenty of storage. (We know of only two other notebook vendors that offer IEEE 1394 connections: Gateway, with its Solo 9300XL; and Fujitsu PC, with its new LifeBook C Series notebook, which we'll cover in October's *Top 15 Notebooks.*) The PCG-XG19 also has a ventilating flap. Located on the bottom of the notebook, the flap automatically lifts to provide ▶

Compromises

How to Live With Just One Bay

A LIGHTWEIGHT TRAVEL notebook can spell relief for tired shoulders, but its single expansion bay and other limitations can take some getting used to. Here are some tips to ease the transition from an all-in-one notebook to a travel model.

- Make sure any notebook you consider comes with hot-swapping software. This feature lets you exchange one device in the expansion bay for another without restarting the notebook.
- Instead of purchasing a Zip drive, DVD-ROM drive, or other add-in as an internal device from the notebook company, consider a third-party external drive that works with a PC Card or USB connection. External drives eliminate drive swapping and allow you to use more devices at the same time.
- If your notebook does not have a full set of built-in legacy ports, make your next printer or mouse a USB model. The Acer TravelMate 602TER, the Fujitsu LifeBook S-4510, and the Sony VAIO PCG-XG19 all require you to use easy-to-lose extra cables or other equipment in order to add a parallel port or other legacy connection. Only the TravelMate comes with two USB ports.
- Prefer or require floppies over more capacious media? You'll be happiest with a notebook that adopts floppy drive-friendly design. Chem USA's ChemBook 8200B, Toshiba's Tecra 8100, and Sony's VAIO PCG-XG19 offer the best configuration for floppy fans: Each ships with an internal floppy drive that can also attach externally to a connection other than the notebook's parallel port. This allows you to print, access the floppy drive, and use another device in the bay simultaneously. HP and Micron offer internal floppy drives only: To establish an external connection, HP makes you pay $43 extra for a parallel-port cable, and Micron requires $20 for its external USB caddy. Conversely, the Fujitsu LifeBook's floppy drive works only as an external device.
- Unwillingly to accept a travel notebook's compromises? Opt for a moderate-weight all-in-one. But these are rare and have fewer nice features than a typical two-spindle notebook that weighs the same. The best we've seen is Compaq's $1799 Armada V300, which comes with a built-in floppy drive, plus a modular bay that can accept one of five devices, including a second battery. With a weight-saver module, the V300's weight drops from 6.3 pounds to about 5.5—but the notebook's screen measures only 12.1 inches.

FLOPPY-FRIENDLY: The Toshiba Tecra 8100.

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further heat dissipation when you open the notebook. And the keyboard comes with Sony's Jog Dial device—a thumbwheel located on the side of the keyboard, which you can set up to launch applications. But the VAIO is pricey, heavy, burns through batteries much too quickly, and lacks standard parallel, serial, and PS/2 connections.

Unless you adore Compaq notebooks, don't buy the $4588 Armada M700. The thinnest notebook of the bunch at a mere 1.1 inches tall, the Armada costs the most and performed worst among notebooks with SpeedStep processors. To add insult to larceny, its wide case holds one of the most cramped keyboards.

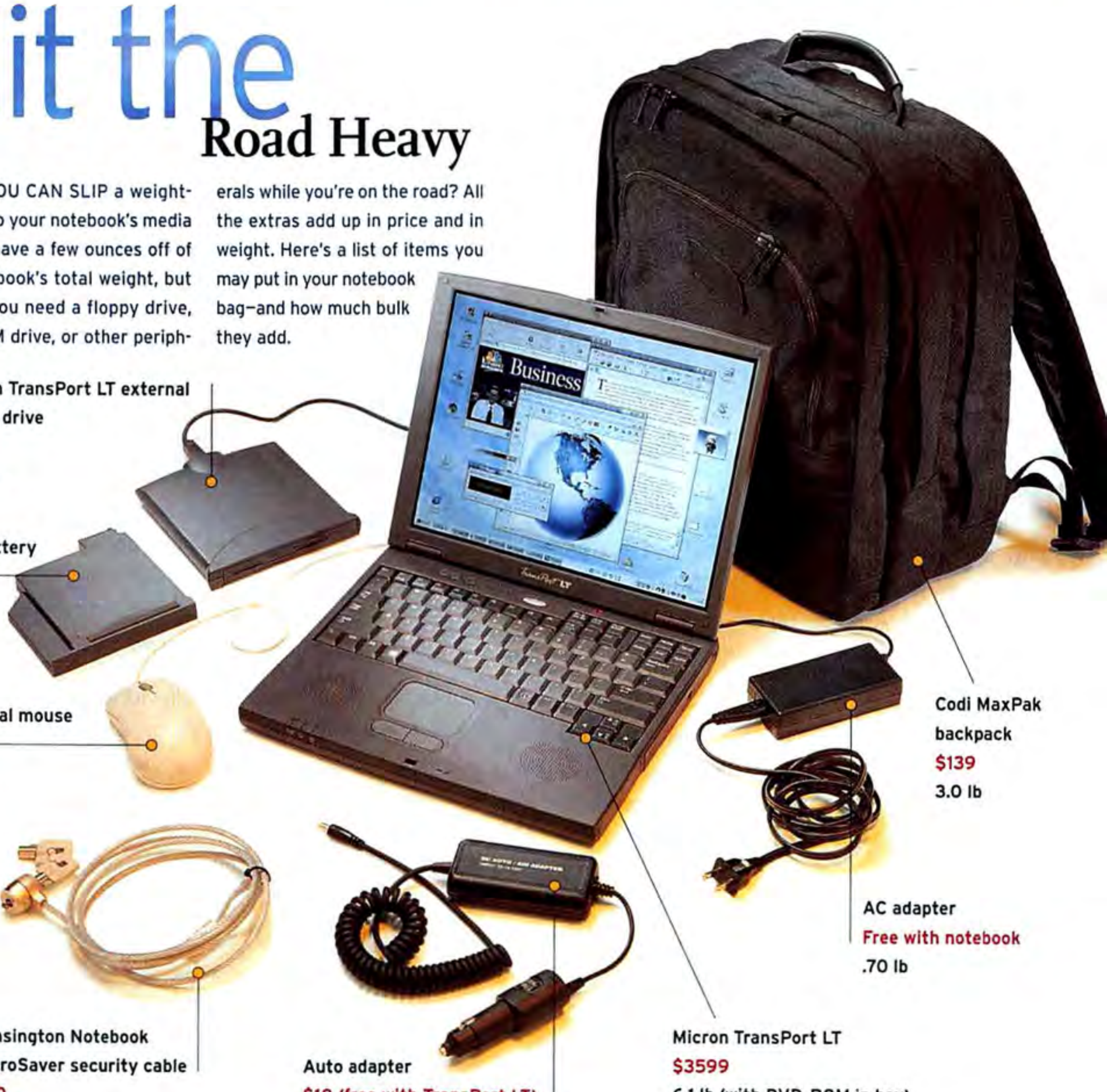
DODGING ON-THE-ROAD DANGERS

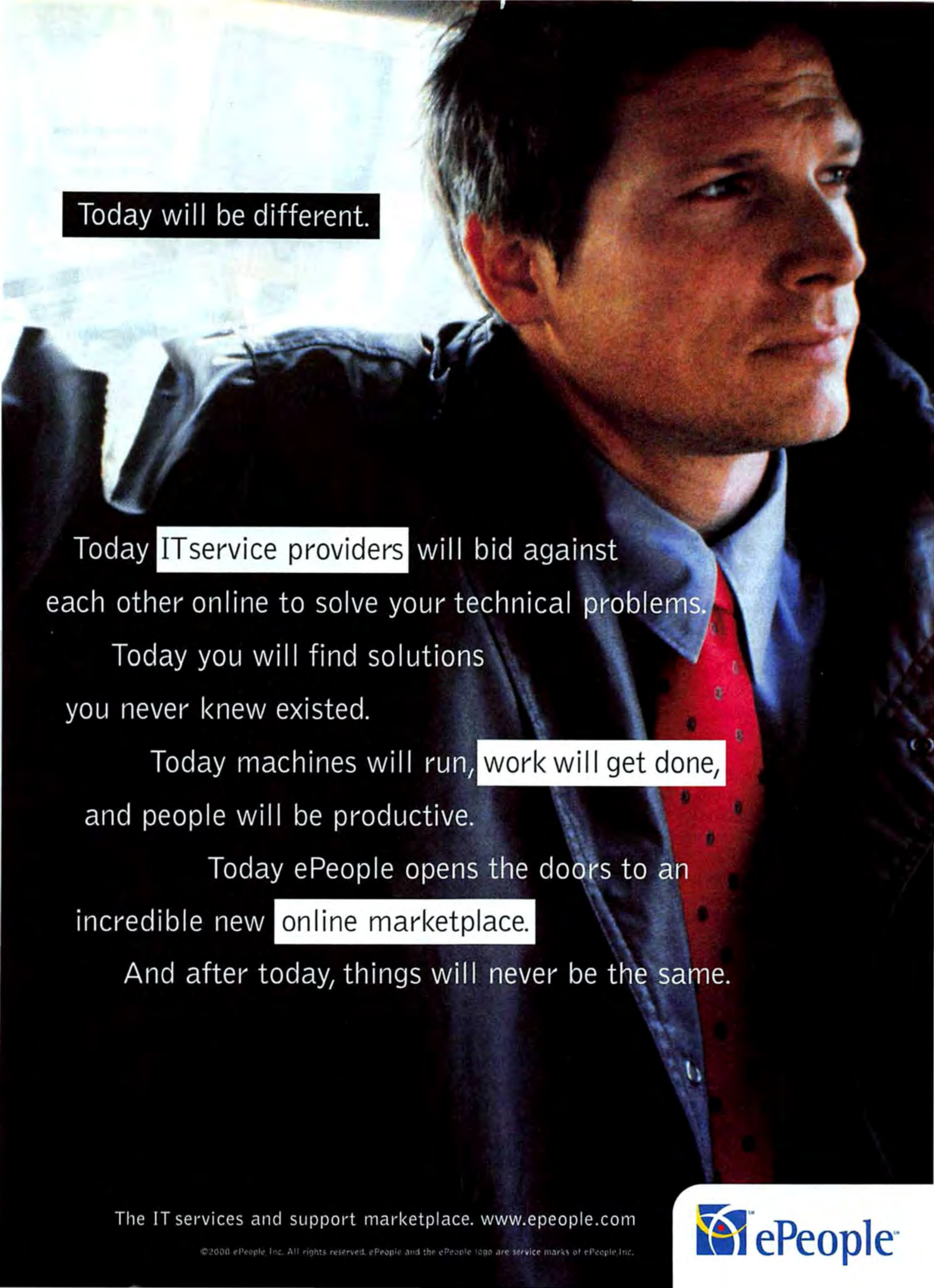
OVERHEAD BINS with weak latches. Bustling airports full of covetous strangers. Coffee cups fanatically devoted to Murphy's Law. It's a dangerous world out there for notebooks, especially small, attractive ones that rely on thin cases to protect their screens and delicate circuitry. Standard warranties cover parts and labor for manufacturing defects, but not for theft, fire, or other unexpected disasters. Among the companies whose products we've reviewed here, only Fujitsu covers accidental drops and spills on the keyboard in its standard warranty. Toshiba and Dell offer supplemental insurance to cover such accidents. Toshiba's SystemGuard plan costs $169 for a three-year policy. Dell's CompleteCare plan also costs $169 for three years and is available everywhere but Florida, Montana, and New Mexico.

Fortunately, you can easily create your own laptop safety net with common sense and a judicious selection of security products. First, choose a carrying case that both cushions and camouflages the notebook. Most laptop vendors sell padded sheath cases for between $50 and $100; these in turn can go into larger packs to disguise your cargo. For holding your laptop, paper- ▶

Hit the Road Heavy

SURE, YOU CAN SLIP a weight-saver into your notebook's media bay to shave a few ounces off of the notebook's total weight, but what if you need a floppy drive, DVD-ROM drive, or other peripherals while you're on the road? All the extras add up in price and in weight. Here's a list of items you may put in your notebook bag—and how much bulk they add.


Micron TransPort LT external floppy drive $99 .69 lb
Second battery $99 .80 lb
External mouse $15 .31 lb
Codi MaxPak backpack $139 3.0 lb
AC adapter Free with notebook .70 lb
Kensington Notebook MicroSaver security cable $40 .38 lb
Auto adapter $10 (free with TransPort LT) .39 lb
Micron TransPort LT $3599 6.1 lb (with DVD-ROM in bay)
Business



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BLUETOOTH-READY: The HP OmniBook 6000

BUILT-IN IEEE 1394 PORT: The Sony VAIO PCG-XG19

DUAL POINTING DEVICES: The Dell Latitude CPx J750GT

work, and other important stuff, we recommend a sturdy backpack like Codi's 3-pound MaxPak, which can accommodate a second notebook, a portable printer, and all of your CDs, floppies, and paper files.

As soon as you've purchased your new laptop, write down its serial number, so the police can trace it if necessary. Get in the habit of locking the hard drive with a password; a thief would have to send the notebook back to the manufacturer to unlock the hard drive. Three of the notebooks we reviewed—Dell's Latitude, Micron's TransPort LT, and Toshiba's Tecra 8100—have removable hard drives that you can stash in your hotel's safe. If your laptop carries sensitive information, consider downloading and installing a free software encryption package for e-mail, files, folders, or entire hard drives from Web sites like www.freewarehome.com.

For times when your laptop will be in plain view, consider buying a security cable. Almost all notebooks, including our roundup units, come with security slots that accommodate a steel cable—such as the $40 Kensington Notebook MicroSaver cable sold by Kensington Technology Group—for securing your notebook to a desk leg (www.kensington.com).

If someone does steal your notebook, your odds of recovering it will be dramatically higher if you installed a homing device on it ahead of time. Absolute Software's CompuTrace program (www.computrace.com) sits hidden on the hard drive and can't be erased by reformatting. When you notify CompuTrace, the company begins monitoring signals sent from the software, which transmits an electronic serial number and the phone number it's calling from every time the thief goes online. With your permission, CompuTrace then works with police to corral the suspect. The package and one year of coverage cost $50.

Blow the whistle on notebook hijackers with TrackIt (www.trackitcorp.com), a $49 antitheft product consisting of a receiver inside the notebook and a small transmitter unit the owner carries. If a receiver-equipped notebook moves more than 40 feet away from the transmitter, an alarm on the notebook sounds.

The ultimate protection against losing your notebook to theft, fire, spilled coffee, or even a computer virus, is insurance. For a reasonable $50 to $75 a year, you can pick up a rider to your existing homeowner's or renter's insurance that covers computers. Policies can differ greatly, so interview several providers and carefully compare their offerings. For instance, few policies designed for homeowners or renters cover accidental breakage or reimburse the full purchase price. In contrast, however, companies that specialize in insuring computer equipment, such as South Coast Metro Insurance Brokers (www.coveragelink.com), commonly offer those types of coverage. (See this month's *Home Office* column on page 47 for more tips on how to keep your laptop safe.)

NEVER TOO THIN

THE PROBLEM with buying any computer is that something a little faster and with a few more features always lurks just around the corner. With travel laptops, weights keep dropping. That's why Bob Greschke is now eyeing the ThinkPad T20, which not only comes with a bigger screen than his now-obsolete ThinkPad 600X, but also weighs 8 ounces less.

"This weight stuff becomes an obsession," he admits sheepishly. "Who cares if a new notebook is faster or has a bigger screen? It's half a pound lighter!"

For more information about the notebooks discussed in this review, visit www.pcworld.com/sep00/travel_notes. Carla Thornton regularly covers notebooks for PC World. *Testing was conducted by Robert James and Thomas Luong of the PC World Test Center.* ■

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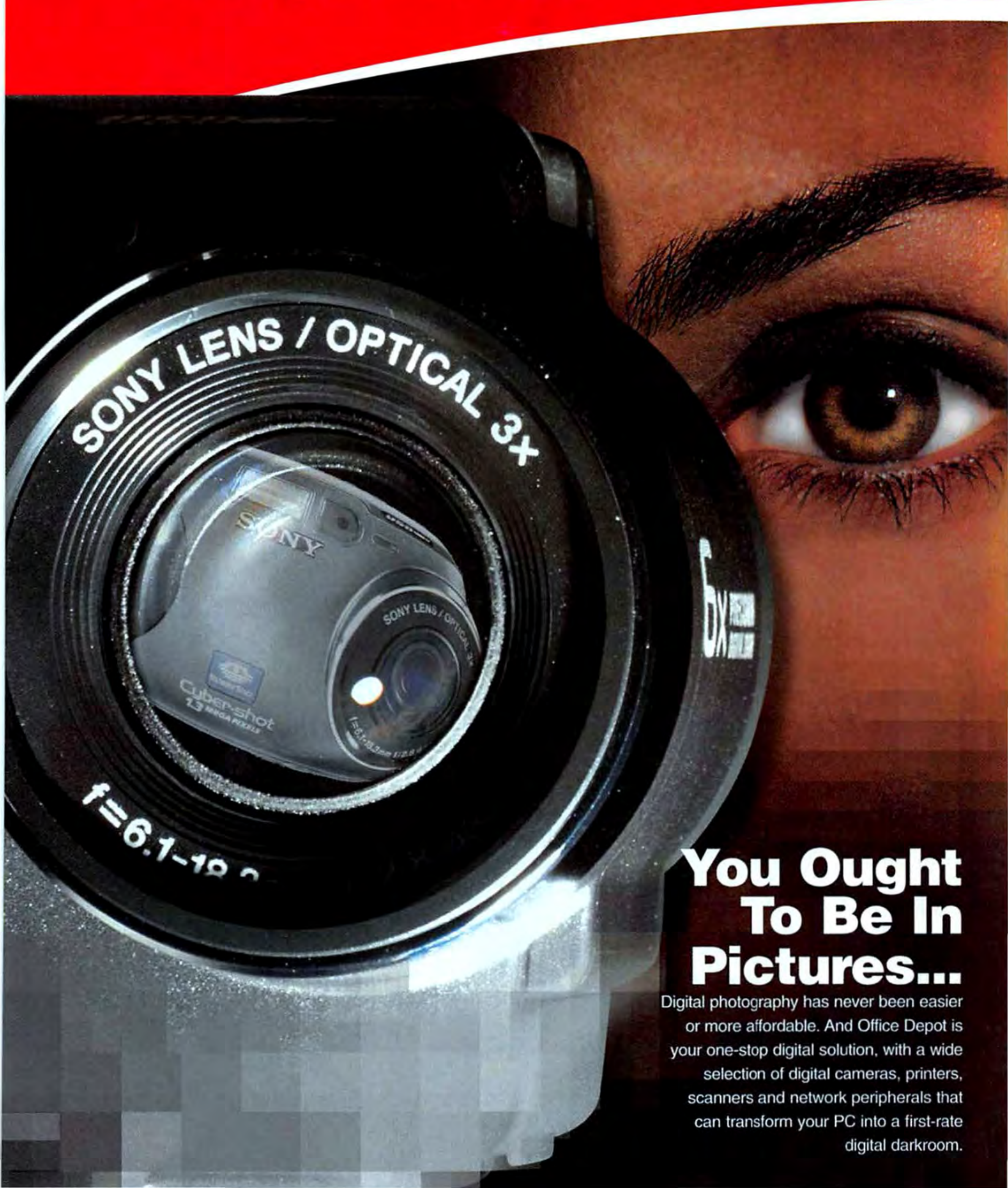
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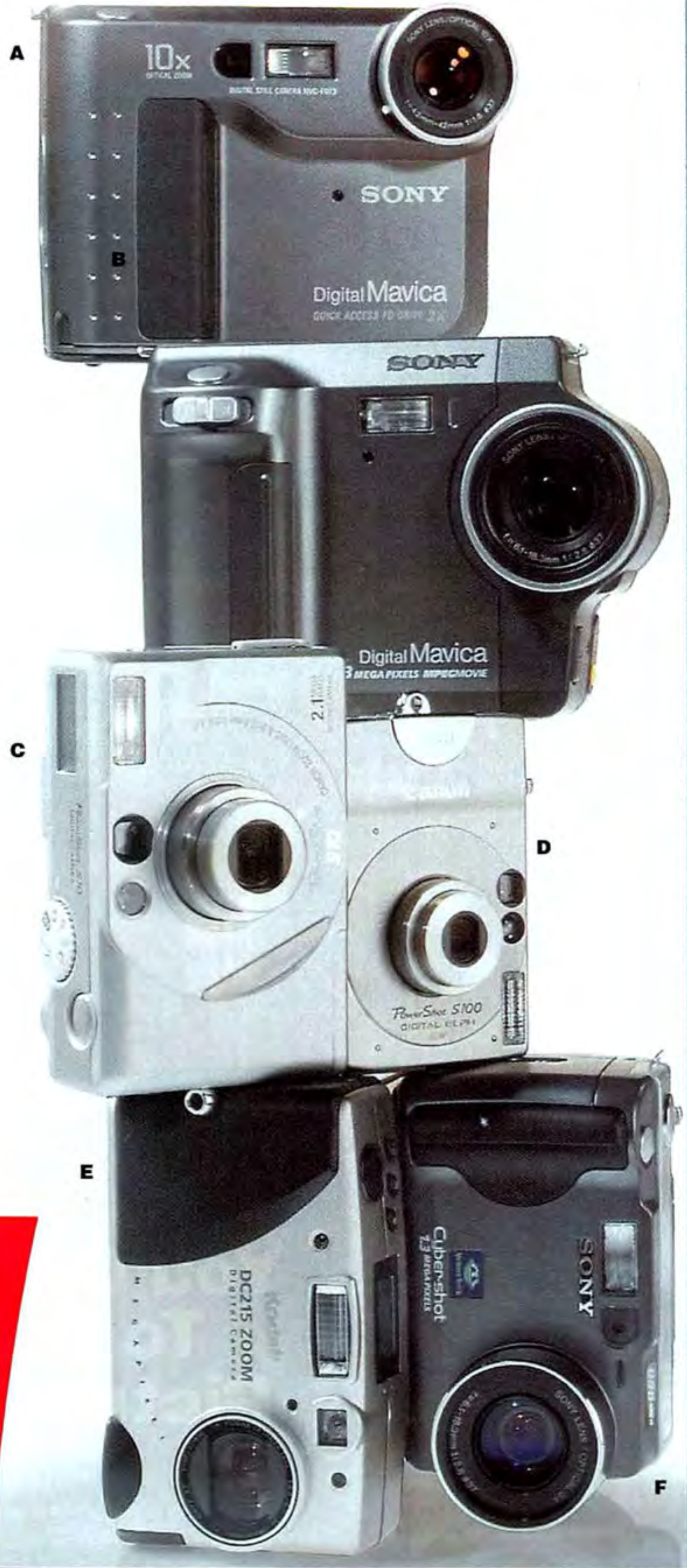

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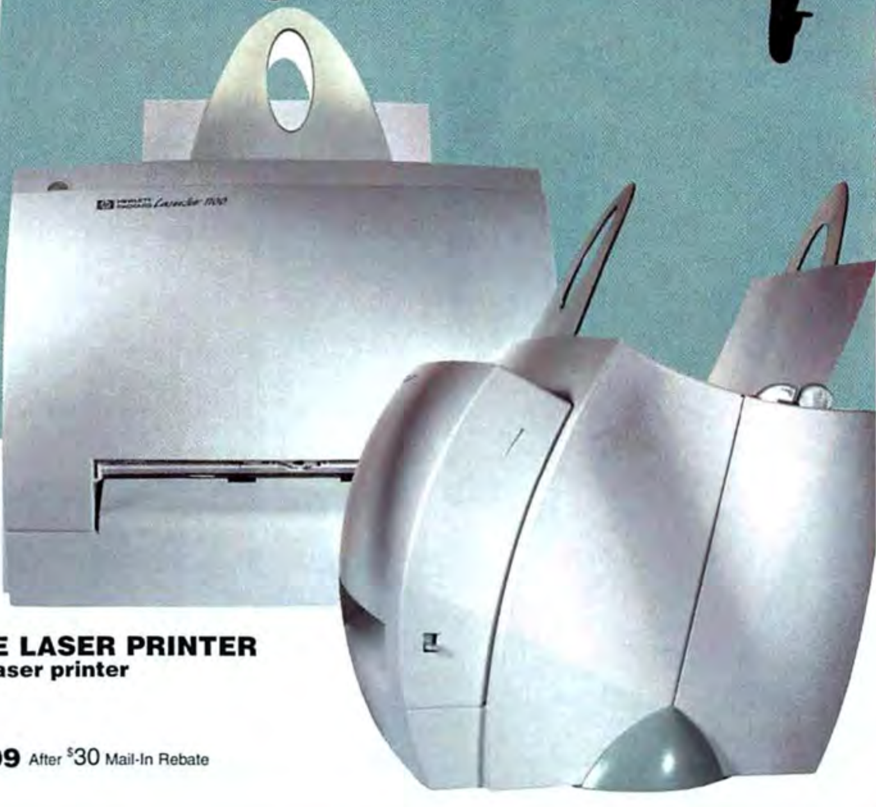

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its results with ridiculously off-topic shopping links. Do a search for *Buddhist philosophy*, for instance, and LookSmart asks if you want "Local sales & coupons for 'Buddhist philosophy' at ShoppingList" before you check its search results.

No matter which directory you choose, all have one advantage over search engines: They're browsable, so you can wander through a series of related topics laid out in the site's menu. For instance, click on "Sports" at LookSmart and you get a drill-down list of topics like Baseball, Olympics, and Motor Sports. Click on "Motor Sports," and you can refine the search to a subtopic such as Formula One Racing or NASCAR.

Or suppose you need a company to make a sign for your Los Angeles–based business, but you know of only one supplier. You can perform a reverse query by running a directory search on the name of the company you know. Yahoo, for instance, will list the category that the company falls under ("Los Angeles> Business and Shopping>Business to Business>Signage"). Click on that category, and you'll get a list of sign manufacturers in LA. This approach can help you track down sites more quickly than you would by guessing at keywords.

Metasearchers: *Strength in Numbers?*

IT'S BOUND TO HAPPEN: AltaVista has a link to exactly the Web site you're looking for. But you're searching at Google, which doesn't know that particular site from Adam.com. Enter metasearch engines (also called metacrawlers). Instead of maintaining their own Web indexes, these sites call on other engines and directories each time you issue a query. Most metasearchers combine results, weed out duplicates, and present you with more links than you'd get if you confined your search to a single engine.

In the early days of the Web when no single search engine had indexed more than a few million pages, metasearchers were essential. Now AltaVista, Google, and other engines boast indexes of hundreds of millions of pages and let you comb a significant percentage of the Web all by themselves. Still, the best metasearch engines are worth trying, especially at times when your favorite single-engine search site strikes out. Unfortunately, metasearchers often fail to match the relevance of Google—probably because it's so tough to mesh links from disparate sites coherently.

GOOD *lookin'*

TOP SEARCH TIPS

1 **BE SPECIFIC.** Search engines work better when you use multiple keywords that are unlikely to pop up on irrelevant pages. The string "armstrong nasa apollo moon landing" will target your search far better than any one of those words alone.

2 **READ THE INSTRUCTIONS.** Every site has its own syntax. Entering a proper query can mean the difference between finding what you're after and being deluged by irrelevant links.

3 **GO BOOLEAN.** Some sites will permit to you enter Boolean-logic queries such as "Moe AND (Curly OR Larry) AND NOT Shemp." If you learn the lingo, you'll be able to enter searches with pinpoint precision.

4 **GET ADVANCED.** Many engines come with an advanced search page offering additional query types and sorting options. These are especially helpful when a simple search bombards you with links.

5 **IF AT FIRST YOU DON'T SUCCEED...** Try another search site. Keep several of them bookmarked, and try out new contenders from time to time.

6 **SAVE PAGES.** Once you find the facts you need, keep track of them. At the very least, bookmark pages; better yet, copy them to your hard disk with SurfSaver (www.surfsaver.com), a free utility.

Today, the Web has numerous metasearcher sites. Among the most prominent are Dogpile (www.dogpile.com), Mamma.com, MetaCrawler (www.metacrawler.com), ProFusion (www.profusion.com), Search.com, and TheBigHub.com. Each one melds results from a lineup of search sites: MetaCrawler, for example, draws from 13 engines—among them AltaVista, Excite, Google, and LookSmart—while TheBigHub.com relies on only eight. But the more engines a metasearcher queries, the longer your search can take. Each time you issue a query, the metasearcher must pass it to the other sites, retrieve the results, and fold them into a single list. By reducing the number of engines it uses, a metacrawler can keep response times to a reasonable length.

The popularity of metasearchers has encouraged many traditional engines to acquire metasearch-like features. Ask Jeeves, for instance, provides results from About.com, AltaVista, Excite, WebCrawler, and 4anything Network in addition to the results from its own database.

SEARCHING FOR THE BEST

METACRAWLER, OUR favorite metasearcher, draws on solid search sites such as AltaVista and Google, which helps it bring back plentiful and pertinent results. It trolls through all sorts of Net resources, too. Search for *Beethoven* and you can click on tabs to leap between engine and directory results, MP3 music files, images, newsgroup discussions, and even online auctions relating to the great composer and his music.

Another worthwhile metasearch site is Search.com, largely because of its specialized metasearchers on dozens of topics. The Automotive one, for instance, queries Autobytel, Car and Driver, CarPrices.com, and nine other car sites. ▶

But Search.com's general-purpose metasearcher often starts by returning a link from GoTo.com, a search engine that invites sites to pay for higher placement in its results. When we searched for *Dell Computer* at Search.com, it referred us to GoTo's paid link to a company that leases Dell PCs before it identified Dell's own home page. But at least Dell's site was the second link at Search.com; at Mamma.com, it was number 18.

Specialty Search Engines: *Doing One Thing Well*

ONE OF OUR FAVORITE search sites has indexed a grand total of just 1600 sites. That achievement might seem negligible, except for one thing: Each of those 1600 sites is about beer. So if you seek a home brew club in Portland, Oregon, Beersite (www.beersite.com) should be your search site of first resort.

From TaxTopic.com to the James T. Kirk Search Engine (www.webwombat.com.au/trek), single-topic search sites cover just about every subject imaginable. We found nine astronomy search sites, half a dozen on politics, and three on fishing. Within their specialty, the best are authoritative in ways that general-purpose engines rarely are, and they helped us find what we were looking for in almost all of our tests.

In addition, because these sites are so focused, the results are highly relevant: If you search for "bacon" at Recipes-For-All.com, you'll get recipes, not pictures of Kevin or essays by Sir Francis.

How do you find out if there's a search site devoted to, say, springer spaniels? Simple: Consult a guide to topic-specific searchers. Two of our favorites are InvisibleWeb.com and Search Engine Guide (www.searchengineguide.com).

Only a few specialized search sites use true automated engines. (One of these is Ditto.com, which helps you find images on the Web.) Most are actually hand-compiled directories to sites on a specific topic. As such, they're better for topic searches than for highly specific queries. For instance, search All Magic Guide (www.allmagicguide.com) for "Houdini," and you'll get 15 useful links about the legendary illusionist. But query on "harry houdini straitjacket escape photo," and it won't find anything.

Many specialty searchers are labors of love by one obsessed Netizen. Therefore, a site will likely grow stale if its proprietor loses interest or runs short of spare time. Look for a "Last updated" banner on the home page—and move on if the site seems to be in limbo.

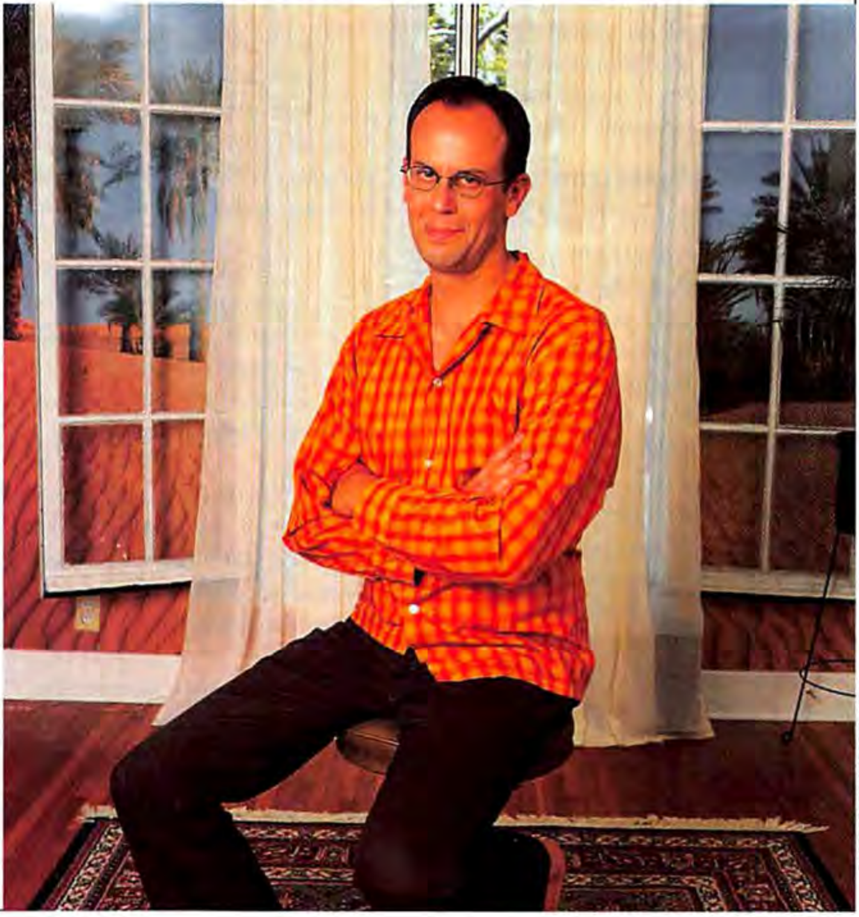
> "For the past year I've been pretty faithful to AskJeeves.com. It checks I don't know how many different engines, and you can pose queries in natural English, like, Who was a better artist: Sid Vicious or Cyd Charisse?"
>
> **—David Bock, Los Angeles screenwriter**

Expert Sites: *Kindness of Strangers*

FOR YEARS, search-engine companies have tried to make their sites think like human beings (without much success). So why not turn the tables? That's the idea behind expert sites—information centers powered by the knowledge and opinions of real people.

Leading contenders in this area include Abuzz (www.abuzz.com), Ask Jeeves AnswerPoint (answerpoint.ask.com), Askme.com, and LookSmart Live (live.looksmart.com). Most of the help at these sites is free. Exp.com's specialty is higher-end, fee-based advice from folks like attorneys and consultants; other sites, such as ExpertCity, devote themselves to computer questions.

The drill at most expert sites is similar: Browse a Yahoo-style topic directory until you find the category you want. ▶



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By Jeff Sengstack

Our test of **6 personal firewalls** finds the best ones for **keeping uninvited guests out** of your office or home system.

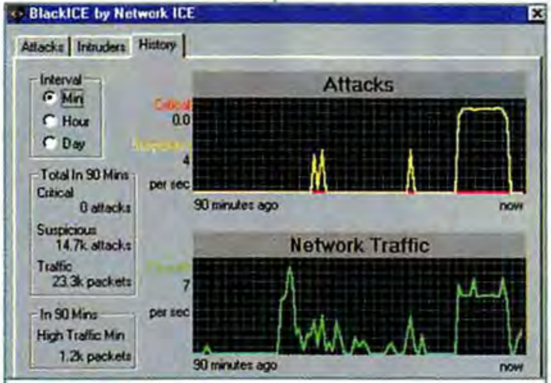
IT WAS GETTING LATE, so Jim Jarrard, president of Cinenet, a stock film footage company in Simi Valley, California, decided to leave his computer on overnight to finish downloading a big file. While Jarrard was gone, a hacker accessed his PC over its DSL Internet connection and loaded a program giving the intruder power to commandeer Jarrard's computer, steal valuable film files, and erase the system's hard drives.

Allan Soifer, an Ottawa, Ontario, electronic mailing list administrator, didn't realize a distant hacker had been scanning his home PC for hours. The hacker had found a way in and needed only a password to access Soifer's files. So he pelted the machine with computer-generated words, hoping for a lucky ▶

Illustrations by James Yang

match. Fortunately, neither of the hackers got the goods.

Jarrard escaped catastrophe because a frozen system and an error message the next morning told him something was wrong. He spent two weeks investigating the problem (and learning more than he wanted to know about hacking) before realizing that he would have to back up his data files and reformat the hard drive to delete the hacker's self-replicating program. Finally, he installed personal firewall software to guard against future attacks.



Best Buys Good Cop/Bad Cop: **BlackICE Defender** (shown here), from Network ICE ($40), worked well with programs that access the Internet, and it provided the clearest explanations of what was going on. It is easy to install—even for newbies—and it permits advanced users to fine-tune its features. **Zone Labs' ZoneAlarm** can be a bit cantankerous when dealing with applications, but it offered the tightest security in our simulated attack tests. And the price can't be beat: It's free for home users and nonprofit organizations.

Soifer was luckier. Before the attack, he had visited Shields Up (www.grc.com), a Web site dedicated to Internet security advice. Soifer followed its recommendation to download and install ZoneAlarm, a free personal firewall program. ZoneAlarm alerted Soifer to the flood of incoming passwords and helped him identify the hacker's ISP—in Anchorage, Alaska. The ISP cut off the intruder's service, but the miscreant could likely open an account with another ISP and continue his misdeeds. And law enforcement is unlikely to take action on any but the largest, most prominent computer crimes.

Hackers come in all flavors. Many are simply curious folks who want to find out how a program or system works. They may not do any harm, and some even provide a service by discovering programming bugs and helping fix them. But malicious or criminal hackers use their skills for devious purposes. Criminal hacking incidents can range from obnoxious to destructive. The latter category includes "denial-of-service" attacks—like those that shut down Internet sites EBay and Yahoo last February when hackers bombarded the sites with data and caused the companies' servers to crash. Is your PC likely to suffer such a massive attack? If you're an individual or small-business user, probably not.

Hacking individual PCs remains a fairly rare phenomenon. Your chances of suffering some type of Internet vandalism are rising, however, especially if you have an uninterrupted, dedicated connection like DSL or cable modem. Fortunately, you can take some simple steps to protect yourself. For most Internet users, changing a few settings, installing a good personal firewall, maintaining updated antivirus software, and using common sense will provide reasonable protection for a small cost.

MANY PORTS OF ENTRY

HOW DO MALICIOUS HACKERS cause damage? They have access to increasingly sophisticated automated software tools that scour the Internet for vulnerable PCs. The tools locate an individual machine by its Internet Protocol address, a unique number that identifies a computer on the Net. Most computers equipped with dial-up connections have dynamic IP addresses: The Internet service provider assigns them a new IP address each time their users log on. By contrast, most high-speed connections, like DSL and cable modems, use constant or "static" IP addresses. In the unlikely event that a hacker decides to target you specifically, such a static address makes it easier to track you down.

An IP address identifies a computer but doesn't provide a way inside. To get in, the hacker must find an open *port*, or connection point. Think of an IP address as a computer's switchboard number and a port as an individual phone extension. Software on your PC creates ports to allow specific networking functions. Web access, for example, generally uses port 80, while FTP runs through port 21. Once they've targeted an IP address, hackers scan

PC DEFENDERS

PERSONAL FIREWALL	Street price (6/2/00)	Security settings (default in bold)	Automatically blocks file sharing	Asks permission for Internet applications
Aladdin Knowledge Systems ESafe Desktop 2.2 800/562-2543 www.eAladdin.com/esafe	Free[2]	Extreme, **Normal**, Low	○	○
McAfee.com Personal Firewall 408/992-8100 www.mcafee.com	$40	Block Everything, **Filter Traffic**, Allow Everything	●	●
Network ICE BlackICE Defender 1.9 650/532-4100 www.networkice.com	$40[4]	Paranoid, Nervous, **Cautious**, Trusting	●	○
Sybergen Networks Secure Desktop 2.1 510/742-2600 www.sybergen.com/products	$30	Ultra, **High**, Medium, Low	○	●
Symantec Norton Personal Firewall 2000 version 2 800/441-7234 www.symantec.com	$50[3]	High, **Medium**, Minimal	●	●
Zone Labs ZoneAlarm 2.1 415/547-0050 www.zonelabs.com	Free[2]	**High**, Medium, Low	●	●

Best Buy
● Yes
○ No

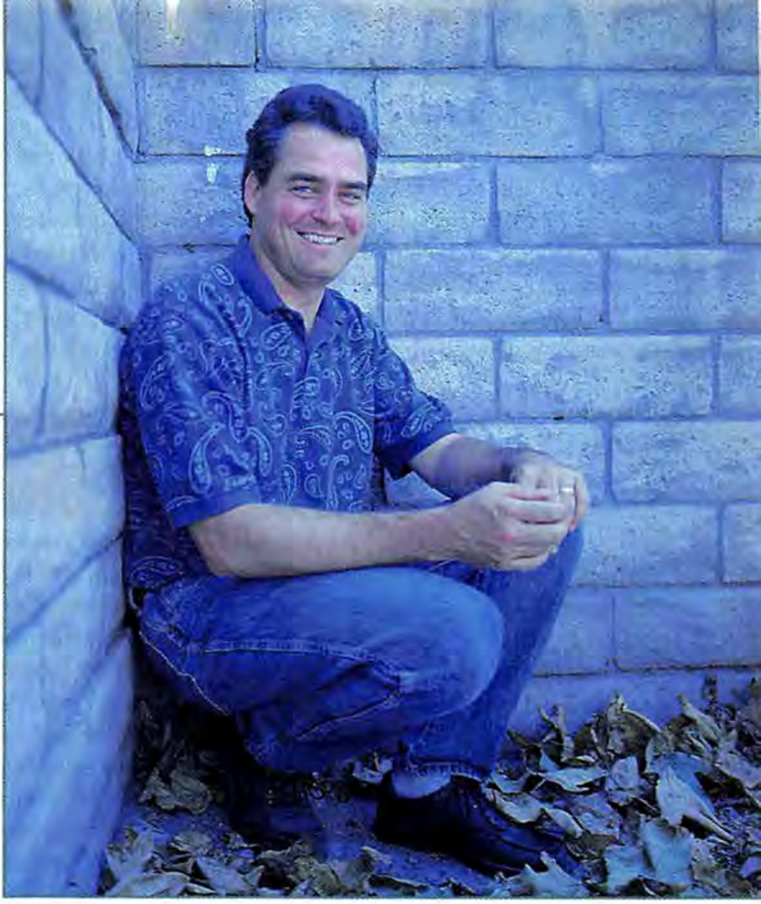
[1] As tested at default setting.
[2] Free to home users; the price for business customers depends on the number of users.
[3] Caught by the product's built-in virus scanner.
[4] Includes updates for one year; update fee is $20 per year thereafter.

the machine for open ports, as happened to Allan Soifer.

Malicious hackers may also trick users into opening ports by sending *Trojan horses.* Mimicking the tactic invented by the wily Greek invaders of Troy, Trojan horses hide damaging cargo within a seemingly benign shell—in this case, an e-mail attachment or a download. When you double-click and open the shell, the hidden program sneaks out to wreak havoc on your computer. One of the best-known Trojan horses is "Back Orifice." (The name is a play on Microsoft's BackOffice network administration software.) Back Orifice surreptitiously opens a port on your PC that a hacker can then exploit to take control of your machine remotely.

Hacking Headache...

Jim Jarrard spent two weeks uncovering and undoing the damage a hacker inflicted on his company's computer in one night. "What a hassle," he says. "It was crazy."



PHOTOGRAPH: ANN SUMMA

CLOSE THE WINDOWS

SO HOW CAN WINDOWS users protect themselves? Before you install any new software, you should perform some simple housekeeping on your operating system to make it safer. The first step is to check the Microsoft Web site for security updates and patches. If you have Windows 9x, Windows NT, or Windows 2000 Professional, point your browser to windowsupdate.microsoft.com and follow the links there to find the updates for your particular operating system.

In addition, David Ursino, Microsoft's product manager for the new Windows Millennium Edition, recommends disabling the File and Printer Sharing option that provides other computers access to a machine running any version of Windows. Go to *Start•Settings•Control Panel* and double-click the *Network* icon. In the dialog box that opens, search the list of installed network components for "File and Printer Sharing for Microsoft Networks." If this item is present, highlight it and then click the *Remove* button beneath the list of components.

Another way you can protect yourself is to use software that blocks Trojan horse programs. Any good antivirus package is designed to identify Trojan horses, but you must keep it up-to-date to defeat the latest subterfuges. You should also make sure your e-mail program is not set to open attachments automatically. And never open an attachment that you don't recognize or that comes from an unknown source.

These measures alone, though, will guarantee security for only a minority of PC users. "Unless you've installed your system from scratch, there's no way of knowing just how secure it really is," says Stuart McClure, coauthor of *Hacking Exposed.* Security breaches can occur on many fronts, typically through Internet software—like PC Anywhere, Net Meeting, or ICQ—that opens ports hackers can subsequently exploit. Even Microsoft's Ursino sees the need to add another layer of security. "If I were a user who had a home network with a persistent Internet connection," he says, "I would choose to have a firewall." ▶

FEATURES COMPARISON

Detects TSAdbot[1]	Blocks Back Orifice[1]	Puts open ports into stealth mode[1]	Detects port scanning[1]	Repels denial-of-service attack[1]	Comments
○	●[3]	○	○	○	Poor performance and confusing configuration. Comes with built-in antivirus utility and filter to block obscenities in Web content.
●	●	●	●	●	Easy configuration and good interface, but event log is difficult to access. User must configure firewall to run automatically at system startup.
○[5]	○[6]	●	●	●	Easy installation and configuration. Clear, easily accessible event log. Best documentation of the products we tested. Identifies type of attack and attacker.
●	○	○	○	○	Poor performance. Provides little feedback and no indication that it is running, but it does have a good, readily accessible event log.
●	●	○	●	●	Provides good protection, but interface is overly complex and controls are clumsy. Also includes filter to block obscenities or objectionable Web content.
●	●	●	●	●	Easy to install and set up. Provides solid protection and plenty of feedback—sometimes too much. Scans e-mail attachments for potential viruses or Trojan horses.

[5] Network ICE does not consider TSAdbot to be harmful.
[6] Blocked Back Orifice at its "Nervous" security setting.
[7] Includes updates for one year; update fee is $7 per year thereafter.
[8] Free to individuals and nonprofits; licensed at $20 per seat per year for business users.

GOOD FENCES MAKE GOOD NEIGHBORS

PERSONAL FIREWALL software goes a step beyond the basic precautions. Like expensive and complex corporate-level firewalls, these affordable and simple products promise to repel intruders by monitoring incoming and outgoing Internet traffic and alerting you to possible dangers. To learn more about how firewalls function, see "How It Works: Personal Firewalls" (www.pcworld.com/how_it_works/firewalls). We looked at ten personal firewalls that sell for $50 or less and chose the six strongest contenders for more detailed testing. This is a new kind of software product, and it shows. The firewalls' performance, usability, and interface quality run the gamut from effective and accessible to weak and incomprehensible.

The perfect personal firewall would be inexpensive and easy to install and use, would offer clearly explained configuration options, would hide all ports to make your PC invisible to scans, would protect your system from all attacks, would track all potential and actual threats, would immediately alert you to serious attacks, and would ensure nothing unauthorized entered or left your PC. Only two products come reasonably close to meeting that ideal: Network ICE's $40 BlackICE Defender 1.9 and Zone Labs' ZoneAlarm 2.1, which is free for home users and nonprofit organizations. Though neither package is perfect, each has strengths that will make it attractive to particular users. Ultimately, we decided that these two products should share the title of Best Buy.

SECURITY CHECKLIST

NO COMPUTER connected to the Internet is 100 percent safe from hacking. But take heart: These five easy steps can make a PC running Windows virtually impervious to online attacks.

☐ **Check Microsoft's Web site** regularly for the latest Windows security updates and patches.

☐ **Remove File and Printer Sharing for Microsoft Networks** under the Network Control Panel (see page 171 for details).

☐ **Use up-to-date antivirus software** to block Trojan horse programs. Exercise caution when deciding whether to open e-mail attachments, even from trusted senders.

☐ **Install personal firewall software.** We recommend BlackICE Defender for users not interested in becoming security experts and ZoneAlarm for those who want to know all the details about their Internet connection.

☐ **If you maintain a persistent Internet connection,** and you *really* want to play it safe, then just shut down your system whenever you will not be using it.

McAfee.com's Personal Firewall ($40) and Symantec's Norton Personal Firewall 2000 version 2 ($50) fall into the second tier of products. Sybergen Networks' Secure Desktop 2.1 ($30) performed unimpressively in our tests and didn't provide sufficient feedback (or even an indication that it was running). And Aladdin's free ESafe Desktop 2.2 fared poorly because it is essentially an antivirus product with what our tests showed to be a kludgy, leaky firewall tacked on.

STILL HUNG UP ON HACKING? We recommend several Web sites that provide tools and further information on security issues. See our picks at **www.pcworld.com/sep00/security.**

Four other products that we examined—Digital Robotics' Internet Firewall 2000 ($40), Delta Design's Net-Commando 2000 ($30), Plasmatek Software's ProtectX 3 Standard Edition ($25), and Tiny Software's Tiny Personal Firewall ($29)—failed to get past our preliminary cut because they exhibited more-serious flaws, such as incomprehensible instructions, weak documentation, or limited functionality.

We assessed the six contending products on three criteria: user-friendliness, ability to work with common programs that access the Internet, and prowess at repelling hacking attempts. In each case we independently installed the firewall on an otherwise unprotected Quantex QP6 350 M2X, a Pentium II-350 machine equipped with 64MB of RAM and running Windows 98 SE.

The best configuration process should be comfortable for a neophyte while giving an advanced PC user the opportunity to tweak the settings. Most of the products we tested offer only three security settings: block all traffic, allow some traffic, and provide no security at all. This scheme works fine if you just surf the Web and check e-mail, but it's too limiting for many users. BlackICE Defender and McAfee.com Personal Firewall have the best configuration options and default settings. BlackICE has the simplest, best-explained security options, and it offers four levels of security for finer adjustment by the user. McAfee.com defaults to a middle "filter" security level that is an excellent starting point for most users. ZoneAlarm ranks near the top, too, but we thought it would have benefited from offering a fourth level of security between its high and medium settings.

Even the best documentation for the firewalls we tested is scarcely adequate, especially since hacking remains a mysterious aspect of computing for most PC users. In particular, none of the products we looked at fully explains its advanced configuration features. If you take into account its reasonably clear and organized online help, BlackICE Defender scores highest in the documentation category. But in this case that's a small honor.

THINGS THAT GO 'BUMP' ON THE NET

THE IDEAL FIREWALL would also work quietly in the background but alert the user to anything worth reporting, and provide comprehensive logs of events. Unfortunately, most of these products tend to overwhelm the user with data. Firewall novices may be stunned at how often someone "touches" their PC. Most of that contact, however, is innocuous traffic that security expert Steve Gibson calls IBR—Internet background radiation. According to Gibson, who maintains the Shields Up Web site, "All firewalls overreport, and they don't do a useful job of discriminating between IBR and actual attacks."

Spikes of IBR occur for various reasons. For example, Internet services like WebTV sometimes send data to the wrong IP address when they attempt to contact users. A firewall might interpret that activity as a port scan. Internet privacy and security guru Simson Garfinkel, author of *Database Nation*, criticizes the misinformation typical firewall products generate. The most frequent complaint ISPs receive is no longer about spam, he says, but about firewall alerts of attempted scans. "Lots of people are going to scan you," he says. "You just can't react every time." ▶

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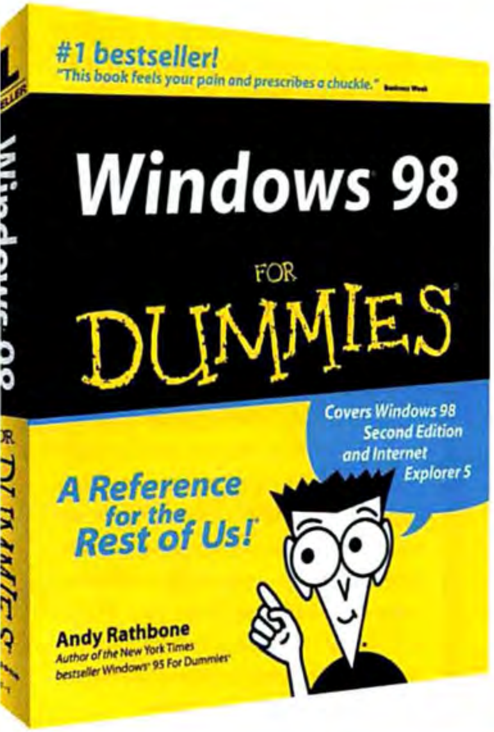
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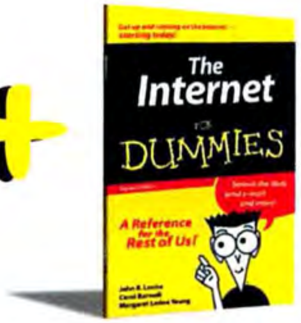
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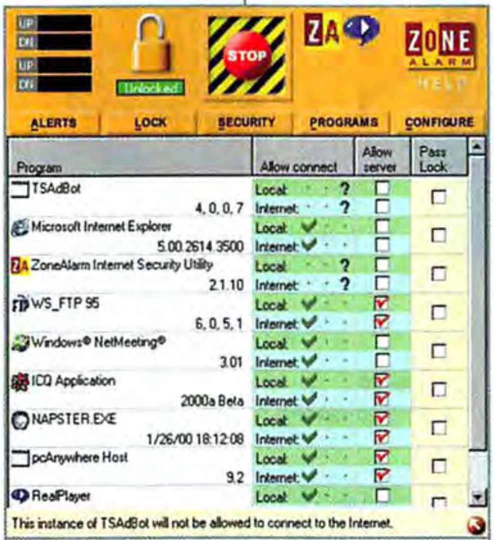
IDG BOOKS WORLDWIDE

Of the products we examined, BlackICE—using carefully crafted reporting windows—provides the clearest, most useful information. The program notes the source of any probe, and it's the only personal firewall we tested that automatically looks up IP addresses and provides contact information about whoever "touched" your PC. An honorable mention goes to Norton and Secure Desktop, which log events in accessible text windows. But ZoneAlarm went a bit overboard: We finally turned off its endless stream of pop-up alert windows, relying instead on its comprehensive event logging for detailed information. However, only ZoneAlarm effectively alerts you in real time to all potential threats—a level of detail that may appeal to some hands-on users. (For more on using ZoneAlarm, see www.pcworld.com/heres_how/zone.) Most firewalls simply flash an icon in the system tray when they detect something, but you won't see it if your system tray is covered or if you're not looking for it.

COMPATIBILITY TEST

WE RAN EACH OF the six firewalls through a number of scenarios to check its compatibility with other applications and its responsiveness to a potential Trojan horse. Compatibility is an important concern with applications that access the Internet: A poorly designed firewall might misconstrue as hacking attempts such legitimate activities as opening ports for Internet communication, and it may mistake legitimate programs for *malware*, or malicious software. Some firewalls will ask the user for permission to run applications, while others will allow or block the apps without providing feedback. In overall compatibility, BlackICE Defender had nearly flawless results, and McAfee.com finished close behind. Norton and ZoneAlarm worked well in most instances; Secure Desktop and ESafe performed poorly.

A good firewall can distinguish between network traffic related to trusted applications and malicious traffic from a hacker or Trojan horse. Some firewalls focus on applications, while others focus on data traffic. In the first case, Norton uses a lookup table of preapproved applications. BlackICE Defender, on the other hand, doesn't note what apps are running. Instead, it scrutinizes all data passing to and from the computer for suspicious behavior, or *signatures*. BlackICE has an extensive, updatable signature file of known hacking techniques, so it can often identify and explain exactly what is happening to your PC.



Program		Allow connect	Allow server	Pass Lock
TSAdBot		Local: ? Internet: ?	☐ ☐	☐
	4, 0, 0, 7			
Microsoft Internet Explorer		Local: ✓ Internet: ✓	☐ ☐	☐
	5.00.2614.3500			
ZoneAlarm Internet Security Utility		Local: ? Internet: ?	☐ ☐	☐
	2.1.10			
WS_FTP 95		Local: ✓ Internet: ✓	☑ ☑	☐
	6, 0, 5, 1			
Windows® NetMeeting®		Local: ✓ Internet: ✓	☐ ☐	☐
	3.01			
ICQ Application		Local: ✓ Internet: ✓	☑ ☑	☐
	2000a Beta			
NAPSTER.EXE		Local: ✓ Internet: ✓	☑ ☑	☐
	1/26/00 18:12:08			
pcAnywhere Host		Local: ✓ Internet: ✓	☑ ☑	☐
	9.2			
RealPlayer		Local: ✓	☐	☐

This instance of TSAdBot will not be allowed to connect to the Internet.

Play by the Rules **Zone Labs' ZoneAlarm monitors applications that access the Net—including ones you may not be familiar with—and blocks out those that misbehave.**

In our tests, we connected to the Internet over DSL and evaluated each firewall's ability to work with common applications that access the Internet: Microsoft Internet Explorer and NetMeeting, WS-FTP LE (a file-transfer program), ICQ (a messaging program), Napster (MP3 music search and download software), PC Anywhere (a program that allows remote control of one computer by another), and RealPlayer (music and video player software).

Sometimes the biggest challenge was determining whether the firewalls were working at all. For instance, in its default installation, McAfee.com does not launch at system start-up or appear in the system tray. You must select those options in the program's configuration. And even though Secure Desktop launches automatically at start-up, it runs entirely in the background—there isn't even an icon for the program in the system tray.

Secure Desktop did ask for permission to run some applications, but when operating at its highest security setting, the program would not allow other applications—ICQ, Napster, or NetMeeting—to run at all. McAfee.com and ZoneAlarm worked fairly smoothly, asking permission for each application. Norton automatically configured rules to permit some apps, but in other cases it made us walk through an overly detailed, six-screen Q&A to manually configure rules for future use of the app. BlackICE doesn't scrutinize applications per se, but it accurately monitors the types of data they send and receive.

Finally, we ran a not-so-trusted application: the freeware version of PKZip (file-compression software). This download includes a built-in application called TSAdbot, which acts as a conduit for advertisements from the Internet and displays them while PKZip is running. TSAdbot is not a malicious program, but it does function similarly to a Trojan horse and thus tests the firewalls' sensitivity to these intruders. McAfee.com, Norton, Secure Desktop, and ZoneAlarm detected TSAdbot and asked us for authorization. ESafe failed to react; BlackICE did not recognize TSAdbot's behavior as harmful. When we asked Network ICE about this result, spokesperson Robert Graham said, "Currently, Network ICE does not consider adbots to be malware." But he added, "Maybe we should reconsider our position." ▶

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SPARRING MATCH

WE THEN HIT each firewall with three simulated hacks: installing and accessing the Back Orifice Trojan horse, running a port scan, and conducting a denial-of-service attack. We ran each test at the programs' default security settings. (Some default to the highest security setting, while others default to the second-highest.) If a firewall failed a test, we tried it again at a higher setting.

In the Back Orifice test, BlackICE did not stop the attack at its default security setting. However, it did stop the Trojan horse when we bumped the security up a notch. (The newest BlackICE version, not available in time for our comparison testing, does stop Back Orifice at its default setting.)

Three products—McAfee.com, Norton, and ZoneAlarm—identified Back Orifice by its file name, Umgr32.exe, and asked permission to run it. Not many PC users have heard of Back Orifice, let alone Umgr32.exe, so they might not know whether to block the app or let it run. ESafe's built-in virus checker identified the Umgr32.exe file and asked whether we wanted to delete it. Secure Desktop failed the Back Orifice test—and all other attack tests—even at its highest security setting.

We next hit our test PC with a port scan, having deliberately left two ports open to see how the firewalls would handle them. The first port, called NetBIOS, is opened when printer and file sharing are enabled. The second port was opened for our Back Orifice Trojan horse. (Some firewalls look for standard ports used by Trojan horses, but we upped the ante by choosing a nonstandard port.) A personal firewall can hide your PC by putting ports into stealth mode so they will not respond to a hacker's port scan; the ports will thereby offer no evidence that your computer exists.

At their default settings, BlackICE, McAfee.com, and ZoneAlarm put the two ports into stealth mode, but ESafe, Norton, and Secure Desktop failed to hide the ports we left open.

Finally, we ran a miniature denial-of-service (DoS) attack, hitting each firewall with a flood of meaningless data intended to confound the operating system. In the real world, a DoS attack overwhelms your Internet connection, making it difficult or impossible to access the Net. It can also crash your system. Malicious hackers can increase the pressure by launching a distributed-denial-of-service (DDoS) attack, in which multiple computers are commandeered and used to launch an attack. Such assaults are usually directed against major Web sites and the servers that support them. In the unlikely event your PC is targeted for a full attack, a good firewall may block the incoming data packets and prevent your machine from crashing, but no firewall can ensure that your Internet connection will remain open.

A HACKER'S GLOSSARY

INTERNET security is a complex subject. Here are some key terms and concepts for PC users to know.

■ **Denial-of-Service (DoS) Attack:** Flooding an IP address with data, causing computers to crash or lose their connection to the Internet. Most DoS attacks are aimed at large Web servers, with the objective of rendering the target site unavailable to other visitors.

■ **Distributed Denial-of-Service (DDoS) Attack:** Using multiple computers to launch a DoS attack. A hacker commandeers several outside computers and uses them as platforms to launch the attack, magnifying its intensity and cloaking the hacker's identity.

■ **Hacker:** Someone who deliberately gains access to other computers, often without a user's knowledge or permission. Malicious hackers do this to steal valuable information, disrupt service, or cause other damage.

■ **IP (Internet Protocol) Address:** The identifying number of a computer or other device. Two machines connected directly to the Internet cannot have the same IP address at the same time. Computers with *static* IP addresses (most systems with DSL or cable modem connections) always use the same IP address; those with *dynamic* addresses (most systems with dial-up connections) are assigned a new IP address each time they log on to the Internet.

■ **Personal Firewall:** Software that keeps unauthorized users from accessing a stand-alone PC. It also prevents malicious programs from sending data out.

■ **Port:** An electronic connection that allows data to travel between a client PC and a server over a network.

■ **Port Scan (or Port Probe):** Data sent by a hacker over the Internet to locate a PC or network and determine whether it has open ports that will accept a connection.

■ **Stealth Mode:** A protective setting that hides a port so it isn't visible over the Internet. A port that has been put into stealth mode will give no reply to a port scan, thereby providing no evidence that a computer exists at the scanned IP address.

■ **Trojan Horse:** A malicious program masquerading as something harmless, usually an e-mail attachment or a download that you open and run. A Trojan horse opens your computer to incursions by a hacker.

At their default settings, four of the firewalls we tested—BlackICE, McAfee.com, Norton, and ZoneAlarm—prevented a crash, although BlackICE was the only product that correctly identified the nature of the attack. Norton gave no indication an attack was under way. We were disappointed that ZoneAlarm repelled the attack only at its default (High) setting, and Secure Desktop and ESafe failed to prevent a crash even at their highest settings.

PLAY IT SAFE

ACCORDING TO Murphy's Law, anything that can go wrong, will. People are putting more sensitive data (such as financial records) on their PCs, and sending other sensitive data (such as credit card numbers) over the Web. They're also switching from dial-up modem–based service to broadband connections, with continuous service and fixed IP addresses. Meanwhile, hackers are acquiring more devious software tools and putting more potential victims at risk. Hacking will inevitably increase. But the good news is, you can protect yourself now.

Jeff Sengstack is a Bay Area freelance writer who contributes regularly to PC World. *Test procedures were designed by Elliott Kirschling of the PC World Test Center. Steve Gibson, a software publisher and security advocate, consulted on this story.* ■

An IBM e-business advantage for small business

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ices shown are prices available from IBM directly; reseller prices may vary for ThinkPad i Series Part #1171-330, Diskette Drive Part #05K9276, USB Hub Part #00N8215; ThinkPad A Series Part #2628-4AU, Memory Upgrade
t #20L0254, Port Replicator Part #02K8667; ThinkPad T Series Part #2647-21U, Memory Upgrade Part #20L0255, Ultrabay 2000 DVD Part #05K9232; NetVista A40 Part #6578-LAU, 17" Monitor Part #17MON05, Printer Part
9N9912, Digital Camera Part #10K3360, Printer Part #09N9780; NetVista X40 Part #6643-13U, Printer Part #09N9994, Memory Upgrade Part #33L3136, Backup Power Supply Part #09N3854. IBM price does not include tax or
pping and is subject to change without notice. [2]Some software may differ from its retail version (if available), and may not include user manuals or all program functionality. For non-IBM software, applicable third-party licenses
y apply. Warranty, service and support for non-IBM products, if any, are provided by third parties, not IBM. IBM makes no representations or warranties regarding non-IBM products. [3]Requires Internet access account, available
parately. [4]Titanium Composite Carbon Fiber Reinforced Plastic has three times the strength of ABS plastic as tested by IBM using the high flex modulus test on 2/28/00. Available on select models. [5]Actual speeds depend on many
tors, including the plan you sign up for with ADSL provider, and are often less than maximum possible. [6]MHz measures only microprocessor internal clock speed. Other factors may affect application performance. For Intel Mobile
ntium III processors featuring SpeedStep technology, this denotes maximum performance mode; battery optimization mode is approximately 80% of maximum performance mode. [7]GB means one billion bytes when referring to

NOTEBOOKS

IBM ThinkPad i Series 1330
Mobile Intel® Celeron™ processor 500MHz
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Windows 98 Second Edition
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Windows 98 Second Edition
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Lexmark Z12 Color Inkjet Printer
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HP PhotoSmart P1100xi Printer
$529.99[1] or $19/month[11]

IBM NetVista X40 13U
Pentium III processor 667MHz
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64MB SDRAM • 20.4GB HDD (7200 rpm)
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SuccessLease for Small Business $85/MONTH[11]

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hard drive capacity. Accessible capacity may vary. Variable read rate. Actual playback speed will vary and is often less than the maximum possible. These modems are designed to be capable of receiving data up to 56Kbps f a compatible service provider, and transmitting data at up to 31.2Kbps. Public networks currently limit maximum download speeds to about 53Kbps. Actual speeds depend on many factors and are often less than the maxim possible. Weight and thickness may vary due to vendor components, manufacturing process and options. SuccessLease is offered and administered in the US and Canada by third-party providers of business financing appr by IBM Global Financing. Featured monthly lease payments are based on a 36-month term with prespecified purchase option at the end of lease, to qualified business customers only, installing in the US. A documentation fee first month's payment due at lease signing. Any taxes are additional. Other lease terms and structures are available. Offer may be withdrawn or changed without notice. Options must be leased with system unit. SuccessLease i IBM trademark. [12]For terms and conditions or copies of IBM's Statement of Limited Warranty, call 1 800 772-2227 in the US and in Canada call 1 800 426-2255. Limited warranty includes International Warranty Service in t countries where this product is offered. Telephone support may be subject to additional charges. All products ship with an operating system. IBM reserves the right to alter/withdraw offerings at any time, without notice. SuccessL and all IBM product names are registered trademarks or trademarks of International Business Machines Corporation. Intel, the Intel Inside logo and Pentium are registered trademarks and Celeron and SpeedStep are trademark Intel Corporation. Microsoft and Windows are registered trademarks of Microsoft Corporation. Other company, product and service names may be trademarks or service marks of others.

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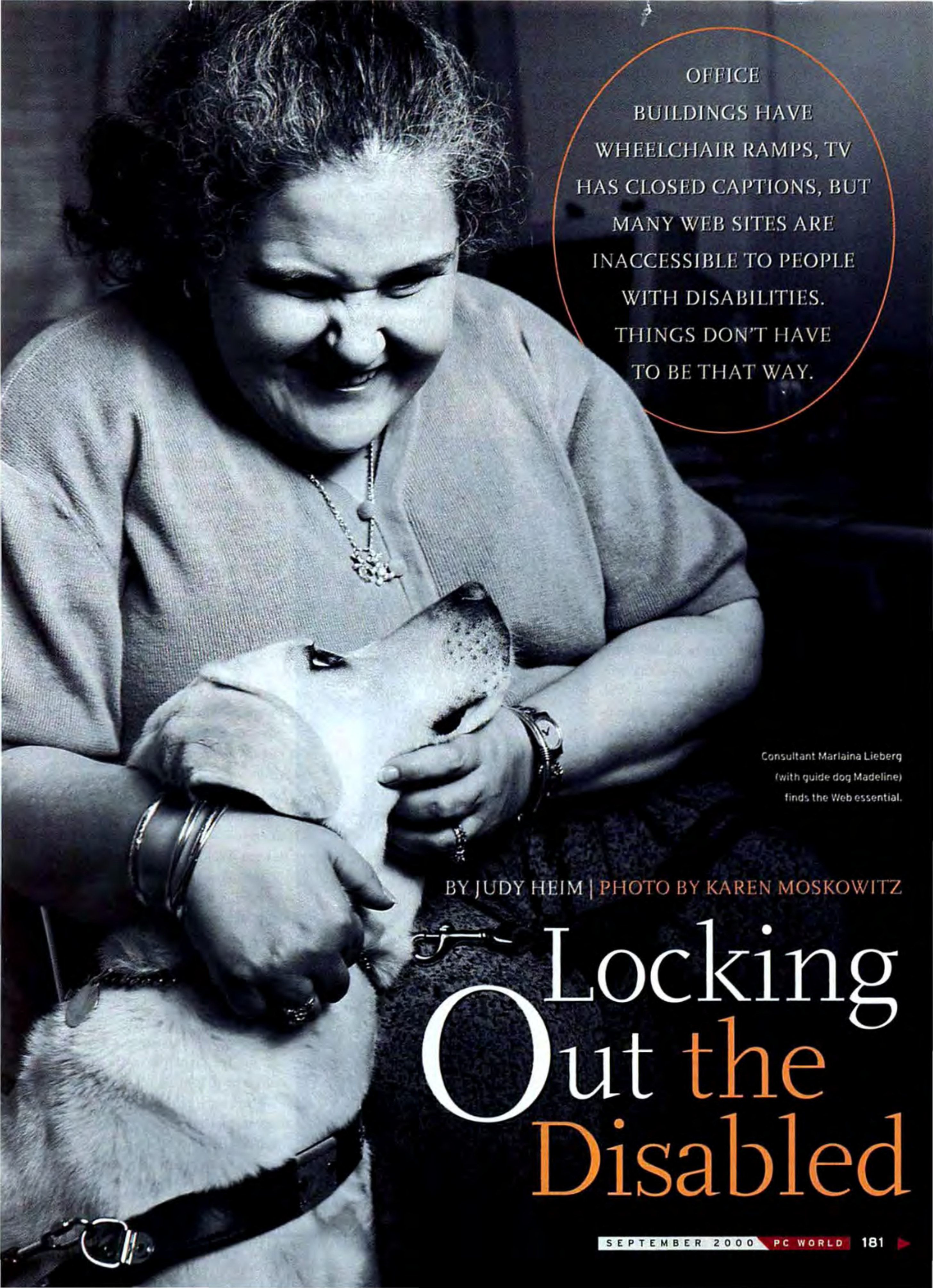


Locking Out the Disabled

OFFICE BUILDINGS HAVE WHEELCHAIR RAMPS, TV HAS CLOSED CAPTIONS, BUT MANY WEB SITES ARE INACCESSIBLE TO PEOPLE WITH DISABILITIES. THINGS DON'T HAVE TO BE THAT WAY.

BY JUDY HEIM | PHOTO BY KAREN MOSKOWITZ

Consultant Marlaina Lieberg (with guide dog Madeline) finds the Web essential.

EVERY MORNING Marlaina Lieberg, who's been blind from birth, reads her local paper, the *Seattle Times*, on the Web, with her guide dog, Madeline, at her feet. Lieberg also taps into Web sites to research corporations she'll pitch her consulting company's services to and trades e-mail with clients. In her spare moments, she trades stocks online and shops for groceries. Last year she bought all her gifts on the Web.

Lieberg navigates cyberspace with a *screen reader*, a software utility that reads Web pages out loud, chattering like a robot as it recites links and text. Surfing the Web without seeing is time-consuming; Lieberg must orient herself on pages by listening carefully to words rather than scanning pictures and must navigate using her keyboard instead of a mouse.

Even so, Lieberg exults over the freedom that the Web has given her. "These shopping services are so important for people who are unable to drive, and for those of us who are unable to peruse the aisles," she says. "It is such a joy. I can even read package directions. I've never done this sort of thing before."

Lieberg can't navigate every Web site easily with her screen reader, though. The majority of Web pages are poorly designed for anyone who's not surfing with a standard copy of Internet Explorer or Netscape Navigator: Buttons can be hard to identify, Java applets can be impenetrable, and forms tend to be indecipherable if they're not coded for a screen reader.

Making Web sites accessible to all potential customers seems like common sense. One in five Americans has some disability; as the country ages, that percentage is expected to increase. A Web site that's navigable by an assistive technology such as a screen reader is also accessible by phones and palmtops, not to mention by old, slow computers. In addition, suggests Mike Piper of PiperStudiosInc, designers of an accessible site for Easter Seals, every site wants to stand out, and the goodwill generated by maintaining an accessible online presence can be a powerful way to do that.

Accessibility also makes sense legally: The Justice Department has ruled that the Americans With Disabilities Act applies to the Web, not just to places that can be accessed physically. A retailer whose Web site doesn't meet ADA standards can be sued under the act, just as a brick-and-mortar store can.

But as the online world grows more graphical, it becomes less accessible to disabled users. For years Rose Combs, a blind medical transcriptionist in Scottsdale, Arizona, used the text-based GEnie service, which was easy to traverse with a screen reader. When GEnie shut its doors, Combs found that getting Web tasks accomplished could be a struggle. "I can't count the times I have had to call my husband to help me navigate a site," she says.

Web sites also hamper those with nonvisual disabilities. Jamie Berke, who is deaf, says she has "waged losing battles" trying to convince network-TV Web sites to provide closed captions for news Webcasts. Even President Clinton's recent Webcast about government and the Internet wasn't captioned, notes Berke, who runs a site called the Closed Captioning Web (www.captions.org).

"It's hit-or-miss whether a site will be accessible," says Joseph Lazzaro, director of the adaptive technology program at the Massachusetts Commission for the Blind and author of *Adapting PCs for Disabilities* (Addison-Wesley, 1995). "If you're cut off from information, you're not going to go to school, you're not going to get a job. You're going to be left out of a lot that society has to offer."

Even being a good citizen may pose a challenge. Recently, Arizona became the first state to let its citizens vote online. But Rose Combs couldn't cast her cyberballot without assistance.

IN MANY COMPANIES, THERE ARE PEOPLE WORKING ON WEB ACCESSIBILITY, BUT WORD HASN'T SPREAD THROUGHOUT THE ORGANIZATION.

–Judy Brewer

PHOTOGRAPH: RICK FRIEDMAN

A PROBLEM IGNORED

IN RECENT YEARS, the physical world has adapted to the needs of the disabled: wheelchair ramps, Braille markings, closed captioning. But of more than 30 major shopping, search, auction, news, and financial Web sites that *PC World* contacted, only a handful admitted any interest in—much less any action taken toward—tailoring the sites for accessibility. A spokesperson for one electronics retailer that asked not to be named said, "That's not a market we've thought about pursuing." Many Web retailers declined to be interviewed for this article. Others did not return repeated calls.

Some sites expressed a vague interest in keeping all users happy; others were dismissive. Anna Lonergan, a spokesperson for The Gap, told us the company has no plans to make its site accessible. "We're aware of the technologies but have no plans to implement them," she said. Asked why not, she replied, "That touches in the realm of strategy, and we don't discuss strategy."

A spokesperson at one of the country's largest computer retailers said that the company's Web designers had not even considered the issue until *PC World* brought it to their attention. That retailer isn't alone: Until this article, this magazine hadn't examined the accessibility of its own site, PCWorld.com. Since then, we've made plans for modest immediate moves to improve access, such as using larger type and clearer directory descriptions, as well as for more-substantial long-term efforts.

Why don't more firms keep accessibility in mind? Mike Paciello, a Web accessibility consultant and technical director for WebAble, a resource for accessible Web design, says, "They don't see the market. The moment you tell a company how important it is to their business to make their Web site accessible, they come back with statistics that the market isn't big enough for them to spend the money."

ACCESS IS NOT SO HARD

BUT DEVELOPING AN accessible site is pricey only if you're redesigning a large site from the ground up, contends Kynn Bartlett, director of the HTML Writers Guild's Accessible Web Authoring Resources and Education Center and a Web site accessibility consultant. "We're not talking about doubling the cost of your site; we're talking about adding 1 or 2 percent to its cost and increasing your audience by 20 percent," he says.

Other Webmasters fear that making a site accessible means replacing attractive graphics with an austere look and a big typeface. Bartlett says that's a myth. "I tell people, don't take down Java, don't get rid of that animation—just add an alternative."

The Web Content Accessibility Guidelines released by the World Wide Web Consortium call for simple changes, such as describing graphics and audio using text and providing alternatives to applets and scripts. Such tweaks result in a site that's easily navigable by many assistive tools. They also make a site friendly to those with a wide variety of disabilities, including visual, auditory, cognitive, and motor impairments.

SIGNS OF PROGRESS

FOR NOW, MANY SITES REMAIN oblivious to the problem. But the news isn't all bad. Judy Brewer, director of the W3C's Web Accessibility Initiative, says that a number of sites are beginning to consider it. "I think that in probably half of those companies [that *PC World* contacted], people are already working on Web accessibility, but word hasn't spread through the organization."

Some companies have made progress. Microsoft, for instance, is gradually improving its sites. "The [W3C] guidelines are not rocket science, but they're not that easy to figure out how to apply in some cases," says Dick Brown, program manager for Web accessibility at Microsoft.

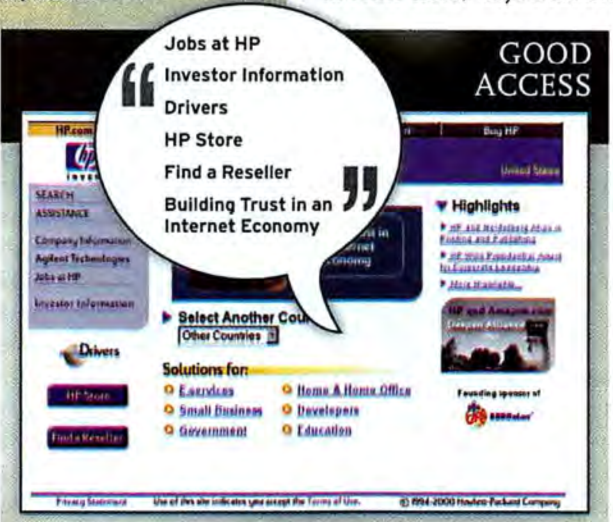
IBM is also revising its Web site as part of a companywide initiative to make all its products accessible. Kim Stephens, Webmaster at IBM's accessibility center, says that the biggest challenge has been educating employees on the importance of Web accessibility. "We've found that one of the most effective motivators is to let someone hear how their Web page sounds [when recited by a screen reader]. When they hear how broken it sounds, [it inspires] them to change it."

In many cases, smaller ▶

The Talking Web

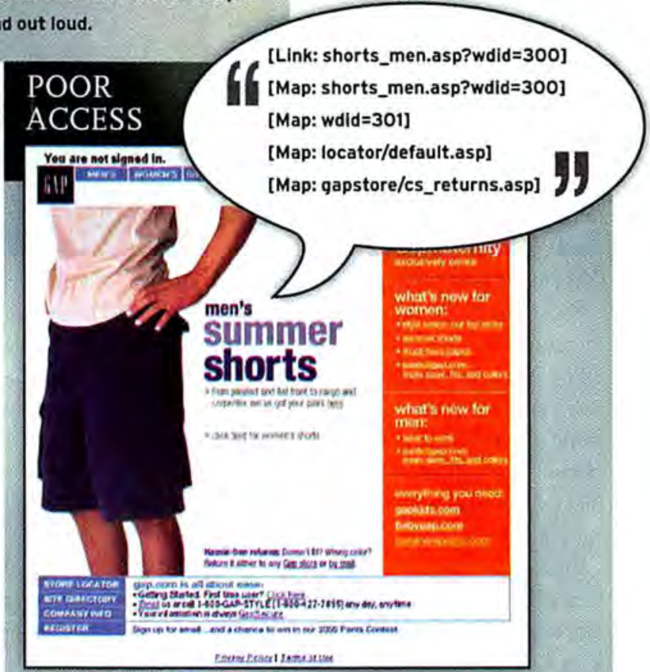
HOW IT WORKS —AND DOESN'T

BLIND WEB SURFERS rely on screen reader software or talking Web browsers (such as IBM's Home Page Reader, used in these examples) to navigate the Web. But while these utilities can handle some pages well, many others are partly or completely inaccessible.



"Jobs at HP
Investor Information
Drivers
HP Store
Find a Reseller
Building Trust in an Internet Economy"

ALL LINKS ON HEWLETT-PACKARD'S home page work properly when spoken aloud by a screen reader, and the page isn't overloaded with dozens of links that must be recited. All images have alternate text that can be read out loud.

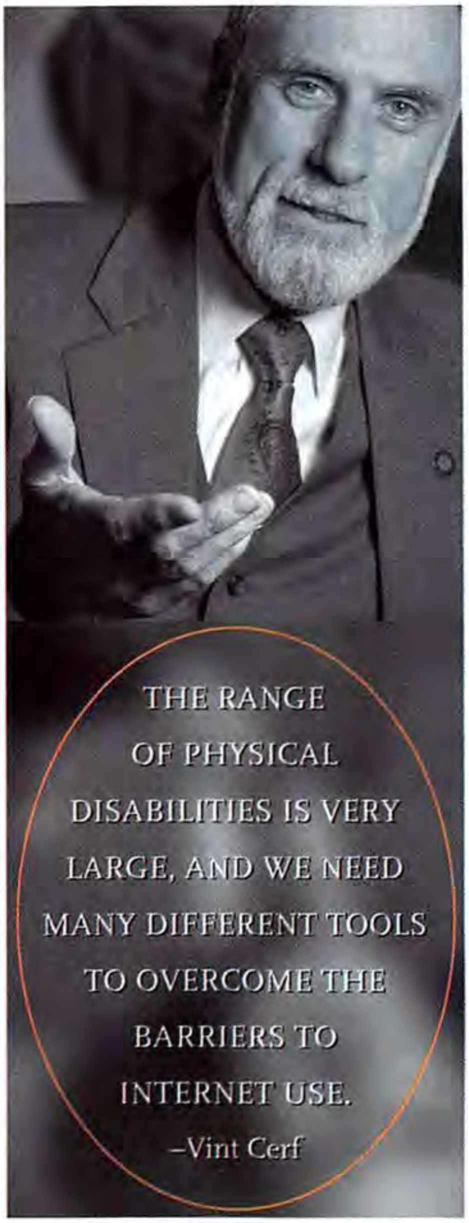


"[Link: shorts_men.asp?wdid=300]
[Map: shorts_men.asp?wdid=300]
[Map: wdid=301]
[Map: locator/default.asp]
[Map: gapstore/cs_returns.asp]"

THE HOME PAGE of clothing merchant The Gap is mostly graphics with no alternate text, so the spoken version makes little sense; the only links that work properly are the privacy policy and terms of use.

sites can move more quickly than big ones. Consider Coffee Anyone?, a mom-and-pop site operated by Norman and Rosemary Belssner. Until they started corresponding with customers, the Belssners were unaware that many were blind. They hadn't known about site accessibility but were surprised at how easy it was to implement.

"The problems [customers] were having were subtle," explains Norman Belssner. "We didn't have some shopping cart buttons labeled, for example." The changes he made were simple and took minutes. "Creating accessibility in a brick-and-mortar environment is far more challenging than adding accessibility to your Web site," concludes Belssner, who says revamping the site has helped his company's bottom line.



THE RANGE OF PHYSICAL DISABILITIES IS VERY LARGE, AND WE NEED MANY DIFFERENT TOOLS TO OVERCOME THE BARRIERS TO INTERNET USE.

–Vint Cerf

UNCLE SAM STEPS IN

NOT EVERY COMPANY sees accessibility as a smart business decision, but those that do not could find themselves in trouble with the law. Last year, the National Federation of the Blind filed suit against America Online, arguing that because AOL's software does not work with screen readers, the service violates the ADA. Under Title III of the act, passed in 1990, all "public accommodations" must provide reasonable access to persons with disabilities. In 1996, the Department of Justice ruled that Web sites are public accommodations and must therefore offer access to the disabled. (A separate law mandates that federal sites created after August 7, 2000, be accessible.)

"Traditionally, what has been covered by the ADA is physical structures," says Curtis Chong, director of technology for the NFB. "We in the National Federation of the Blind believe that although we don't have many problems accessing buildings, the world is moving in the direction that everything one does revolves around electronic services and the Internet. If the blind can't use that information, we will not be able to compete. We will be relegated to the backwaters of the electronic information highway."

Chong says that before filing suit, the organization asked AOL to modify its software, but the company "pretty much ignored us." Nicholas Graham of AOL reports that the company is talking with the NFB. He says AOL will support screen readers in future versions of its software, although he can't say when.

The NFB is considering suits against other ISPs and Web sites. "The AOL suit has drawn people's attention to the fact that this is a serious issue," says Cynthia Waddell, ADA coordinator for the city of San Jose, California. The ADA mandates both that sites be accessible to the disabled and that workers can request that their own company's site be redesigned so they can perform their jobs, she says.

Waddell says many businesses fear the expense that could accompany redesigning their sites to comply with the ADA, but accessible design isn't necessarily costly. "When the ADA was passed in 1990, there was concern that businesses would go bankrupt because they would have to make their buildings accessible," she explains. "Now we're hearing the same argument."

Steve Jacobson, vice president of the computer science division for the National Federation of the Blind, says such concerns are mostly groundless. "Some of [this is] fear mongering.... We're not looking at a massive rewrite of Web pages but at working with Web designers to make pages accessible."

Earlier this year, the NFB and the Connecticut attorney general's office reached an agreement with four companies that provide online tax filing services. The Internal Revenue Service listed HDVest, Intuit, H&R Block, and Gilman & Ciocia on its site as partners for e-filing, but users with screen readers couldn't file returns on those sites. The firms agreed to make their sites accessible by the 2000 tax season.

Similarly, the California Council of the Blind has been working with large financial institutions to ensure that their sites are accessible. The first agreement was reached in March with Bank of America. "I think it's really important to get people in the institutions to understand why technology should be accessible," says Lainey Feingold, a disability rights lawyer in Berkeley, California, who represents the council. "We approached the banks and said, 'You have a problem here.' They've been totally on board."

SMARTER TECHNOLOGY AHEAD?

ONE REASON THE INTERNET isn't more hospitable to the disabled is that few Web authoring tools take accessibility into consideration. But new W3C Authoring Tool Accessibility Guidelines should improve the situation. "Hopefully, in the future any tool you pull off the shelf is going to help you to automatically create accessible Web pages," says the W3C's Brewer.

Some Web technology companies are also working on fixes. For instance, when a screen reader encounters Java on a Web site, the result can sound like a Martian poem. Sun Microsystems has created the Java Accessibility API, which lets screen readers and voice recognition devices make Java applets and

PHOTOGRAPH: KATHERINE LAMBERT

LEARN MORE ABOUT
Web Accessibility

IF YOU WOULD LIKE an instant lesson in how inaccessible the Web remains for some, do what we did and download and install the free trial version of IBM's Home Page Reader, a talking browser (www.ibm.com/able/hprtrial25.htm). Use it to get a sense of what it's like to hear the Web rather than see it, and to understand more clearly why many sites flunk the accessibility test.

Try visiting your own business or personal page with Home Page Reader. Can't find your way around? The Web is full of accessibility resources. Here's where to start if you're responsible for a site, or just want ammunition to nudge those in charge of your company's online presence in the right direction:

First, head to the **Bobby** accessibility checker at the Center for Applied Special Technology (www.cast.org/bobby). Enter your site's URL, and Bobby will give you a rough idea of what you need to do to make the pages usable by a screen reader—the most helpful tool for visually impaired Web surfers. (One tip: When Bobby spits out a long-winded report card, don't get hung up on its details. Use it as a guide, not a mandate.)

To learn a few easy tricks for making your site more accessible, visit the **World Wide Web Consortium's Quick Tips to Make Accessible Web Sites** (www.w3.org/wai/references/quicktips). Next, check out the **W3C's Web Accessibility Guidelines** (www.w3.org/tr/wai-webcontent). You can also download the free utility **HTML Tidy** (www.w3.org/People/Raggett/tidy), a useful supplement to the checks performed by Bobby.

A bastion of support, information, and reality checks, the **HTML Writers Guild's AWARE Center** (www.awarecenter.org) offers straightforward Web page coding tutorials and thought-provoking essays, including one on the myths about creating accessible sites (www.awarecenter.org/why/myths.html). Myth no. 1: An accessible Web page is dull, boring, plain text.

For additional help, check out the following sites:

Designing More Usable Web Sites, from the University of Wisconsin's Trace Research & Development Center
www.trace.wisc.edu/world/web

The Department of Justice's Web Page Accessibility Checklist
www.usdoj.gov/crt/508/webpage.html

IBM's Accessibility Guidelines
www.ibm.com/able/guidelines.htm

Adobe's tips and tools for optimizing PDF files for accessibility
access.adobe.com

Microsoft's Accessibility Center
www.microsoft.com/enable

applications talk as well as listen. However, this solution works only if developers build Java apps that take advantage of the new API and users have an up-to-date screen reader and browser.

Another new tool is the Web-captioning editor Media Access Generator from public TV station WGBH and its National Center for Accessible Media in Boston. "One reason there are hardly any captions on the Web is because they're a big pain in the neck to create," says Geoff Freed, project manager for the Web Access Project at NCAM. With MAGpie, as the editor is called, one can write video captions in multiple formats simply. "This knocks down one excuse for not providing captions," he says.

Disabled users may also benefit as companies see profit in providing Web access to phones, wireless PDAs, and other devices. "When we were writing the accessibility guidelines, someone told us we should really call them Guidelines for Making Your Web Site Work With Mobile Technologies," says Gregg Vanderheiden, director of the University of Wisconsin's Trace Research Center and an editor of the W3C accessibility guidelines. "If you want to access the Web with a Palm Pilot, you want text large, and that's how people with low vision want to view the page. If you want to access the Internet via phone, you're accessing it auditorily, and that's how someone with a speech reader accesses it."

Earl Johnson, an accessibility architect at Sun, feels that wireless devices will start to transform the Web in as little as two to three years, making it more accessible to people with and without disabilities in the process. "If you start introducing in your site the ability to display information on different devices, that's where accessibility starts to benefit every user," he says.

ACCESS VERSUS ISOLATION

DESPITE REMAINING ROADBLOCKS, the Web is already helping the disabled. "Look at the wealth of information you have at your fingertips," marvels Kelly Ford, an access technology coordinator at Mount Hood Community College in Gresham, Oregon. Ford has been blind since birth. "Admittedly some of it is hard to get at, but 20 years ago I couldn't flip through the *L.A. Times* and read book reviews, let alone buy the books online."

Looking ahead, users and activists voice cautious optimism. Most agree that there will be more lawsuits, and more rankling between consumers and Webmasters. "I see [the Web] becoming accessible, but slowly," says the Massachusetts Commission for the Blind's Lazzaro. "It's not going to happen overnight."

And the Web won't truly be open to all until "all providers of information on the Net...put effort into making that information readily accessible to everyone, regardless of physical barriers," says Vint Cerf, an Internet founding father and chairman of the Internet Societal Task Force.

"If you are deaf, you need captions for spoken elements. If you are blind, you need voiced descriptions of Web contents and spoken renderings of e-mail. The range of physical disabilities is very large, and we need many different tools to overcome the consequential barriers to Internet use," says Cerf, who himself has a hearing impairment. "Let us commit ourselves to truly assuring that the Internet really is for everyone."

Judy Heim is a contributing editor for PC World. ■

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2X AGP with 64-bit Hardware Accelerated 3D Graphics
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Compaq CV535 15" Monitor (13.8" VIA)
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40X Max CD-ROM Drive[2]
2X AGP with 64-bit Hardware Accelerated 3D Graphics
ESS Allegro Integrated PCI Audio
56K ITU V.90 Modem[3]
JBL Platinum Speakers with Digital Audio Port
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32 MB nVidia TNT2 M64 ProGraphics
Creative Labs 1373 Audio with 128 Voices
56K ITU V.90 Modem
JBL Platinum Speakers with Digital Audio Port
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Every day, Puneet Maheshwari makes it his mission to help businesses move forward. For Lexington, Mass.-based Domain Pharma Corp., he integrates the developer's clinical data management software into its clients' (mostly major biopharmaceutical firms) existing applications. And at his home near Princeton, NJ, Maheshwari works to keep his wife's PC running smoothly so she can pursue her career in Web design.

But recently, when Maheshwari sought a RAM upgrade for his wife's system, he learned that buying memory had become a costly proposition. Then a search engine pointed him toward Crucial Technology, at Crucial.com, which sells RAM directly to consumers from the factory. Maheshwari suspected that Crucial could deliver the prices he was looking for.

crucial™
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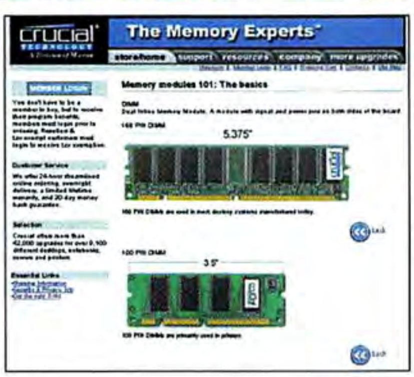
He first used Crucial's Memory Selector to enter the make and model of his wife's PC; the site instantly listed low-cost upgrades that were guaranteed to be compatible. "The Memory Selector led me easily to what I was looking for," Maheshwari says. "And once I knew the prices, it was very easy to compare them with the competition. I was stunned—Crucial beat some of the so-called industry leaders by as much as 40 to 60 percent."

At the same time, Maheshwari learned that Crucial was actually a division of memory chip manufacturer Micron Technology, Inc. so he was purchasing the same modules that PC makers Gateway, IBM, and HP were building into their base systems. "That certainly increased my comfort level," Maheshwari says.



Micron tests all of its memory modules under extreme temperatures, voltages, and operating conditions before it sells them through Crucial's Web site and telephone sales service. By eliminating the middleman, Micron can boast prices lower than those offered by other vendors. "The key difference is that we make our own memory," says Crucial's general manager, Fred Waddel. "This allows us to offer lower prices while the other vendors are forced to buy their chips on the open market."

Customers and others can now keep tabs on the memory market and check Crucial's prices with weekly pricing updates sent directly to their email inboxes. They can also subscribe to The Crucial News, a monthly update that includes discounted pricing alerts, promotions, parts availability, special events, and company news.

Crucial takes consumer education even further with up-to-date tips and how-to features, articles about memory manufacturing, and answers to frequently asked questions. Crucial's Comprehensive [Microsoft] Windows 2000 Upgrade Guide, for example, recommends RAM for performance PCs and lists hardware and software requirements for users upgrading to the new operating system.

Puneet Maheshwari says that Crucial's customer service is hard to beat. He has already taken advantage of the vendor's streamlined 24 X 7 online ordering system, same-day shipping, delivery options (including overnight delivery), and shipment tracking features. "With just one click of the mouse," he says, "I can track a shipment straight to my door. Crucial makes shopping for memory painless and seamless."

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[*Genius.*]

I called my computer manufacturer for two days and they could never tell me what type of memory my system needed. It took about 30 seconds to find the answer on your Web site. Keep up the great service.

John Bowler, IT Consultant

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Millennia 400	$115.00	$71.99
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IBM	Kingston	**Crucial**
Aptiva (2153) Model E2U	$108.00	$71.99
Aptiva (2139) Model E5D	$108.00	$71.99
HP	Kingston	**Crucial**
Pavilion 4530	$126.00	$71.99
Pavilion 4535	$126.00	$71.99
Kayak XU PC Workstation 440BX Chipset	$143.00	$89.99
Vectra VL Series 8	$143.00	$71.99
Apple	Kingston	**Crucial**
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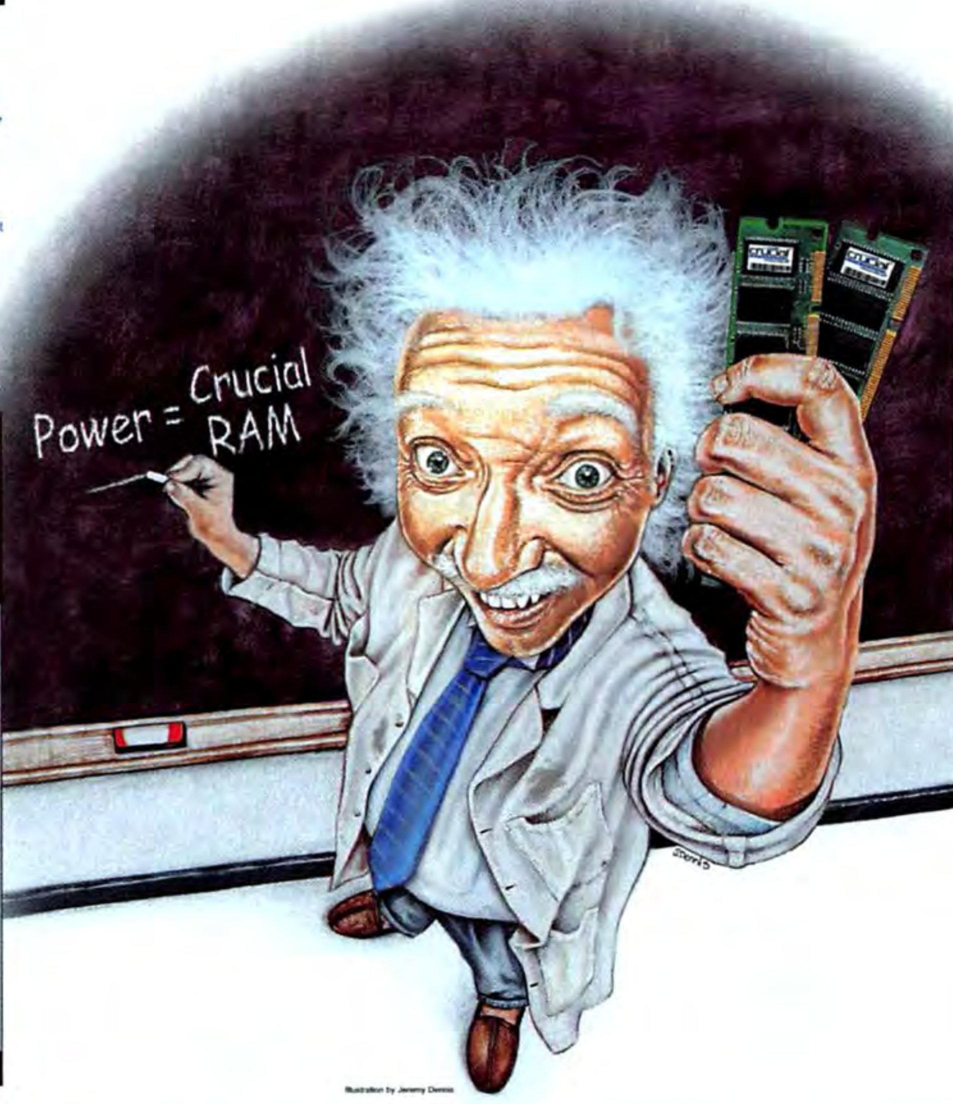
Power Mac G4	$140.00	$71.99

Crucial prices reflect an automatic 10% discount for ordering online. Prices were taken from Crucial and Kingston Web sites on 7/6/00; however, they can (and do) change daily. Prices may vary according to specific system requirement.



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If extra-terrestrials looking for high-performance PCs approach you with the order, "Take me to your leader," you'd do well to guide them to Alienware Corporation. Just look at some of the comments customers have posted on Alienware's web site:

"I just want to thank you for such a well-built product," says Marty. "My new Area 51 computer is truly 'all that and a bag of chips.'...I will be referring your excellent company to my friends who are looking for a computer system that is a cut above the rest."

Another user, David Shor, writes, "Thank you, guys, for building the best system money can buy! There are no false claims about performance level. The machine I got from you just *smokes*."

"Alienware, you are supreme," gushes Jack Powell. "I am now on my second Alienware system.... I fell in love with the first and am now in love with this one. There is no better-built computer on the market, and the components are absolutely cutting-edge.... I wouldn't consider buying a computer system from someone else."

"I have never had the pleasure of using a machine that was built to such perfection," Mario Viscardi adds. "The speed of the machine is amazing!"

Users aren't the only ones enthusiastic about Alienware's computer systems. "Alienware's top-of-the-line system packs a lot of brand-name punch into a reasonably priced package," writes *PC Gamer*, which has given Alienware its Editor's Choice award every year for the past three years. Alienware also won *Maximum PC*'s "Kick-Ass Award" and was described by that magazine as "the fastest PC we've ever seen, bar none!"

Alienware's success is due in part to its vision of building high-performance computer systems that go beyond word-processing and net-surfing capabilities to include full-blown multimedia options. The company strives to use the latest 3D accelerators and the best hardware possible, allowing users to custom-configure their systems by choosing the best brand-name components.

The South-Florida-based company, which was recently named a Microsoft System Builder Gold Member, prides itself on its customer service and support, which is also praised by its customers.

"The minute I began talking to your service reps, I knew I was in good hands," explains Michael Cooke. "They made me feel confident in the product I was purchasing, offered suggestions, and gave their input on the hardware.... Keep up the good work and keep setting the standards for what should be expected from any company."

Abraham Egnor says, "I love you guys. I sent you a message about losing the Software DVD player. I expected to get a reply sometime this week, maybe asking me for more info. Instead I got a reply the next day, with the software attached. Two words: jaw droppage. And it works. I'm not used to things going this well, especially where computer problems are concerned."

High performance, service, and support. It's no wonder many consider Alienware "out of this world."

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The next time you open a cardboard box—any cardboard box—you may want to thank Dave Dulaney, because few people work as hard as he does to make them. Since Cicero, Ill.-based Royal Box Group hired him as its IT director five years ago, Dulaney has turned the 78-year-old maker of corrugated cardboard boxes into a technology-based packaging powerhouse. "You might not think of corrugated boxes as a high-tech endeavor," he says, "but it is a very competitive industry in terms of price and service, and you need technology to stay out in front."

Dulaney keeps abreast of innovation through free online seminars hosted by Vernon Hills, Ill.-based CDW Computer Centers, Inc., the number-one direct seller of technology from Compaq, Computer Associates, Microsoft, Toshiba, and other top names. The Customer Technology Seminar Series kicked off last summer when experts from IDC, Cisco, Compaq, and Microsoft participated in a webcast about the future of the Internet for IT thought leaders at small and midsize businesses. The event was preceded by two pilot seminars that featured speakers from Toshiba and Quantum.

Attendees get a split-screen view of the seminars; the speakers appear in a Microsoft Windows Media Player window on the left, and their slides show up on the right. Attendees can submit questions through their web browsers in real time. Dulaney says he has no problems receiving the complete webcasts through his office network. "The charts and graphics are especially clear, and the audio always comes through perfectly. The whole package looks and sounds quite sharp."

Dulaney also likes participating in seminars without having to leave his office. "In the old days, we had to take time off and pay for travel to get to these conferences," he says. "And sometimes you just couldn't get away. CDW's webcasts are just as effective, but much more convenient."

Dulaney was doing paperwork during a webcast recently when an IDC analyst started talking about projected IT staffing shortages for the coming year. "I was actually waiting for the next guy to come on, but the topic got my attention," he says. "It can be like watching television at home. You can do something else while the webcast plays in the background, and then give it your full attention when something interesting comes up."

CDW makes it easy to capture and review any part of its webcasts. When Dulaney sees a slide that might help his organization—like a chart depicting IT staffing shortages—he simply captures the screen in Microsoft Windows. And if he misses a seminar, Dulaney can view an unedited rebroadcast from CDW's archives, 24 X 7.

As a five-year CDW.com customer, Dulaney sees the vendor's webcasts as a powerful extension to its customer support model. "It impresses the heck out of me that CDW has so many resources to answer your questions," he says. "Whatever you need help with, they help you get to the bottom of it, every time."

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While many motorists in Dimondale, Mich. say the family-owned Windmill Truck Stop is a home away from home, its controller, Kevin Edelmann, says it's been more like a house of accounting horrors. Besides monitoring retail fuel sales in the truck stop's "truckers only" area, he also has to keep an eye on commuters' and travelers' purchases in the king-sized complex's convenience store, family restaurant, motel, and auto service center. "Keeping track of all of that inventory has been a nightmare," Edelmann says.

The Point of Sale (POS) system that the Windmill had been using since 1982 did a fine job of ringing up sales, but it couldn't tell store managers anything about what was on the shelf. "The system only broke sales down by department," Edelmann says. "So it couldn't tell the difference between a tube of toothpaste and a bottle of shampoo."

PC AMERICA

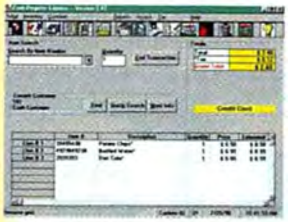
Edelmann found only a few POS solutions that were easy to use, Microsoft Windows-based, and able to support multiple input devices. And none of them could manage the 20,000-plus items in the Windmill's convenience store and restaurant. "We desperately needed a solution that could bring all of these components of our business together," he says.

Things finally turned around at the Windmill once Edelmann deployed PC America's Cash Register Express (CRE 2000), a Windows-based POS program that works with ordinary PCs and peripherals, as well as barcode scanners, receipt printers, and pole displays (which show charges at the checkout counter). Now all of the Windmill's cashiers can use touch screens and barcode scanners to enter orders and update inventory. And setting up CRE 2000 could not be easier, says Edelmann. "PC America did an excellent job pulling all of the hardware together initially. But the great thing about their software is that I can grab any component I want off the shelf and throw it together in no time. This is one slick program."

The Windmill has processed more than half a million transactions with CRE 2000 and PC America's Restaurant Pro Express (RPE 2000) since October 1999. And Edelmann predicts that PC America will continue to develop the software he needs to keep things running smoothly. "PC America is constantly improving upon their products," he says.

Now PC America is helping retailers like the Windmill to move beyond the sale itself to increase revenues. A new feature in CRE 2000 gives businesses the ability to print coupons on the bottom of sales receipts on an Epson TM-T88II receipt printer. They can use the coupons to advertise specials on slow business days (e.g., "10 Percent Off All Purchases Every Tuesday"), or to give their customers discounts on overstock items (e.g., "Get a Free Six-Pack of Pepsi on Your Next Visit").

CRE 2000's couponing feature promises retailers an excellent route to a crucial dimension in retail sales. "Repeat business is the most important aspect of any business," says PC America's president, Howard Gosman. "With this addition to our POS package, we are giving our customers a quick and easy-to-use method for creating it."



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All PC America Software requires Microsoft Windows. The software was written in Visual Basic using Microsoft Access Files. The source code is available.

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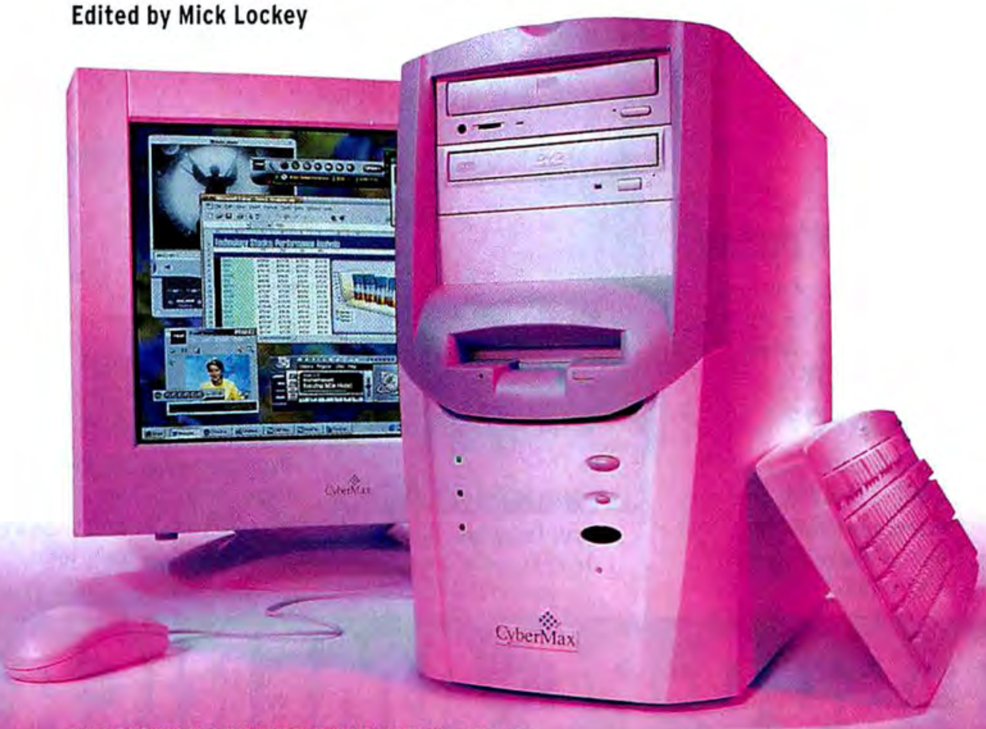
A monthly update of the best desktop PCs, notebooks, printers, scanners, monitors, and graphics boards

PC WORLD TOP 100

200 Power PCs
204 Midrange PCs
208 Budget PCs
212 Notebook PCs
214 Home PCs
217 Printers
219 Scanners
221 Monitors
223 Graphics Boards

A Few Ticks Short of a Gigahertz

Edited by Mick Lockey



THE CYBERMAX ENTHUSIAST K7-950 offers hearty power and a flat-screen monitor at a competitive price.

FOR MONTHS, THE NEWS has been all about breaking the gigahertz barrier. But now several new processors from Intel and AMD ratchet clock speed back a notch—and chop the price by a bunch. Usually, processor clock speeds (and prices) march in only one direction: forward. The Kingdom Royale PIII-933 and the CyberMax Enthusiast K7-950 did perform slightly slower than the 1-GHz systems we've tested, but the difference is unnoticeable for most everyday business applications—and these systems cost far less than those with gigahertz processors. The gigahertz systems competing for chart positions cost an average of $3425, while the CyberMax and the Kingdom cost more than $1000 less. (See the latest processor pricing information on page 206.)

Stepping down to either an 850-MHz or 900-MHz system won't cost you much in performance but will gain you a lot of pocket change. And vendors frequently include extras, such as a larger monitor or 256MB of RAM instead of 128MB, to adorn these not-quite-cutting-edge PCs and make them more attractive.

Meanwhile Intel's Pentium IIIs still outperform AMD's Athlons—but that situation may change over the coming months. AMD recently introduced a new version of Athlon processors—previously referred to as Thunderbird—that use on-chip Level 2 cache to generate faster performance (Pentium III chips already have this capability). Previous Athlons used off-chip Level 2 cache. We'll keep you informed about how these chips perform.

online POINT YOUR browser to www.pcworld.com/top400 for late-breaking reviews on desktop computers. In the Top 400 section, you'll find comprehensive reviews and ratings. You'll also find details on the PC WorldBench 2000 test suite at www.pcworld.com/benchmark.

PHOTOGRAPHS: KEVIN CANDLAND; ICONS: JEFFREY PELO; COMPUTER SCREEN GRAPHICS: JOHN GODDARD

MONITORING THE VIEW

ON THE *Top 10 Monitors* chart, the new ViewSonic EF70 bolts past the competition to take the number one position thanks to a low price, crisp image quality, and easy-to-use on-screen controls. Meanwhile Sony's MultiScan CPD-E200 holds steady in the number two spot, where it debuted on our February chart. This month, the prices on half of the Top 10 17-inch monitors hover in the vicinity of $300.

A LOW PRICE, saturated colors, and simple controls earn the ViewSonic EF70 a Best Buy.

Three new Best Buys grace the notebook Top 15, with Gateway claiming the top spot on both the power and midrange charts. The Gateway Solo 9300XL offers such compelling features as two multipurpose drive bays for docking an extra hard drive, a DVD-ROM drive, or an extra battery. The Solo 9300XL is gussied up with a big screen and a useful IEEE 1394 port, good for speedy downloads of content-rich multimedia files. If the head of your accounting office is threatening to close your expense account, you might instead want to take a look at the Solo 9300XL's inexpensive cousin on the midrange chart, the Gateway Solo 2550LS, which offers very good battery life in addition to an LS-120 drive.

NUMBER NINE DEEP-SIXED

FINALLY, NUMBER NINE Visual Technology, which made integrated and standalone graphics hardware for consumer and business PCs, has ceased operation. Though the company shut down telephone technical support for its products, online technical support and updated drivers will continue to be available at its Web site, www.nine.com.

Freelance writer Joel Strauch and PC World *editors Lisa Cekan, Katharine Dvorak, Mick Lockey, Kalai Murugesan, Kalpana Narayanamurthi, Karen Silver, and Alan Stafford contributed to the articles in this month's Top 100. Testing was performed by Curt Buehler, Ulrike Diehlmann, Robert James, Elliot Kirschling, Jeff Kuta, Thomas Luong, Sean Tieu, and John Tjon of the PC World Test Center. See page 18 for contact information.* ▶

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following information should answer them.

How do the charts work? Each month we test a large number of PCs, printers, scanners, monitors, graphics boards, and modems, and compare them with previously reviewed products. Only the best products land on the Top 10 and Top 15 charts, which are refreshed monthly. System configurations are shown as tested. Vendors may have since changed components.

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 70s is above average.

What does the PC WorldBench 2000 score mean? It's a measure of how fast a PC can run a mix of common business applications as compared with our baseline machine, an HP Pavilion 8380 with a PII-400 CPU, 96MB of RAM, and an 8GB hard drive. For example, a PC that scores 200 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 on anonymous support calls made by *PC World* staff. The policies score is based on vendor support policies.

TOP 10 POWER PCs

	SYSTEM: $2000 AND OVER	Month tested	★ Overall rating	Street price (6/09/00)	PC WorldBench 2000 performance score[1] Faster	Base configuration
1	**Micron Millennia Max 800** 800/642-7667 www.micronpc.com	May 00	98	**Inexpensive:** $2149	Good 149	**Outstanding:** Pentium III-800, 128MB of SDRAM, 256KB L2 cache, 27GB hard drive, 19-inch monitor, Windows 98 SE
2	**Dell OptiPlex GX300** 800/388-8542 www.dell.com	May 00	95	**Expensive:** $2813	Very good 165	**Outstanding:** Pentium III-733, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 19-inch monitor, Windows 2000 Pro
3	**Sys Performance 850A** 800/613-9963 www.sys.com	Jun 00	94	**Average:** $2559	Outstanding 198	**Outstanding:** AMD Athlon-850, 128MB of SDRAM, 512KB L2 cache, two 20.5GB hard drives, 19-inch monitor, Windows NT 4.0
4	**ABS Performance 1** 800/876-8088 www.buyabs.com	May 00	93	**Inexpensive:** $2199	Good 151	**Outstanding:** Pentium III-700, 256MB of SDRAM, 256KB L2 cache, 27.3GB hard drive, 19-inch monitor, Windows 98 SE
5	**Dell Dimension XPS B866r** 800/388-8542 www.dell.com	July 00	92	**Very expensive:** $3149	Outstanding 170	**Outstanding:** Pentium III-866, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows 2000 Pro
6	**Acer Power 8600** 800/873-2237 www.acer.com	July 00	90	**Average:** $2479	Good 157	**Outstanding:** Pentium III-866, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows 98 SE
7	**Kingdom Royale PIII-933** 800/385-3436 www.kingdomcomputers.com	NEW	90	**Inexpensive:** $2277	Outstanding 171	**Good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 27GB hard drive, 15-inch LCD monitor, Windows 2000 Pro
8	**Axis Systems Terra AXD** 800/378-9014 www.axissys.com	July 00	89	**Inexpensive:** $2199	Very good 194	**Outstanding:** AMD Athlon-850, 256MB of SDRAM, 512KB L2 cache, 30.7GB hard drive, 19-inch monitor, Windows NT 4.0
9	**Premio Apollo T440B** 800/677-6477 www.premiopc.com	May 00	88	**Very inexpensive:** $2075	Good 140	**Very good:** Pentium III-700, 128MB of SDRAM, 256KB L2 cache, 18.2GB hard drive, 19-inch monitor, Windows 98 SE
10	**CyberMax Enthusiast K7-950** 800/437-4596 www.cybermaxpc.com	NEW	86	**Average:** $2349	Good 153	**Outstanding:** AMD Athlon-950, 128MB of SDRAM, 512KB L2 cache, 20GB hard drive, 19-inch monitor, Windows 98 SE
	Best Buy	Percent of overall rating ▶		Price: 15 percent	Performance: 20 percent	Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 199.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

MOST OF THE ACTION on this month's power chart occurs in the lower echelons. The Kingdom Royale PIII-933 claims seventh spot. Fueled by Intel's newest processor, the Royale performs a tad slower than PIII-1000–enabled systems but at a much lower cost. It's a good choice if you need power but don't want to pay top dollar. CyberMax's Enthusiast K7-950 slips onto the chart in tenth place, thanks to a robust feature set. Dell discontinued its Dimension XPS B800r, allowing last month's number five PC, the Micron Millennia Max 800, to ride a $150 price drop into the top spot.

1 MICRON MILLENNIA MAX 800

WHAT'S HOT: A well-designed interior offers access to four open slots and five open drive bays, and the power supply swings out to clear even more maneuvering room. Text on the 19-inch Micron Trinitron CPD-4401 monitor stayed sharp up to the unbelievably high resolution of 2048 by 1536. Colors of test images appeared rich (albeit a tad dark). **WHAT'S NOT:** At this price, the Millennia Max 800 provides neither a removable storage option nor a CD-RW drive. And this Pentium III-800 unit scored just 149 on our PC WorldBench 2000 tests—making it a scant 6 points faster than its PIII-677 sibling, the Millennia Max 667. **WHAT ELSE:** This PC earns points for documentation, thanks to its setup poster and thorough system manual, but it lacked some component manuals. The midsize tower case features twin fans, a case lock, and a side that pops off smoothly (getting it back on requires some fiddling, however). The motherboard provides both Slot 1 and Socket 370 processor slots, so you can upgrade with either type of CPU. **BEST USE:** With its excellent monitor, this PC makes a fine presentation system.

2 DELL OPTIPLEX GX300

WHAT'S HOT: Running Windows 2000 Professional, this OptiPlex posted a PC WorldBench 2000 score of 165, trailing the two Windows NT machines and the two other Windows 2000 Pro PCs on the chart but outpacing the five Windows 98 PCs. A tidy interior offers chassis intrusion detection, a case lock, a swing-out power supply, five open PCI slots, and three open (and toolless)

Extra features	Design and expandability [2]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Good: VisionTek NVidia GeForce 256 graphics card with 32MB of SDRAM, 12X DVD-ROM drive, V.90 modem, case lock, Microsoft Office 2000 SBE	**Very good:** roomy interior; midsize tower; 5 open drive bays, 4 open slots	Good	Fair/ Outstanding	24/7, toll-free	Varies [3]/1
Good: Celestica NVidia GeForce 256 graphics card with 32MB of SGRAM, 8X/4X/32X CD-RW drive, network card, case lock, wake-on-LAN, Microsoft Natural keyboard, IntelliMouse	**Good:** toolless drive bay carriers; midsize tower; 3 open drive bays, 5 open slots	Outstanding	Good/ Outstanding	24/7, toll-free	3/3
Good: Matrox G400 Max graphics card with 32MB of SGRAM, 17X–40X CD-ROM drive, network card, case lock, RAID card	**Very good:** room for expansion; midsize tower; 4 open drive bays, 3 open slots	[4]	Good [4]/ Good	24/7, toll-free [5]	Varies [6]/5
Outstanding: ATI Rage Fury Maxx graphics card with 64MB of SDRAM, 8X DVD-ROM drive, 4X/4X/32X CD-RW drive, V.90 modem, Microsoft Office 2000 SBE, microphone	**Good:** front-mounted MIDI inputs; midsize tower; 2 open drive bays, 4 open slots	[4]	Fair [4]/ Outstanding	24/7, toll-free	3/lifetime
Outstanding: Celestica NVidia GeForce DDR graphics card with 64MB of SDRAM, 8X/4X/32X CD-RW drive, Iomega Zip 100 drive, V.90 modem, network card, Microsoft Office 2000 Pro	**Good:** simple access to interior; midsize tower; 3 open drive bays, 2 open slots	Outstanding	Good/ Good	24/7, toll-free	3/1
Outstanding: Leadtek WinFast 3D GeForce 256 graphics card with 32MB of DDR SGRAM, 8X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem, network card	**Good:** chassis intrusion detection; midsize tower; 2 open drive bays, 3 open slots	[4]	Fair [4]/ Good	24/7, toll-free	3/3
Good: Cardex NVidia TNT2 M64 graphics card with 32MB of SDRAM, 52X CD-ROM drive, LS-120 drive, V.90 modem, Microsoft Office 2000 Professional	**Good:** hard to access interior; midsize tower; 3 open drive bays, 4 open slots	[4]	Good [4]/ Fair	12.5/6, toll-free	Varies [3]/1
Very good: Creative Labs 3D Blaster Annihilator Pro graphics card with 32MB of DDR SGRAM, 16X DVD-ROM drive DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem	**Good:** easily removable case; midsize tower; 2 open drive bays, 3 open slots	[4]	Fair [4]/ Outstanding	24/7, toll-free	3/3
Very good: Creative Labs 3D Annihilator Pro graphics card with 32MB of DDR SGRAM, 6X DVD-ROM drive, V.90 modem, Microsoft Office 2000 SBE	**Good:** MPEG decoder card; midsize tower; 5 open drive bays, 2 open slots	[4]	Fair [4]/ Fair	10/5, toll-free	3/3
Very good: Creative Labs 3D Blaster Annihilator graphics card with 32MB of SDRAM, 12X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem, network card, Corel WordPerfect Office 2000	**Good:** hard to access memory sockets; midsize tower; 3 open drive bays, 2 open slots	Fair [4]	Fair [4]/ Good	9/5, toll-free	1/1
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent		

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

[4] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech-support quality, this rating may also depend on our anonymous support-quality calls.

[5] Support hours drop to 9 hours Monday–Friday after one year.

[6] Six years on CPU and main RAM, three years on other parts.

drive bays. Dell's 19-inch UltraScan P991 monitor delivers vibrant colors and crisp text at resolutions up to 1600 by 1200.

WHAT'S NOT: This $2813 OptiPlex is hardly cheap. Dell posts most documentation online; the hard copy of the main system manual contains the bare minimum, and you won't find paper documentation for individual components (though you can order it for free).

WHAT ELSE: Despite the easy-service chassis, the memory slots are buried, and the interior feels cramped until you swing the power supply out of the way. Thanks to the 8X/4X/32X CD-Rewritable drive, making backups is convenient, fast, and easy.

BEST USE: For businesses that want fast, managed Windows 2000 systems, this OptiPlex workhorse offers substantial bang, albeit for beaucoup bucks.

PHOTOGRAPH: KEN SMITH

MICRON'S MILLENNIA MAX 800 delivers plenty of multimedia punch for a moderate price.

New This Month

7 KINGDOM ROYALE PIII-933

NEW **WHAT'S HOT:** The keys to this Kingdom are extras you rarely find at this price ($2277): an LS-120 drive, Microsoft Office 2000 Professional, and a 15-inch ADI LD-521 flat-panel monitor, which delivers rich colors and sharp text, making it a good choice for space-constrained offices. Running Windows 2000 Professional, this new Pentium III-933 sped to an outstanding score of 171 on our PC WorldBench 2000 benchmark tests. A thick system manual offers thorough upgrade information, along with a detailed glossary of useful terms.

WHAT'S NOT: You have to remove four screws and wrestle with the case a bit to access the interior. The flat-panel display doesn't swivel sideways or pivot up and down into landscape mode—desirable features of other LCD panels.

WHAT ELSE: Expansion room abounds, with four open PCI slots and three open bays in the neat interior, but a support panel obstructs access to the bays.

BEST USE: A feature-rich machine for well-heeled and growing businesses ready to make the leap to Windows 2000. ▶

10 CYBERMAX ENTHUSIAST K7-950

NEW **WHAT'S HOT:** With a 12X DVD-ROM drive, a Creative Labs FPS2000 Digital five-speaker set, and an excellent 19-inch CyberMax CX900DF flat-screen monitor—which delivered beautiful colors and crisp text at all normal resolutions—this CyberMax can produce top-notch multimedia presentations. It also offers both a V.90 modem and a network interface card for multiple connectivity options.

WHAT'S NOT: Documentation includes a quick-setup guide and adequate component manuals, but the overall system manual is limited to generic information not specific to this model. In our most recent reader survey, CyberMax earned only a Fair rating for system reliability.

WHAT ELSE: An 8X/4X/32X CD-RW drive means the system offers four different storage options—it also boasts a 20GB hard drive, a DVD-ROM drive, and a floppy drive. The software bundle includes Corel's WordPerfect Office 2000. With an Athlon-950 processor inside, the Enthusiast K7-950 earned a score of 153 on our PC WorldBench 2000 tests, ranking in the middle of the three similarly configured systems that we've tested. The midsize tower case looks cool, and opening it is a simple matter of loosening two thumbscrews and removing a side panel that comes off and goes back on smoothly. A tidy interior offers two open PCI slots and three open bays for expansion, but wiring blocked access to the RAM slots.

BEST USE: This Enthusiast machine would make a good choice for a cash-strapped, multimedia-inclined office.

AGP Gets Faster With New Chip Set

TECH TREND MANY OF THE PC chip sets that vendors use to build systems—including those on our budget chart—integrate graphics systems onto the motherboard for cost savings. But users who want faster graphics performance must add a PCI graphics card, and these cards are fast becoming relics. Intel's new chip sets—the 815 and the 815e—include support for AGP 4X graphics cards as well as for their standard integrated graphics.

"You can use this new integrated graphics functionality—[suitable for] mainstream graphics—or you can go with a separate AGP graphics card," says Intel spokesperson Dan Francisco. "It gives you a lot of flexibility."

The new chip sets also offer improved system memory support. While the higher-end 820 chip set—aimed at power users—supports only the more expensive Rambus memory, the 815 and 815e support PC133 SDRAM memory. "It's the first Intel chip set validated to run PC133 memory," Francisco explains. The chip sets also support Pentium III and Celeron processors, plus an integrated LAN connection and the new ATA100 standard for hard drives. Bottom line: The two chip sets will increase a system's overall expandability.

Also of Note

TWO CONTENDERS couldn't crack the chart this month. The specs alone of the $2799 Axis Terra AXK would seem to warrant a spot on the chart: This powerhouse features an Athlon-950 processor with 256MB of PC133 SDRAM, a 21-inch KDS VS-21E monitor, a 16X DVD-ROM drive, a hardware decoder card, a 10X/4X/32X CD-RW drive, and flat-panel Monsoon MH-500 speakers. But the Terra AXK scored lower than many Athlon-900s and -850s on our PC WorldBench 2000 tests. Colors on the monitor appeared washed out in our image tests, and text blurred at average resolutions. Worse, reader reports of poor tech support have dogged the company lately, leading to a downgrading of the company's tech support rating. Axis says the problem is due to recent staff turnover and expects the problem to be temporary. We'll continue to monitor the company's technical support.

Meanwhile, despite a PIII-850 tugging at the reins, the new $2475 Tangent Medallion ProDV lands at the slow end of the performance scale (earning a 162 on PC WorldBench 2000 tests, behind similarly configured PIII-800 and -733 PCs we've tested). But it has some notable extras. The IntelliMouse with IntelliEye allows optical input—no mouse pad needed—and an IEEE 1394 expansion card lets you connect high-speed peripherals. Also, side-mounted pass-through ports for USB, headphones, and a microphone make connecting these devices easy. The 19-inch Optiquest Z90 monitor enhances the package with deep, rich colors and crisp text, but Tangent doesn't supply a modem or a network card, and a panel blocks some interior components. ▶

MORE REVIEWS ONLINE

online THE FOLLOWING SYSTEMS didn't score high enough to reach the *Top 10 Power PCs* chart. For write-ups, visit PCWorld.com (www.pcworld.com/t10pcs).

- **Axis Terra AXK**
- **Tangent Medallion ProDV**

NO CHEESE, PLEASE: Kingdom's Royale PIII-933 offers a svelte LCD and zippy CPU performance at an affordable price.

PHOTOGRAPH ABOVE: KEVIN CANDLAND; BELOW: KEN SMITH

Dang. Forgot the racing stripes.

But that's about it, in terms of souped-up, sports-car qualities. Introducing TurboRing™, the world's first trackball with patented Scroll Ring™ technology and three programmable buttons. Now, you can blast through long documents. And whiz through Web pages. All in sheer, ergonomic bliss. The idea of comfort and handling at high speeds is coming to a whole new Autobahn. Your desktop. For more information, visit www.turboring.com. And please, buckle up.

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TOP 10 MIDRANGE PCs

	SYSTEM: $1200 TO $1999	Month tested	★ Overall rating	Street price (6/09/00)	PC WorldBench 2000 performance score[1] Faster ▶	Base configuration
1	**Gateway GP7-700** 800/315-2536 www.gateway.com	May 00	90	**Inexpensive:** $1453	Very good 147	**Good:** Pentium III-700, 128MB of SDRAM, 256KB L2 cache, 15GB hard drive, 17-inch monitor, Windows 98 SE
2	**Quantex SM667sx** 800/352-4051 www.quantex.com	May 00	88	**Inexpensive:** $1349	Good 138	**Very good:** Pentium III-667, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 98 SE
3	CyberMax Enthusiast K7-750 800/437-4596 www.cybermaxpc.com	June 00	87	**Average:** $1499	Very good 154	**Very good:** AMD Athlon-750, 128MB of SDRAM, 512KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 98 SE
4	Dell OptiPlex GX110 800/388-8542 www.dell.com	July 00	87	**Average:** $1531	Good 140	**Good:** Pentium III-667, 128MB of SDRAM, 256KB L2 cache, 10GB hard drive, 17-inch monitor, Windows 98 SE
5	Sys Performance 800 800/613-9963 www.sys.com	NEW	86	**Expensive:** $1799	Outstanding 180	**Very good:** Pentium III-800EB, 128MB of SDRAM, 256KB L2 cache, 20.5GB hard drive, 17-inch monitor, Windows 2000 Pro
6	Micron Millennia Max 733 800/642-7667 www.micronpc.com	July 00	86	**Average:** $1499	Very good 148	**Very good:** Pentium III-733, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 98 SE
7	Micro Express MicroFlex 850A 800/989-9900 www.microexpress.net	July 00	84	**Inexpensive:** $1399	Very good 153	**Very good:** AMD Athlon-850, 128MB of SDRAM, 512KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 98 SE
8	ABS Conquest GL 800/876-8088 www.buyabs.com	NEW	84	**Expensive:** $1899	Very good 150	**Outstanding:** AMD Athlon-850, 128MB of SDRAM, 512KB L2 cache, 20GB hard drive, 19-inch monitor, Windows 98 SE
9	NuTrend Sierra LE 888/482-6678 www.nutrend.com	Aug 00	82	**Inexpensive:** $1389	Good 142	**Very good:** Pentium III-733, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 98 SE
10	Polywell Poly 800K7 800/999-1278 www.polywell.com	May 00	80	**Very expensive:** $1995	Very good 151	**Outstanding:** AMD Athlon-800, 128MB of SDRAM, 512KB L2 cache, two 13.5GB hard drives, IDE RAID controller, 19-inch monitor, Windows 98 SE
	Best Buy	Percent of overall rating ▶		Price: 17 percent	Performance: 18 percent	Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. See "Your Guide to the Top 100" on page 199.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

TWO NEW PCs climb aboard the chart this month. Sys Technology's Performance 800 distinguishes itself with raw horsepower—the Pentium III-800EB system delivers the fastest performance on the chart. The other new machine, ABS's Conquest GL, includes a 19-inch monitor that displays crisp images. Meanwhile, Dell discontinued the Dimension XPS T600r, making room at the top for Gateway's GP7-700, which boasts a generous price cut.

1 GATEWAY GP7-700

WHAT'S HOT: A hefty $305 price drop since June helps lift the GP7-700 into Best Buy land (it was our number one power PC back in March, when it cost $2198). With a Pentium III-700 CPU and running Windows 98 SE, this Gateway earned a PC WorldBench 2000 score of 147, the highest we've recorded for a system with this configuration. For the competitive price, you get a well-outfitted, network-ready system replete with a network card, a modem, and an APC surge protector that guards eight outlets and two phone lines. The system interior is easily accessible, thanks to a side panel that slides off smoothly after you loosen a couple of thumbscrews. Even at $1453, the GP7-700 comes with Microsoft Office 2000 Small Business Edition and an Iomega Zip 100 drive.

WHAT'S NOT: The GP7-700 provides just two open slots—one PCI and one shared PCI/ISA—and interior cabling obstructs your access to the memory upgrade slots.

WHAT ELSE: The documentation includes a detailed setup guide and a system manual with plenty of color illustrations. The two-speaker Cambridge SoundWorks SBS52 set pumps out rich sound, and a solid keyboard allows smooth typing.

BEST USE: Aimed at small to medium-size businesses, the GP7-700 combines attractive pricing, office-ready features, and plenty of power.

2 QUANTEX SM667SX

WHAT'S HOT: Quantex's SM667sx posted a score of 138 on our PC WorldBench 2000 tests, about average for the Pentium III-667 systems we've tested. With four open slots and four open bays, the machine offers ample expansion room. The keyboard provides buttons for instant access to frequently used applications and Web sites. Color-coded ports aid setup.

Extra features	Design and expandability [2]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Outstanding: 3dfx Voodoo3 3000 graphics card with 16MB of SDRAM, 17X–40X CD-ROM drive, Iomega Zip 100 drive, V.90 modem, network card, surge protector	**Good:** roomy, easy-access case; midsize tower; 5 open drive bays, 2 open slots	Good	Fair/ Outstanding	24/7, toll-free	3/3
Very good: Joytech NVidia TNT2 M64 graphics card with 32MB of SDRAM, 12X DVD-ROM drive, Iomega Zip 250 drive, V.90 modem, network card, Corel WordPerfect Office 2000	**Good:** multimedia keyboard; minitower; 4 open drive bays, 4 open slots	Fair [3]	Fair [3]/ Good	24/7, toll-free	3/1
Good: Joytech NVidia GeForce 256 graphics card with 32MB of SDRAM, 12X DVD-ROM drive, V.90 modem, Corel WordPerfect Office 2000	**Very good:** sleep and reset buttons on case; midsize tower; 4 open drive bays, 5 open slots	Fair [3]	Fair [3]/ Good	9/5, toll-free	1/1
Good: Celestica NVidia M64 graphics card with 16MB of SDRAM, 20X–48X CD-ROM drive, network card, Wake-on-LAN, Microsoft Intellimouse, case lock	**Good:** chassis intrusion detection; midsize tower; 3 open drive bays, 3 open slots	Outstanding	Good/ Outstanding	24/7, toll-free	3/3
Good: Matrox Millennium G400 dual-head graphics card with 32MB of SGRAM, 10X DVD-ROM drive, LS-120 drive, network card, case lock	**Outstanding:** easy access to peripherals; midsize tower; 5 open drive bays, 4 open slots	[3]	Good [3]/ Good	24/7, toll-free [4]	Varies [5]/5
Very good: Visiontek NVidia TNT2 Pro graphics card with 32MB of SDRAM, 12X DVD-ROM drive, network card, case lock, Microsoft Office 2000 SBE	**Good:** easy access to slots and motherboard; midsize tower; 5 open drive bays, 5 open slots	Good	Fair/ Outstanding	24/7, toll-free	Varies [6]/3
Good: ATI Xpert Pro graphics card with 32MB of SDRAM, 8X DVD-ROM drive, V.90 modem, microphone	**Good:** easily accessible expansion slots; midsize tower; 4 open drive bays, 3 open slots	[3]	Fair [3]/ Outstanding	24/7, toll-free	4/4
Good: Guillemot Cougar Video Edition graphics card with 32MB of SDRAM, 10X DVD-ROM drive, V.90 modem, microphone, Corel WordPerfect Office 2000	**Very good:** neat, roomy interior; midsize tower; 4 open drive bays, 4 open slots	[3]	Fair [3]/ Outstanding	24/7, toll-free	3/lifetime
Good: ATI Rage 128 Pro graphics card with 32MB of SDRAM, 8X DVD-ROM drive, V.90 modem	**Good:** detachable wrist rest; midsize tower; 4 open drive bays, 4 open slots	[3]	Fair [3]/ Good	24/7, toll-free	3/lifetime
Very good: Leadtek NVidia GeForce 256 AGP graphics with 32MB of SDRAM, 8X DVD-ROM drive, Iomega Zip 100 drive, V.90 modem, Lotus SmartSuite Millennium	**Good:** one-piece case slides off easily; minitower; 3 open drive bays, 3 open slots	[3]	Fair [3]/ Good	24/7, toll-free	3/5
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent		

[3] Insufficient data to give a rating, or the rating is derived from our Reliability and Service survey scores for the vendor's home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

[4] Support hours drop to 9 hours Monday–Friday after one year.

[5] Six years on CPU and main RAM, three years on other parts.

[6] Six years on CPU and main RAM, three years on other parts.

WHAT'S NOT: You must remove two screws to free the flimsy side panel, and the plastic tabs that secure it are easy to bend. Once inside, you'll find a fairly cluttered interior. The 17-inch Quantex XP175N monitor displayed washed-out colors and blurry text at the standard resolution of 1024 by 768. (We suggest upgrading the monitor.)

WHAT ELSE: The Altec Lansing ACS 33W system delivered crisp, strong audio in concert with the Aureal Vortex2 sound card. The documentation includes a helpful setup guide and a slim system manual with lots of screen shots.

BEST USE: This Quantex suits the small office set up for modem connectivity.

New on the Chart

5 SYS PERFORMANCE 800

NEW **WHAT'S HOT:** Featuring a PIII-800EB processor and Windows 2000 Professional, the Performance 800 earned impressive marks on our PC WorldBench 2000 tests: Its 180 score tops the previous high of 178 from the PIII-1000-based Dell Dimension XPS-B1000r Special Edition. Despite its midrange price of $1799, the Sys Performance 800 packs a 10X DVD-ROM drive, an LS-120 drive for small backups, a network card, and a Matrox dual-head video card, to which you can connect a pair of monitors for a double-width desktop display.

SYS PERFORMANCE 800, featuring a PIII-800EB CPU, takes bragging rights for outgunning the competition. Four open PCI slots and five open drive bays round out the ample storage offerings.

WHAT'S NOT: The system lacks an overall user manual, though manuals for components are included. Sys includes no office suite or other productivity software, and you must remove two screws to open the case and gain access to the interior.

WHAT ELSE: Smooth guide rails make removing the side panels easy. The roomy, neat interior contains four open PCI slots and five open drive bays for expansion. Colors on the 17-inch Optiquest Q71 ▶

PHOTOGRAPHS: KEN SMITH

Processor Prices

OFTEN YOU CAN save a lot of money without compromising performance by choosing a processor with a slightly lower clock speed. For example, the average PIII-866 system we've tested earned a PC WorldBench 2000 score of 158, while the average PIII-800 system earned a WorldBench score of 150—a difference of less than 5 percent, which most users can't detect.

	CLOCK SPEED (MHz)	Price [1]
Intel Pentium III	1000	$990
	933	$774
	866	$562
	850	$551
	800	$385
	750	$337
	733	$246
	700	$241
	667	$193
Intel Celeron	700	$192
	667	$170
	633	$138
	600	$112
	566	$93
	533	$79
	500	$69
AMD Athlon [2]	1000	$990
	950	$759
	900	$589
	850	$507
	800	$359
	750	$319
AMD Duron [3]	700	$192
	650	$154
	600	$112

[1] When purchased in quantities of 1000; all prices as of 6/19/2000. [2] New line of processors code-named Thunderbird. [3] New line of budget PC processors.

monitor looked somewhat light on our test photos, although spreadsheet and document text was crisply legible at the standard resolution of 1024 by 768.

BEST USE: This Sys would work well for people who want to move up to Windows 2000 Pro with a minimal investment.

8 ABS CONQUEST GL

NEW **WHAT'S HOT:** With an Athlon-850 processor inside, this ABS earned an above-average score of 150 on our PC WorldBench 2000 tests. Its 19-inch Lite-On B1996NSL monitor delivered deep, rich colors and crisp text. Only slight blurring occurred at the extremely high resolution of 2048 by 1536 provided by the Guillemot Cougar Video Edition graphics card (which also offers S-Video input and output and composite input). With the exception of those who work with CAD applications, most people will find text at that resolution too eye-straining to work with for 8 or more hours a day. The system's neat interior contains four open PCI slots and four open drive bays. Extras include a microphone, a 10X DVD-ROM drive, and Creative SoundWorks Digital speakers that deliver solid sound despite their unimpressive size.

THE ABS CONQUEST GL wields a moderate amount of multimedia muscle, but it's pricey compared to other systems.

WHAT'S NOT: To open the GL's sturdy case, you must remove two screws. The system manual contains no model-specific information.

WHAT ELSE: Though generic, the manual offers helpful upgrading details and lots of color illustrations, and ABS packs all the paperwork in a large but handy binder. Corel's WordPerfect Office 2000 anchors the software bundle. The fairly large multimedia keyboard, which houses many programmable buttons and includes an attachable wrist rest, supports smooth typing with only a little clacking from the responsive keys.

BEST USE: Excellent multimedia features and speedy performance make this ABS a good choice for any small office with a penchant for graphics work.

Also of Note

ANOTHER NEW SYSTEM this month, NuTrend's Intrepid XE, sporting a Pentium III-733 processor, just missed the chart, partly because its performance ranks slightly below average for a PIII-733 PC. Nevertheless, the system does offer several desirable multimedia components, including a 10X DVD-ROM drive that features good playback and the same stellar 19-inch Lite-On B1996NSL monitor with deep colors and sharp text that the eighth-place ABS Conquest GL uses. The keyboard offers plenty of smooth typing with a minimum of clacking noise, but its construction felt flimsy. A binder conveniently houses the system's documentation and software CD collection; its contents include a large illustrated setup poster, Corel's WordPerfect Office 2000, and Grolier's Multimedia Encyclopedia.

Like NuTrend's Intrepid, Micro Express's MicroFlex 900A was a near miss this month, despite several noteworthy features. For a low price of $1399, Micro Express configures this computer with an Athlon-900, helping the 900A earn a middle-of-the-road score of 151 on our PC WorldBench 2000 tests. However, the 900A's performance is nearly indistinguishable from that of its Athlon-850 cousin, the Micro Flex 850A—number seven on this month's chart.

With the 900A, you also get an 8X DVD-ROM drive and an ELSA Erazor X2 graphics board that features fast DDR memory and S-Video output—helpful when you need to send that sales presentation to a television set. Unfortunately, the standard-issue 17-inch Impression 7VX monitor delivered only mediocre text on our image-quality tests, marring what could have been a Top 10 system. ▶

MORE REVIEWS ONLINE

online THE FOLLOWING SYSTEMS didn't score high enough to reach the *Top 10 Midrange PCs* chart. For write-ups, visit PCWorld.com (www.pcworld.com/t10pcs).

- ◆ Micro Express MicroFlex 900A
- ◆ NuTrend Intrepid XE

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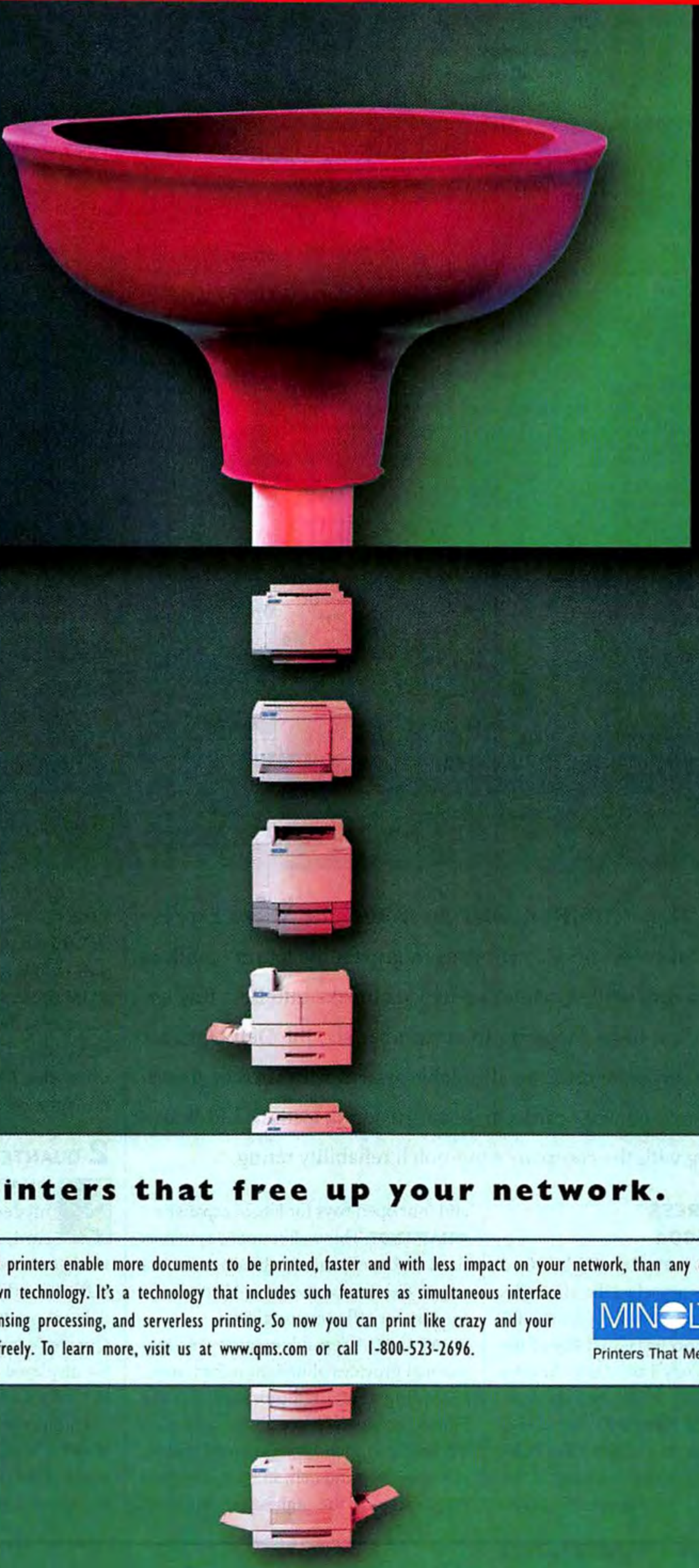

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TOP 10 BUDGET PCs

	SYSTEM: UNDER $1200	Month tested	★ Overall rating	Street price (5/15/00)	PC WorldBench 2000 performance score[1] Faster ▶	Base configuration
1	**Micro Express MicroFlex 600A** 800/989-9900 www.microexpress.net	June 00	89	**Average:** $1099	Very good 134	**Outstanding:** AMD Athlon-600, 128MB of SDRAM, 512KB L2 cache, 18GB hard drive, 17-inch monitor, Windows 98 SE
2	**Quantex SB500sx** 800/352-4051 www.quantex.com	May 00	84	**Inexpensive:** $829	Satisfactory 101	**Good:** Celeron-500, 64MB of SDRAM, 128KB L2 cache, 15GB hard drive, 17-inch monitor, Windows 98 SE
3	NuTrend Athlon Special 2 888/482-6678 www.nutrend.com	NEW	84	**Expensive:** $1199	Outstanding 140	**Outstanding:** AMD Athlon-750, 128MB of SDRAM, 512KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 98 SE
4	Quantex M650sx 800/352-4051 www.quantex.com	June 00	82	**Average:** $1029	Good 121	**Good:** Pentium III-650, 64MB of SDRAM, 256KB L2 cache, 15GB hard drive, 17-inch monitor, Windows 98 SE
5	Sys TaskMaster 600A 800/613-9963 www.sys.com	Aug 00	81	**Expensive:** $1199	Very good 135	**Very good:** AMD Athlon-600, 128MB of SDRAM, 512KB L2 cache, 13.6GB hard drive, 17-inch monitor, Windows 98 SE
6	Dell OptiPlex GX100 800/388-8542 www.dell.com	NEW	81	**Expensive:** $1169	Good 111	**Good:** Celeron-600, 64MB of SDRAM, 128KB L2 cache, 10GB hard drive, 17-inch monitor, Windows 98 SE
7	Racer PC500c 800/843-8458 www.racerpc.com	May 00	81	**Inexpensive:** $799	Satisfactory 102	**Good:** Celeron-500, 64MB of SDRAM, 128KB L2 cache, 8.4GB hard drive, 17-inch monitor, Windows 98 SE
8	IDot.com SA Series 600 888/388-4368 www.idot.com	July 00	80	**Expensive:** $1169	Very good 125	**Good:** AMD Athlon-600, 64MB of SDRAM, 512KB L2 cache, 13.5GB hard drive, 17-inch monitor, Windows 98 SE
9	Polywell Poly LPC 1000 800/999-1278 www.polywell.com	May 00	76	**Average:** $999	Satisfactory 103	**Very good:** Celeron-500, 128MB of RAM, 128KB L2 cache, 27.3GB hard drive, 17-inch monitor, Windows 98 SE
10	Toshiba V3100 800/867-4422 www.buy.toshiba.com	May 00	74	**Average:** $959	Satisfactory 99	**Satisfactory:** Celeron-500, 64MB of RAM, 128KB L2 cache, 8.5GB hard drive, 17-inch monitor, Windows 95
	Best Buy	Percent of overall rating ▶		Price: 22 percent	Performance: 13 percent	Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 199.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

OUR NUMBER ONE Best Buy, the Micro Express MicroFlex 600A, maintains its grip for the fourth month in a row, while Quantex's SB500sx breaks into Best Buy territory for the first time. Stepping in at number six, the Dell OptiPlex GX100 offers corporate users an affordable system with such business-class features as a network card, chassis intrusion detection, and Wake-on-LAN, along with the company's top-notch reliability rating.

1 MICRO EXPRESS MICROFLEX 600A

WHAT'S HOT: Its Athlon-600 processor propelled the MicroFlex 600A to a score of 134 on our PC WorldBench 2000 tests, just shy of the new Sys Technology TaskMaster 600A's score of 135. If your wrists are complaining, the Microsoft Natural Keyboard may pacify them with its comfortable, quiet typing. The uncluttered interior of the midsize tower holds three open PCI slots and four open bays for lots of expansion.

WHAT'S NOT: This well-rounded system is hard to knock, though business users might wish for a network card instead of a modem for office connectivity.

WHAT ELSE: A sensibly organized system manual provides abundant information, including a detailed glossary, but the blurred images look like photocopies. Colors on the 17-inch Impression 7VX monitor were deep and rich, and text remained crisp except at the highest resolution of 1600 by 1200. The ATI Rage Fury graphics card offers S-Video and composite output—boons for presenters. The 6X DVD-ROM drive, with smooth playback, is a surprise at this unit's bargain price.

BEST USE: This is an excellent general-use system for a small office seeking performance on a shoestring.

2 QUANTEX SB500SX

WHAT'S HOT: Packing both a modem and a network interface card, the Quantex SB500sx is ready for any kind of connectivity your office can throw at it—and at $829, it delivers pretty good pop for your penny. Quantex's 17-inch MON-XP170DP monitor displayed our test images with deep, rich colors, and text stayed sharp up to the maximum resolution of 1280 by 1024.

WHAT'S NOT: To remove the flimsy side panel of the midsize tower case, you have to remove two screws and wiggle it back

Extra features	Design and expandability [2]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Good: ATI Rage Fury graphics card with 32MB of SDRAM, 6X DVD-ROM drive, V.90 modem, hardware MPEG, Norton AntiVirus	**Very good:** easy motherboard access; midsize tower; 4 open drive bays, 3 open slots	[3]	Fair [3]/ Good	24/7, toll-free	4/4
Good: integrated Intel 810 graphics with UMA, 24X-48X CD-ROM drive, V.90 modem, network card, Corel WordPerfect Office 2000	**Good:** removing side panel takes fiddling; midsize tower; 4 open drive bays, 1 open slot	Fair	Fair [3]/ Good	24/7, toll-free	3/1
Good: Guillemot Maxi Gamer Cougar graphics card with 32MB of SDRAM, 10X DVD-ROM drive, V.90 modem, Corel WordPerfect Office 2000, microphone	**Very good:** easy interior access; midsize tower; 4 open drive bays, 4 open slots	[3]	Fair [3]/ Good	24/7, toll-free	3/lifetime
Good: integrated Intel 810 graphics with UMA, 12X DVD-ROM drive, V.90 modem, Corel WordPerfect Office 2000	**Good:** programmable keyboard buttons; midsize tower; 4 open drive bays, 2 open slots	Fair	Fair [3]/ Good	24/7, toll-free	3/1
Good: Matrox Millennium G400 graphics card with 16MB of SGRAM, 17X-40X CD-ROM drive, V.90 modem, network card	**Good:** easy-open case, spacious interior; midsize tower; 5 open drive bays, 3 open slots	[3]	Good [3]/ Good	24/7,[4] toll-free	Varies [5]/5
Satisfactory: integrated Intel 810 graphics with UMA, 20X-48X CD-ROM drive, network card, chassis intrusion detection, Wake-on-LAN	**Satisfactory:** sturdy case, easy access to memory; midsize tower; 3 open drive bays, 4 open slots	Outstanding	Good/ Outstanding	24/7, toll-free	3/3
Satisfactory: integrated Intel 810 graphics with UMA, 4.8X DVD-ROM drive, V.90 modem	**Good:** side handles on case; minitower; 1 open drive bay, 3 open slots	[3]	Good [3]/ Good	24/7, toll-free	Varies [6]/3
Good: Leadtek NVidia TNT2 Series graphics card with 16MB of SDRAM, 17X-48X CD-ROM, network card, McAfee VirusScan, microphone	**Good:** cramped interior; midsize tower; 3 open drive bays, 4 open slots	[3]	Good [3]/ Good	24/7, toll-free	1/3
Good: integrated Intel 810 graphics with UMA, 24X-52X CD-ROM drive, V.90 modem, network card, Corel WordPerfect Suite 8	**Satisfactory:** notebook-size case; compact; no open drive bays, no open slots	[3]	Fair [3]/ Good	24/7, toll-free	3/5
Good: integrated Intel 810 graphics with UMA, 17X-40X CD-ROM drive, network card	**Satisfactory:** well-organized interior; minitower; 2 open drive bays, 2 open slots	[3]	Good [3]/ Good	24/7, toll-free	1/1
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent		

[3] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

[4] Support hours drop to 9 hours Monday-Friday after one year.

[5] Six years on CPU and main RAM; three years on other parts.

[6] One year on screen, mouse, and keyboard; three years on other parts.

and forth. The cluttered interior offers limited expandability: four open bays but only a single open PCI slot.

WHAT ELSE: The SB500sx's performance score of 101 on our PC WorldBench 2000 tests is about average for a Celeron-500 system. The keyboard is large and solid and has extra multimedia keys, but it clacks a bit as you type—spend an extra $29 to upgrade to Microsoft's Natural Elite keyboard. Documentation includes a slim system manual filled with illustrations and a Windows 98 setup guide.

BEST USE: A strong performer for the price, this Quantex would suit almost any small business faced with a tight budget.

New on the Chart

3 NUTREND ATHLON SPECIAL 2

NEW **WHAT'S HOT:** A 10X DVD-ROM drive and an Altec Lansing ACS33 three-speaker set are nice finds at this budget system's price of $1199. The fairly neat interior boasts four open PCI slots and four open bays for expansion.

WHAT'S NOT: Text in spreadsheets and other documents looked sharp at 1024 by 768 resolution on the 17-inch Lite-On B1770 NSL monitor, but colors in our test images appeared pale.

WHAT ELSE: The Athlon-750 inside this NuTrend powered it to a score of 140 on PC WorldBench 2000 tests, near the average for similarly configured systems. A large binder houses all the documentation and software—including Corel's WordPerfect Office 2000—but the system manual contains mostly generic information. The sturdily constructed multimedia keyboard allows smooth (albeit a bit clacky) typing and holds lots of programmable buttons.

BEST USE: For a budget system, this NuTrend delivers adequate performance for users with multimedia needs.

MICRO EXPRESS MICROFLEX 600A: Big value for small offices holds steady in Best Buy territory.

6 DELL OPTIPLEX GX100

NEW **WHAT'S HOT:** Dell's OptiPlex GX100 wins kudos for its innovative design and corporate features, including a slide-out riser board (for easily adding expansion cards), toolless drive bay installation, and a swing-out power supply. ▶

PHOTOGRAPHS: KEN SMITH

Explaining LANDesk and Wake-on-LAN

TECH TREND MANY CORPORATE SYSTEMS—including the Dell OptiPlex GX100 (number six on this month's budget chart)—come with either LANDesk or Wake-on-LAN. Both of these network-management tools can be valuable, but what do they do?

LANDesk and Wake-on-LAN allow network administrators to access client PCs on a network remotely, without disturbing the user. For example, a system administrator can use LANDesk to check a system's processor type, RAM allotment, hard drive size, and other information from a remote location. LANDesk also enables the administrator to monitor system health and receive alerts if a system problem such as an imminent hard drive failure arises.

Similarly, Wake-on-LAN combines software and hardware to allow administrators to start up systems remotely for after-hours software upgrades, virus scans, and backups. Both Wake-on-LAN and LANDesk can help you manage large groups of computers, but LANDesk usually exacts a small price in return: Systems running remote management software may take a slight performance hit. Fortunately, our PC WorldBench 2000 tests show that the average performance decline is less than 5 percent, which most users won't notice.

ILLUSTRATION: DOUG ROSS

With chassis intrusion detection, a case lock, and an integrated network interface, this system is ready for any office with network management.

WHAT'S NOT: The small system manual contains sparse information, and Dell provides no printed documentation for individual components. You'll find plentiful free documentation online, however.

WHAT ELSE: The Celeron-600 processor led this Dell to a score of 111 on our PC WorldBench 2000 tests—reasonable performance for this CPU. Dell's standard midsize tower opens smoothly when you press a button on the front and pop off the side; inside are four open PCI slots and three unoccupied drive bays. Colors on the Dell E770p 17-inch monitor appeared rich, and text displayed sharply in our photo test images, but 1024 by 768 is the maximum resolution, so this display is not the best choice for businesses that use graphics-intensive or CAD applications.

BEST USE: For the corporate buyer who's looking for high-end features and a low-end price, this OptiPlex fits the bill.

MORE REVIEWS ONLINE

THE FOLLOWING SYSTEM didn't score high enough to reach the Top 10 Budget chart. For a write-up, visit PCWorld.com (www.pcworld.com/t10pcs).

- **Premio Aries T440Z**

Also of Note

THE PREMIO ARIES T440Z lands beyond the Top 10, despite packing business extras such as a network interface card, a case lock, and Microsoft Office 2000 Small Business Edition. Its lackluster performance on our PC WorldBench 2000 tests didn't help its ranking: Even with a PIII-600 inside, this Premio managed a score of only 121, trailing similarly configured systems we've tested. The system is further marred by a tiny and fairly cluttered interior, so upgrading components could be challenging. Although the 17-inch Premio Elite 701 monitor delivered crisp text at average resolutions, it blurred at the maximum resolution of 1280 by 1024, and colors in our test images appeared washed out and a bit tepid.

Two previous Top 10 PCs, Polywell's Poly LPC 1000 and Toshiba's V3100, ease back onto the chart (in ninth and tenth place, respectively), replacing two that dropped off. Last month's number nine, Acer's Power 4400, was discontinued, while Micron's ClientPro Cf fell from view because of its relatively high price.

We've noticed some subtle changes during the past year in the processors that appear in our budget Top 10 PCs. In September 1999, systems powered by Pentium III and Celeron CPUs dominated the budget chart. But that makeup has gradually changed. These days a budget system is more likely to feature an AMD chip than one made by Intel. Beginning with our June 2000 issue, systems carrying AMD processors have been infiltrating the budget chart, slowly gaining ground on those that use Celeron and Pentium III CPUs.

Last month, half the systems on our budget chart came equipped with AMD processors—most of which were based on the Athlon architecture, as opposed to the older K6-2 architecture, which has gravitated to the budget chart in its lower-megahertz form. This month, an AMD Athlon–based system (NuTrend's Athlon Special 2) delivered the fastest CPU performance on the budget Top 10.

Other important changes are on the horizon. Next month, PCs that feature AMD's new Duron processor, intended for price-conscious buyers, will make their appearance. Instead of seeing yesterday's technology on today's budget chart, we'll see more systems carrying chips that Intel and AMD have introduced specifically for this segment of the market. ▶

DELL'S OPTIPLEX GX100 offers a host of corporate features as well as innovative case design, toolless drive bays, and a swing-out power supply.

We All Know Who Invented The Automobile
Visioneer Invented One Touch Scanning

Thanks to dedicated function buttons and powerful software integration, the Visioneer OneTouch 8100 scanner provides the handling and reliability that busy professionals demand. Visioneer's sleek 42-bit color scanner allows users to redefine image quality with ease, ensuring that your projects have the styling needed to turn heads. The OneTouch 8100 features a quick and powerful engine, reliable drive train, smooth lines, and all the other bells and whistles you'd expect in a professional scanner.

Hit the fast lane with the Intelligent Imaging Solution from Visioneer. It's quick, easy, and affordable.

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TOP 15 NOTEBOOK PCs

	POWER NOTEBOOK: $2700 AND OVER	Month tested	★ Overall rating	Street price (6/12/00)	PC WorldBench 2000 performance score (Faster ▶)	Base configuration
1	**Gateway Solo 9300XL** 800/846-2000 www.gateway.com	NEW	91	**Expensive:** $3695	Outstanding 143	**Outstanding:** Pentium III-700/550, 15.7-inch active screen, touchpad, 128MB of SDRAM, 12GB hard drive, Windows 2000 Pro
2	Dell Inspiron 5000 G700VT 800/388-8542 www.dell.com	Aug 00	89	**Average:** $3137	Good 127	**Very good:** Pentium III-700/550, 15-inch active screen, touchpad, 128MB of SDRAM, 18GB hard drive, Windows 98 SE
3	HP OmniBook 900 800/462-8947 www.hp.com	June 00	86	**Inexpensive:** $2999	Very good 132	**Good:** Pentium III-650/500, 13.3-inch active screen, touchpad, eraserhead, 64MB of SDRAM, 12GB hard drive, Windows 2000 Pro
4	Toshiba Satellite Pro 4300 Series 800/867-4422 www.buy.toshiba.com	Aug 00	84	**Inexpensive:** $2899	Good 125	**Good:** Pentium III-700/550, 15-inch active screen, eraserhead, 64MB of SDRAM, 12GB hard drive, Windows 98 SE
5	Compaq Presario 1800-T 750 800/345-1518 www.compaq.com	NEW	84	**Average:** $3150	Very good 131	**Very good:** Pentium III-750/600, 15.1-inch active screen, touchpad, 128MB of SDRAM, 18GB hard drive, Windows 98 SE
	MIDRANGE NOTEBOOK: $2000 TO $2699	Percent of overall rating ▶		Price: 14 percent	Performance: 20 percent	Base configuration: 5 percent
1	**Gateway Solo 2550LS** 800/846-2000 www.gateway.com	NEW	87	**Inexpensive:** $2124	Good 115	**Good:** Pentium III-600/500, 13.3-inch active screen, touchpad, 64MB of SDRAM, 6GB hard drive, Windows 98 SE
2	Micro Express NP4600A 800/989-9900 www.microexpress.net	Aug 00	80	**Inexpensive:** $2099	Good 111	**Very good:** Pentium III-600/500, 15.1-inch active screen, touchpad, 128MB of SDRAM, 12GB hard drive, Windows 98 SE
3	IBM ThinkPad i Series 1492 800/426-7255 x4751 www.ibm.com/pc/us/thinkpad	July 00	80	**Expensive:** $2594	Very good 120	**Very good:** Pentium III-500, 15-inch active screen, eraserhead, 128MB of SDRAM, 12GB hard drive, Windows 98 SE
4	Micron TransPort ZX 800/642-7667 www.micronpc.com	July 00	80	**Expensive:** $2499	Good 116	**Very good:** Pentium III-600/500, 14.1-inch active screen, touchpad, 64MB of SDRAM, 12GB hard drive, Windows 98 SE
5	Axis Systems Fusion 7280V 800/378-9014 www.axissys.com	Aug 00	80	**Average:** $2399	Very good 129	**Very good:** Pentium III-500, 14.1-inch active screen, touchpad, 256MB of SDRAM, 12GB hard drive, Windows 2000 Pro
	BUDGET NOTEBOOK: UNDER $2000	Percent of overall rating ▶		Price: 17 percent	Performance: 17 percent	Base configuration: 5 percent
1	**Compaq Presario 1200-XL110** 800/345-1518 www.compaq.com	NEW	84	**Average:** $1499	Satisfactory 86	**Good:** AMD K6-2-475, 12.1-inch active screen, touchpad, 64MB of SDRAM, 6GB hard drive, Windows 98 SE
2	Dell Inspiron 3800 C500 GW 800/388-8542 www.dell.com	June 00	84	**Expensive:** $1867	Good 101	**Good:** Celeron-500, 14.1-inch active screen, touchpad, eraserhead, 64MB of SDRAM, 6GB hard drive, Windows 98 SE
3	Enpower ENP-313+ 800/997-2258 www.enpower.com	NEW	83	**Expensive:** $1899	Outstanding 120	**Very good:** Pentium III-600/500, 13.3-inch active screen, touchpad, 96MB of SDRAM, 6GB hard drive, Windows 98 SE
4	Compaq Notebook 100 800/345-1518 www.compaq.com	June 00	83	**Inexpensive:** $1299	Satisfactory 85	**Satisfactory:** AMD K6-2-475, 12.1-inch active screen, touchpad, 64MB of SDRAM, 5GB hard drive, Windows 98 SE
5	Chem USA ChemBook 2000 800/866-2436 www.chemusa.com	June 00	80	**Very inexpensive:** $1149	Satisfactory 80	**Satisfactory:** AMD K6-2-450, 13-inch dual-scan screen, touchpad, 64MB of SDRAM, 4.3GB hard drive, Windows 98 SE
	Best Buy	Percent of overall rating ▶		Price: 20 percent	Performance: 14 percent	Base configuration: 5 percent

[1] Unless otherwise noted, all notebooks come with a lithium ion battery.

[2] Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.

[3] Insufficient data to give a rating.

[4] Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.

GATEWAY STAGES a near-complete coup d'état this month, taking over two of the three top spots on our Top 15 list. The company's latest SUV-like desktop replacement, the Solo 9300XL, blazes in as our new number one power notebook. With a huge 15.7-inch screen and a PC WorldBench score approaching that of a Pentium III-750 notebook, it would make a good choice for digital and graphic artists who can use its built-in IEEE 1394 connection.

Our new midrange Best Buy, Gateway's $2124 Solo 2550LS, would please both business and consumer shoppers looking for a compact all-in-one. It kicks in an extra USB port, a built-in SuperDisk drive and 4-hour-plus battery life.

The Presario 1200-XL110, an inexpensive Compaq laptop with powerful sound, grabs budget Best Buy honors. A more basic version of the new CD-playing Pre-

Extra features [1]	Design and ease of use	Battery life (hours:min)	Travel weight (pounds) [2]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Outstanding: two multipurpose bays, 10X-24X CD-ROM drive, LS-120 drive, built-in modem, PC Card NIC, 1394 port	**Outstanding:** movie-size screen dominates fast multimedia-savvy SUV of desktop replacements	Good/ 3:24	Heavy/ 9.6	Good	Fair/Good	24/7, toll-free	3/3
Very good: single multipurpose bay, 8X DVD-ROM drive, built-in modem, Microsoft Works 2000	**Very good:** decked-out business machine can hold a second battery, weight saver, or Zip drive	Good/ 3:15	Heavy/ 8.8	Good	Good/Best	24/7, toll-free	3/3
Satisfactory: single multipurpose bay, PC Card modem	**Very good:** subnotebook stashes drives in external caddy	Satisfactory/ 2:44	Light/ 6.6	[3]	Good [4]/Fair	24/7, toll call	1/1
Satisfactory: 6X DVD-ROM drive, built-in modem	**Satisfactory:** all-in-one's utility turns almost entire keyboard into a collection of shortcuts	Satisfactory/ 2:38	Average/ 8.3	Good	Fair/Good	24/7, toll-free	1/1
Good: 6X DVD-ROM drive, built-in modem, built-in NIC, Microsoft Word 2000	**Satisfactory:** network-ready portable has music CD controls, few upgrade options	Good/ 3:14	Average/ 8.4	Fair	Fair/Fair	24/7, toll-free	1/1
Extra features: 5 percent	Design and ease of use: 10 percent	Battery life: 8 percent	Weight: 8 percent	Reliability: 20 percent	Support and warranty: 10 percent		
Satisfactory: 10X-24X CD-ROM drive, LS-120 drive, built-in modem	**Satisfactory:** two USB ports, built-in LS-120 drive highlight compact all-in-one	Very good/ 4:13	Average/ 8.3	Good	Fair/Fair	24/7, toll-free	1/1
Satisfactory: single multipurpose bay, 6X DVD-ROM drive, built-in modem, built-in NIC	**Satisfactory:** two USB ports but only one PC Card slot; no docking connection	Satisfactory/ 2:45	Average/ 8.2	[3]	Fair [4]/Fair	24/7, toll-free	2/2
Satisfactory: 6X DVD-ROM drive, built-in modem, Lotus SmartSuite	**Very good:** LED illuminates keyboard for typing in the dark; colorful $29 screen covers	Very good/ 4:00	Average/ 8.4	Good	Good/Fair	24/7, toll-free	1/1
Good: single multipurpose bay, 6X DVD-ROM drive, built-in modem, Microsoft Office 2000 SBE	**Very good:** configurable laptop comes with soft faux-leather casing	Good/ 3:18	Average/ 7.6	Good	Good [4]/Fair	24/7, toll-free	Varies [5]/3
Good: 4X DVD-ROM drive, PC Card modem	**Satisfactory:** two-tone all-in-one has handy external battery gauge and volume thumbwheel	Good/ 3:20	Average/ 8.2	[3]	Fair [4]/Fair	24/7, toll-free	3/3
Extra features: 5 percent	Design and ease of use: 10 percent	Battery life: 8 percent	Weight: 8 percent	Reliability: 20 percent	Support and warranty: 10 percent		
Satisfactory: 12X-24X CD-ROM drive, built-in modem, Microsoft Word 2000	**Satisfactory:** thickish portable has buttons to launch Web sites but no docking connection	Good/ 3:04	Average/ 8.0	Fair	Fair/Fair	24/7, toll-free	1/1
Good: single multipurpose bay, 10X-24X CD-ROM drive, built-in modem, Microsoft Works 2000	**Excellent:** thinnish, flexible business laptop comes in different colors; easily upgradable	Poor/ 1:58	Average/ 7.8	Good	Good/Good	24/7, toll-free	3/3
Satisfactory: 12X-24X CD-ROM drive, PC Card modem	**Poor:** boxy all-in-one has reasonable weight, but keyboard could be better designed	Good/ 3:39	Average/ 7.1	[3]	Fair [4]/Fair	Varies,[6] toll-free	1/1
Satisfactory: 12X-24X CD-ROM drive, built-in modem, Microsoft Word 2000	**Poor:** no standard docking station port, but vendor sells USB legacy hub	Satisfactory/ 2:36	Average/ 7.4	Fair	Fair/Fair	24/7, toll-free	1/1
Satisfactory: 12X-24X CD-ROM drive, built-in modem, NiMH battery	**Satisfactory:** basic notebook has okay dual-scan screen; memory moderately easy to reach	Satisfactory/ 2:15	Average/ 8.0	[3]	Fair [4]/Fair	24/7, varies [7]	1/3
Extra features: 5 percent	Design and ease of use: 10 percent	Battery life: 8 percent	Weight: 8 percent	Reliability: 20 percent	Support and warranty: 10 percent		

[5] Five years on CPU and main memory, three years on other parts.

[6] 11 hours of technical support on weekdays, 5 hours of technical support on Saturdays.

[7] Toll-free only from 8:30 a.m. to 5:30 p.m.

sario 1800-T 750 (fifth place on our power list), the $1499 Presario 1200-XL110 could serve as a no-frills e-mail and word processing companion to a desktop PC.

FULL REVIEWS ONLINE

online FOR DETAILED WRITE-UPS OF ALL the new notebooks that were tested this month, visit PCWorld.com (www.pcworld.com/top400).

If you're looking for a light all-in-one, check out Enpower's ENP-313+, third on the budget list. At only 7.1 pounds (6.3 pounds without an AC adapter), the Enpower weighs about a pound less than most other notebooks with built-in floppy and CD-ROM drives.

Contributing Editor Carla Thornton regularly covers notebooks for PC World. ▶

SCREEN GEM: Gateway's Solo 9300XL has an enormous 15.7-inch screen.

PHOTOGRAPH: KEN SMITH

TOP 15 HOME PCs

	POWER SYSTEM: $2000 AND OVER	Month tested	★ Overall rating	Street price (6/6/00)	PC WorldBench 2000 performance score[1] Faster	Base configuration[2]
1	**Dell Dimension XPS B866r** 800/388-8542 www.dell.com	Aug 00	94	**Very expensive:** $2879	Outstanding 158	**Very good:** Pentium III-866, 128MB of RDRAM, 256KB L2 cache, 30GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
2	HP Pavilion 9600A-850 800/752-0900 www.hp-at-home.com	NEW	90	**Very inexpensive:** $2115	Outstanding 152	**Very good:** AMD Athlon-850, 128MB of SDRAM, 512KB L2 cache, 40.8GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
3	Quantex GX800SX 800/352-4051 www.quantex.com	June 00	86	**Average:** $2299	Very good 147	**Very good:** Pentium III-800EB, 128MB of SDRAM, 256KB L2 cache, 30.7GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
4	Axis Systems Terra AXA K7-850 800/378-9014 www.axissys.com	NEW	82	**Very inexpensive:** $2099	Very good 144	**Very good:** AMD Athlon-850, 256MB of SDRAM, 512KB L2 cache, 30.7GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
5	Compaq Presario 5900Z-800 800/345-1518 www.compaq.com	May 00	81	**Average:** $2468	Good 138	**Very good:** AMD Athlon-800, 128MB of SDRAM, 512KB L2 cache, 30GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
	MIDRANGE SYSTEM: $1200 TO $1999	Percent of overall rating ▶		Price: 5 percent	Performance: 15 percent	Base configuration: 10 percent
1	**Micron Millennia Max 733** 800/642-7667 www.micronpc.com	July 00	92	**Very expensive:** $1965	Outstanding 150	**Very good:** Pentium III-733, 128MB of SDRAM, 256KB L2 cache, 20.5GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
2	HP Pavilion 9600A-700 800/752-0900 www.hp-at-home.com	NEW	90	**Average:** $1699	Very good 141	**Good:** AMD Athlon-700, 128MB of SDRAM, 512KB L2 cache, 20.4GB hard drive, minitower, 17-inch monitor, Windows 98 SE
3	Quantex GX700SX 800/352-4051 www.quantex.com	May 00	89	**Average:** $1799	Outstanding 143	**Very good:** Pentium III-700, 128MB of SDRAM, 256KB L2 cache, 29GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
4	Tiny Computers Internet Writer 733 888/818-8469 www.tiny.com	NEW	85	**Average:** $1799	Very good 141	**Good:** Pentium III-733, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, minitower, 17-inch monitor, Windows 98 SE
5	ABS Multimedia System 1 800/876-8088 www.buyabs.com	May 00	84	**Expensive:** $1849	Very good 139	**Outstanding:** AMD Athlon-700, 256MB of SDRAM, 512KB L2 cache, 27GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
	BUDGET SYSTEM: UNDER $1200	Percent of overall rating ▶		Price: 15 percent	Performance: 10 percent	Base configuration: 10 percent
1	**Dell Dimension L500cx** 800/388-8542 www.dell.com	Aug 00	94	**Expensive:** $1189	Satisfactory 104	**Very good:** Celeron-500, 128MB of SDRAM, 128KB L2 cache, 10.2GB hard drive, minitower, 17-inch monitor, Windows 98 SE
2	CyberMax ValueMax 700 888/853-2692 www.cybermaxpc.com	July 00	86	**Expensive:** $1149	Outstanding 140	**Good:** AMD Athlon-700, 128MB of SDRAM, 512KB L2 cache, 15.4GB hard drive, midsize tower, 17-inch monitor, Windows 98 SE
3	Quantex M650SX 800/352-4051 www.quantex.com	May 00	85	**Average:** $1099	Outstanding 132	**Good:** Pentium III-650, 64MB of SDRAM, 256KB L2 cache, 20.5GB hard drive, minitower, 17-inch monitor, Windows 98 SE
4	NuTrend Maestro GE 888/482-6678 www.nutrend.com	May 00	80	**Inexpensive:** $899	Satisfactory 100	**Good:** Celeron-500, 64MB of SDRAM, 128KB L2 cache, 8GB hard drive, midsize tower, 17-inch monitor, Windows 98 SE
5	Compaq Presario EZ2200 800/345-1518 www.compaq.com	May 00	76	**Expensive:** $1198	Satisfactory 97	**Good:** Celeron-500, 64MB of SDRAM, 128KB L2 cache, 17.3GB hard drive, minitower, 17-inch monitor, Windows 98 SE
	Best Buy	Percent of overall rating ▶		Price: 20 percent	Performance: 10 percent	Base configuration: 5 percent

[1] A system's performance word score is relative to the scores earned by other PCs in the same price category running the same operating system. For more details, see "Your Guide to the Top 100" on page 199.

NEW SYSTEMS FROM HP hit both the power and midrange charts this month, along with debuts from Axis Systems and Tiny Computers. The $2115 HP Pavilion 9600A-850 lands at number two on the power list with a zippy PC WorldBench 2000 score of 152 and many extra features, such as CD-RW and DVD-ROM drives and a network card. HP nabs second place on the midrange list as well, with the $1699 Pavilion 9600A-700, which has the power to handle just about any application. Its somewhat poorly designed interior makes adding cards and drives difficult, however.

Also new on the power list is the $2099 Axis Systems Terra AXA K7-850, in the fourth spot. The Terra AXA comes with a whopping 256MB of RAM and features rivaling those of the HP Pavilion 9600A-850. Our final newcomer is the $1799 Internet Writer 733 from Tiny Computers,

Extra features	Setup/ ease of use	Graphics	Reliability/ support	Comments
Very good: NVidia GeForce 256 DDR graphics board with 64MB of DDR SDRAM, 12X DVD-ROM drive, V.90 modem	Outstanding/ Good	Very good	Outstanding/ Good	**PRO:** Fastest system on the chart, good graphics. **CON:** Will easily break your budget.
Very good: ASUS AGP-V7700 DDR graphics board with 32MB of DDR SGRAM, 10X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem	Good/ Very good	Very good	Fair/ Fair	**PRO:** Top-notch performance, comes with DVD-ROM and CD-RW drives and a network card. **CON:** A cramped interior makes expansion difficult.
Very good: Guillemot 3D Prophet graphics board with 32MB of SDRAM, 12X DVD-ROM drive, 4X/2X/24X CD-RW drive, V.90 modem	Very good/ Satisfactory	Good	Fair/ Fair	**PRO:** Great value, lots of storage and extra features. **CON:** Lackluster DVD movie playback, poorly illustrated setup poster.
Good: Leadtek WinFast GeForce 256 DDR graphics board with 32MB of DDR SGRAM, 16X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem	Satisfactory/ Satisfactory	Good	[3]	**PRO:** Extra RAM and features, such as a network card. **CON:** Graphics scores could be better, limited documentation.
Very good: Creative Labs 3D Blaster Annihilator graphics board with 32MB of SDRAM, 10X DVD-ROM, V.90 modem	Outstanding/ Good	Very good	Poor/ Fair	**PRO:** Fast with games, high-speed Web connectivity, first rate Klipsch Pro Media v.4 THX sound system. **CON:** Poor reliability rating.
Extra features: 15 percent	**Setup/ease of use: 5 percent**	**Graphics: 15 percent**	**R & S: 35 percent**	
Very good: NVidia NV990 graphics board with 32MB of DDR SGRAM, 12X DVD-ROM drive, 8X/4X/24X CD-RW drive, V.90 modem	Outstanding/ Good	Very good	Good/ Fair	**PRO:** Good graphics quality, $234 price drop puts it on midrange chart. **CON:** DVD movies are too dark, player lacks brightness settings.
Very good: ASUS AGP-V6800 DDR graphics board with 32MB of DDR SGRAM, 10X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem	Outstanding/ Very good	Very good	Fair/ Fair	**PRO:** Very good performance and graphics scores. **CON:** Claustrophobic interior inhibits expansion.
Good: Creative Labs 3D Blaster Annihilator graphics board with 32MB of SDRAM, 8X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	Good/ Satisfactory	Good	Fair/ Fair	**PRO:** Fast midrange system, swift 3D-gaming performance. **CON:** Poorly illustrated setup sheet, inadequately marked ports.
Good: Leadtek WinFast 3D S320 II-Ultra graphics board with 32MB of SGRAM, 8X DVD-ROM drive, 6X/4X/32X CD-RW drive, V.90 modem	Good/ Very good	Good	[3]	**PRO:** Comes with tons of features, including a printer and a scanner. **CON:** Graphics scores and speaker sound could be better.
Good: Matrox Millennium G400 graphics board with 32MB of SGRAM, 8X DVD-ROM drive, V.90 modem	Good/ Satisfactory	Good	[3]	**PRO:** Zippy performance, dual-display graphics support. **CON:** Pricey for its class, no setup poster, inadequate connector and cable labels.
Extra features: 10 percent	**Setup/ease of use: 10 percent**	**Graphics: 10 percent**	**R & S: 35 percent**	
Good: integrated Intel 810 graphics with UMA, 22X-48X CD-ROM drive, V.90 modem, Iomega Zip 100 drive	Outstanding/ Good	Satisfactory	Outstanding/ Good	**PRO:** Sharp monitor, easy setup, top-notch reliability rating. **CON:** Second-most-expensive system on the budget chart.
Good: 3dfx Voodoo3 3000 graphics board with 16MB of SDRAM, 12X DVD-ROM drive, V.90 modem	Satisfactory/ Good	Good	Fair/ [3]	**PRO:** Highest-performing budget PC here. **CON:** Expensive, comes with mediocre monitor and keyboard.
Good: integrated Intel 810 graphics with UMA, 12X DVD-ROM drive, V.90 modem	Good/ Good	Satisfactory	Fair/ Fair	**PRO:** Terrific value for a Pentium III-650 processor, roomy interior. **CON:** Small fonts blurry, scant software bundle, rudimentary manual.
Satisfactory: ATI Xpert 128 graphics board with 16MB of SDRAM, 8X DVD-ROM drive, V.90 modem	Good/ Good	Satisfactory	[3]	**PRO:** Good monitor and easy expandability in an accessible case. **CON:** Somewhat slow for its CPU class, flimsy keyboard.
Very good: integrated Intel 810 graphics with UMA, 17X-40X CD-ROM drive, 4X/4X/24X CD-RW drive, V.90 modem	Very good/ Very good	Satisfactory	Poor/ Fair	**PRO:** Ample storage, with a 17GB hard drive and a CD-RW drive. **CON:** Slowest and most expensive system on the budget chart.
Extra features: 10 percent	**Setup/ease of use: 10 percent**	**Graphics: 10 percent**	**R & S: 35 percent**	

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

[3] Insufficient data to give a rating.

number four on the midrange list. Tiny is new to the United States from Great Britain, and if the Internet Writer is any indication, full-featured is the name of its game. The Internet Writer 733 comes with a 6X/4X/32X CD-RW drive, an 8X DVD-ROM drive, a Lexmark Z11 Color Jetprinter, a USB flatbed color scanner, and lots of home-oriented software for the whole family.

FULL REVIEWS ONLINE

FOR WRITE-UPS on all the systems we reviewed this month, visit PCWorld.com (www.pcworld.com/top400/newhomepcs).

Kirk Steers is a contributing editor for PC World. ▶

TINY COMPUTERS' Internet Writer 733 comes with a printer, a scanner (shown here), and tons of software.

PHOTOGRAPHS: KEN SMITH

Paul Anderson is the record holder of the greatest weight ever lifted – 6,270 Lbs! He is also the last American to win a gold medal in the super heavy weight division at an Olympics (1956 – Melbourne, Australia).

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PC WORLD

TOP 10 PRINTERS

	SMALL-BUSINESS/HOME LASER	Street price (6/6/00)	Overall rating	Speed for plain text/full-page graphics (ppm)	Print quality for text/gray-scale graphics	Comments
1	★ **Brother HL-1240** 800/276-7746 www.brother.com	$299	85	8.2/3.0	Very good/ Good	⚡ **FEATURES:** Rated 12 ppm. Standard 2MB of RAM, 600-by-600-dpi maximum resolution, 250 sheets input, 150 output. **SUMMARY:** The inexpensive HL-1240 produces terrific-looking text and smooth gray-scale images at respectable speeds. It's also small and quiet, a bonus in packed office spaces. Unfortunately, it has no ethernet option.
2	**Minolta-QMS PagePro 1100L** NEW 800/523-2696 www.minoltaprinters.com	$249	85	8.6/4.7	Very good/ Adequate	**FEATURES:** Rated 10 ppm. Standard 4MB of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. **SUMMARY:** The Minolta-QMS PagePro 1100L is the lowest-priced model on the SOHO list, as well as the speediest at printing graphics. Text appears solid, sharp and clean, but gray-scale images are so dark they lose large chunks of detail.
3	**Samsung QL-6100** 877/804-9949 www.samsungusa.com	$549	83	10.1/3.4	Very good/ Good	**FEATURES:** Rated 12 ppm. Standard 4MB of RAM, 1200-by-1200-dpi maximum resolution, 350 sheets input, 250 output. **SUMMARY:** The most expensive SOHO laser on the chart, the QL-6100 is fastest at printing text, rivaling corporate lasers in performance. It also produces clear text quality and respectable, though somewhat dark, gray-scale images.
4	**Oki Data Okipage 10ex** 800/654-3282 www.okidata.com	$386	83	8.5/2.8	Good/ Good	⚡ **FEATURES:** Rated 10 ppm. Standard 2MB of RAM, 1200-by-600-dpi maximum resolution, 250 sheets input, 100 output. **SUMMARY:** This quick personal LED printer delivers solid output overall, though text can look slightly jagged, and you must buy extra RAM to support the highest resolution. Good documentation helps balance a somewhat sloppy design.
5	**Brother HL-1270N** 800/276-7746 www.brother.com	$499	83	6.9/2.6	Very good/ Good	⚡ **FEATURES:** Rated 12 ppm. Standard 4MB of RAM, 1200-by-1200-dpi maximum resolution, 250 sheets input, 150 output. **SUMMARY:** A more expensive, networked version of the HL-1240, the HL-1270N produces clean text, sharp lines, and smooth grays. Its network capabilities work well for small workgroups, but it's a bit flimsy for larger offices.
	CORPORATE LASER					
1	★ **Lexmark Optra M412** NEW 800/539-6275 www.lexmark.com	$799	86	13.0/0.7	Very good/ Good	⚡ **FEATURES:** Rated 17 ppm. Standard 4MB of RAM, 1200-by-1200-dpi maximum resolution, 350 sheets input, 270 output. **SUMMARY:** This nonnetworked model has the quickest text speed on the chart but prints graphics slowly. Output quality is sharp and smooth, and the Optra M412's price is right. The networked model costs $300 more and comes with 8MB of RAM.
2	**NEC SuperScript 1800N** 800/632-8324 www.nectech.com	$999	86	11.3/3.7	Excellent/ Good	**FEATURES:** Rated 17 ppm. Standard 20MB of RAM, 1200-by-1200-dpi maximum resolution, 1100 sheets input, 250 output. **SUMMARY:** The SuperScript 1800N produces perfectly clean, sharp text and detailed, though slightly dark, gray-scale images. It offers speedy graphics performance, and best of all, it comes with ethernet and a duplexer for about a thousand bucks.
3	**Xerox DocuPrint N2125** 800/835-6100 www.xerox.com	$1399	86	11.7/3.7	Very good/ Very good	⚡ **FEATURES:** Rated 21 ppm. Standard 32MB of RAM, 1200-by-1200-dpi maximum resolution, 650 sheets input, 500 sheets output. **SUMMARY:** The N2125 offers admirable performance and sharp print quality. With a price increase of $100, it's the most expensive printer on the chart. Paper options for adding up to 1750 sheets make it a nice addition for larger offices.
4	**IBM Infoprint 21** NEW 800/358-6661 www.ibm.com/printers	$1179	85	12.2/1.5	Very good/ Good	⚡ **FEATURES:** Rated 21 ppm. Standard 32MB of RAM, 1200-by-1200-dpi maximum resolution, 550 sheets input, 500 output. **SUMMARY:** IBM's new addition to the chart delivers speedy text printing and crisp output quality for a moderate price. Text looks especially sharp, and gray-scale graphics, though light, appear smooth and detailed.
5	**Ricoh AP-1600** NEW 800/637-4264 www.ricoh-usa.com	$799	85	11.1/3.8	Very good/ Adequate	**FEATURES:** Rated 16 ppm. Standard 16MB of RAM, 1200-by-1200-dpi maximum resolution, 350 sheets input, 250 output. **SUMMARY:** Replacing the AP-1400, Ricoh's new, low-cost AP-1600 offers better speed. Though somewhat slow at printing text, this unit produces sharp text quality. Graphics output is less impressive, appearing dark and banded.

★ **Best Buy** ⚡ **Windows 95-certified Plug and Play** **For reviews of printers we tested this month, visit www.pcworld.com/t10printers.**

TEST PC WORLD CENTER **HOW WE TEST** The overall rating for both small-business/home and corporate 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.

MINOLTA-QMS MARCHES INTO second place on the small-business list this month with the PagePro 1100L. At $249, it offers speedy graphics performance and crisp text. The corporate list gains three new models: Lexmark's nonnetworked Optra M412 is a new Best Buy, with fast text speed for $799. IBM's $1179 Infoprint 21 takes fourth place, and Ricoh's $799 AP-1600 grabs fifth. Lexmark's Optra E312 just missed the chart. ▶

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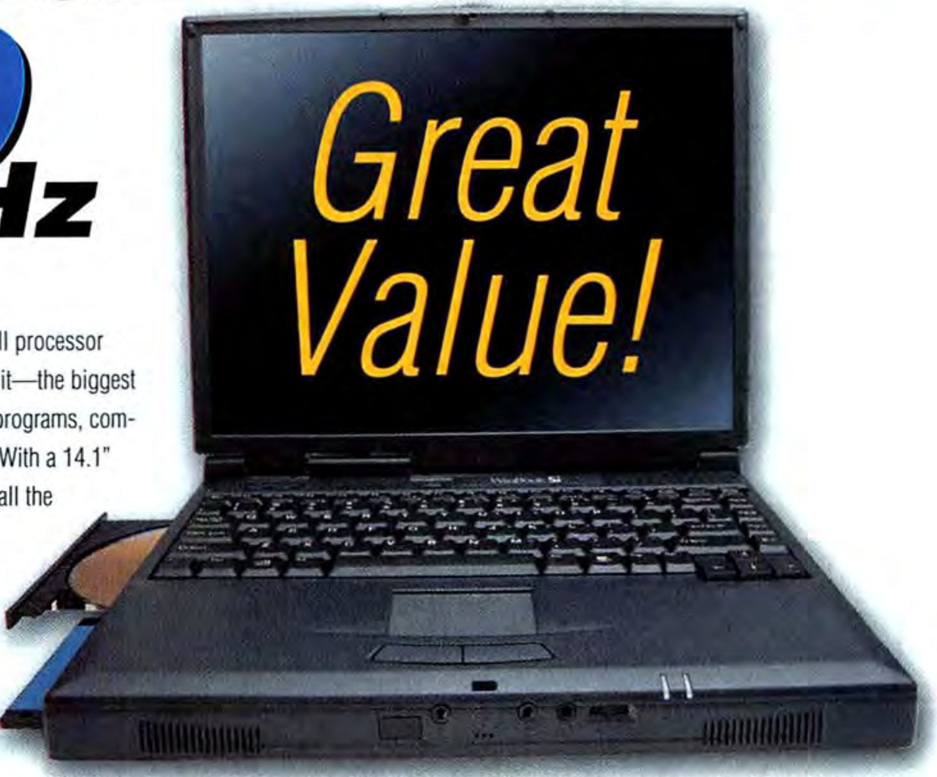

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TOP 10 SCANNERS

	SOHO SCANNER	Month tested	Street price (6/23/00)	Overall rating	Scan quality	Scan speed (seconds per page)		Comments
						B&W	Color[1]	
1	**Epson Perfection 1200S** 800/463-7766 www.epson.com	Aug 00	$299[2]	95	Good	17 @ 300 dpi	249 @ 1200 dpi	**FEATURES:** SCSI, 1200 by 2400 dpi, 11.3-by-16.8-by-3.5-inch case,[3] 9.9 pounds, 8.5-by-11.7-inch scanning area, optional transparency adapter and automatic document feeder. **SUMMARY:** Epson's SCSI unit offers sharp resolution and high-quality color and runs a bit faster than the USB model—but costs $50 more.
2	**Umax Astra 3400** 800/562-0311 www.umax.com	NEW	$99	92	Good	31 @ 300 dpi	121 @ 600 dpi	**FEATURES:** USB, 600 by 1200 dpi, 11.6-by-18.1-by-3.2-inch case,[3] 5.7 pounds, 8.5-by-11.7-inch scanning area, no optional transparency adapter or ADF. **SUMMARY:** Impressive newcomer features speedy performance, 42-bit color, easy push buttons, generous support, and a bargain price.
3	**Visioneer OneTouch 8600** 888/229-4172 www.visioneer.com	Aug 00	$200	91	Good	35 @ 300 dpi	129 @ 600 dpi	**FEATURES:** Parallel and USB,[4] 600 by 1200 dpi, 16.7-by-11.7-by-3.7-inch case,[3] 4.0 pounds, 8.5-by-11.7-inch scanning area, optional transparency adapter and ADF. **SUMMARY:** This versatile model has a handy seven-button front panel, ample software, and good color accuracy on its maximum-resolution scans.
4	**Acer 640U** 800/733-2237 www.acerperipherals.com	Aug 00	$90	90	Good	40 @ 300 dpi	121 @ 600 dpi	**FEATURES:** USB, 600 by 1200 dpi, 12-by-18-by-3-inch case,[3] 8.8 pounds. 8.5-by-11.7-inch scanning area, no optional transparency adapter. **SUMMARY:** This scanner produces fast color scans of admirable quality, offers an abundant software bundle, and has around-the-clock tech support.
5	**Agfa SnapScan Touch** 888/281-2302 www.agfahome.com	Aug 00	$99	90	Good	48 @ 300 dpi	78 @ 600 dpi	**FEATURES:** USB, 600 by 1200 dpi, 12-by-18-by-4.1-inch case,[3] 14 pounds, 8.5-by-11.7-inch scanning area, no transparency adapter. **SUMMARY:** Impressive scan quality, easy-to-use push buttons, and toll-free support. Makes a good choice for entry-level scanning tasks.
6	**Umax Astra 4000U** 800/562-0311 www.umax.com	Aug 00	$299	89	Good	65 @ 300 dpi	461 @ 1200 dpi	**FEATURES:** USB, 1200 by 2400 dpi, 11.3-by-16.8-by-3.5-inch case,[3] 9.9 pounds, 8.5-by-14-inch scanning area, optional transparency adapter. **SUMMARY:** A $50 price drop makes this legal-document-capable scanner a deal. No speed demon, but has splendid scan quality and generous tech support policies.
7	**HP ScanJet 4300C** 800/722-6538 www.scanjet.hp.com	NEW	$149	86	Fair	49 @ 300 dpi	97 @ 600 dpi	**FEATURES:** Parallel and USB,[4] 600 by 1200 dpi, 12-by-19.5-by-3.5-inch case,[3] 7.5 pounds, 8.5-by-11.7-inch scanning area, no optional transparency adapter or ADF. **SUMMARY:** Five push buttons and a unique LCD panel aid this unit's copy center function. We saw the 4300C's best scans on lower-resolution tests.
	CORPORATE SCANNER							
1	**Microtek ScanMaker X12USL** 800/654-4160 www.microtekusa.com	Aug 00	$389[2]	98	Good	31 @ 300 dpi	438 @ 1200 dpi	**FEATURES:** USB and SCSI,[5] 1200 by 2400 dpi, 11.9-by-21.4-by-2.8-inch case,[3] 12.1 pounds, 8.5-by-14-inch scanning area, optional transparency adapter and ADF. **SUMMARY:** Legal-document-capable unit boasts high resolution, 42-bit color, and good scan quality. Also available for $40 less without a SCSI card.
2	**Canon CanoScan FB 1200S** 800/652-2666 www.ccsi.canon.com	Aug 00	$149	95	Good	30 @ 300 dpi	373 @ 1200 dpi	**FEATURES:** SCSI, 1200 by 1200 dpi, 11.5-by-18.1-by-3.7-inch case,[3] 8.8 pounds, 8.5-by-11.7-inch scanning area, optional transparency adapter and ADF. **SUMMARY:** Performance-savvy corporate model boasts great color and detail, comes packaged with its SCSI card in the box, and drops in price by $150 this month.
3	**Epson Expression 1600 Artist** 800/463-7766 www.epson.com	Aug 00	$899[2]	94	Good	18 @ 300 dpi	495 @ 1600 dpi	**FEATURES:** USB and SCSI,[5] 1600 by 3200 dpi, 13-by-22.2-by-5.2-inch case,[3] 18.7 pounds, 8.5-by-11-inch scanning area, optional transparency adapter and ADF. **SUMMARY:** Strong performance and color accuracy keep this premium-priced high-resolution unit on the chart. Offers robust optional accessories.

Best Buy For expanded reviews of this month's scanners, visit www.pcworld.com/sep00/scanners.

HOW WE TEST All scanners are tested with default settings under Windows 98 on a Gateway GP7-550 (Pentium III-550) PC with 128MB of RAM, using each scanner's bundled software. Overall score is based on scanned image quality (25 percent), scanning speed (SOHO, 22 percent; corporate, 25 percent), ease of use (SOHO, 17 percent; corporate, 10 percent), features (SOHO, 16 percent; corporate, 20 percent), support (10 percent), and price (10 percent). Speed tests are timed from start of scanning until cursor control is regained. Data based on tests designed and conducted by the PC World Test Center.

[1] Color scan speed is at unit's maximum optical resolution. [2] Price with SCSI adapter. [3] In order: width, depth, and height. [4] Tested with USB interface. [5] Tested with SCSI interface.

TWO WELL-PRICED 600-by-1200-dpi scanners join the SOHO ranks this month. The Umax Astra 3400 produced pleasing color and line-art results. The HP ScanJet 4300C created better images on our lower-resolution, 75-dpi color and 300-dpi black and white tests. Its handy dual interface gives users two connectivity options—something only one other SOHO scanner on the chart offers. Our corporate list remains unchanged. ▶

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TOP 10 MONITORS

	17-INCH MONITOR	Month tested	Street price (6/15/00)	Overall rating	Quality of text/graphics	Comments
1	**ViewSonic EF70** 800/888-8583 www.viewsonic.com	NEW	$299	92	Very good/ Excellent	**FEATURES:** 16.1-inch viewable area, .25mm stripe pitch Diamondtron NF tube,[1] up to 87-Hz refresh rate,[2] Plug and Play ready, three-year warranty, 24-hour daily toll-free support. **SUMMARY:** Deep, saturated color in graphics propels this model to the top spot. Sophisticated on-screen control menu is easy to navigate with standard buttons on the front bezel.
2	**Sony Multiscan CPD-E200** 888/476-6972 www.sony.com/displays	Feb 00	$350	89	Very good/ Excellent	**FEATURES:** 15.6-inch viewable area, .24-.25mm varying stripe pitch FD Trinitron tube,[1] up to 85-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, one-year warranty, 24-hour daily toll-free support. **SUMMARY:** Gorgeous colors and razor-sharp text keep this model near the top of the chart. Its cousin, the CPD-G200, offers comparable image quality with a 16-inch viewable area but costs $50 more.
3	Samsung SyncMaster 700NF 800/726-7864 www.samsungmonitor.com	Jul 00	$299	88	Very good/ Excellent	**FEATURES:** 16-inch viewable area, .25mm stripe pitch Diamondtron NF tube,[1] up to 85-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 24-hour daily toll-free support. **SUMMARY:** Radiant colors and fine detail make this a good choice for heavy graphics work. Easy-to-use on-screen controls are set on a retracting panel on the front bezel.
4	LG Flatron 795FT-Plus 800/243-0000 www.lgeus.com	NEW	$319	88	Very good/ Excellent	**FEATURES:** 15.9-inch viewable area, .24mm stripe pitch LG Flatron tube,[1] up to 120-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 12-hour daily toll-free support. **SUMMARY:** Deep, bright, saturated color makes this model a good choice for extensive graphics work. The small, sophisticated on-screen controls on the front bezel are simple to use.
5	Princeton AGX740 800/747-6249 www.princetongraphics.com	Apr 00	$225	87	Very good/ Excellent	**FEATURES:** 15.8-inch viewable area, .25mm stripe pitch Diamondtron tube,[1] up to 85-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 9-hour daily toll-free support. **SUMMARY:** A $74 price drop keeps this model at number five. Lively colors on photos. Offers high-end controls, but zoom settings on other models work better. Tech support hours could be more generous.
6	CTX PR705F 877/857-7846 www.ctxintl.com	Apr 00	$349	87	Excellent/ Very good	**FEATURES:** 15.9-inch viewable area, .24-.25mm varying stripe pitch FD Trinitron tube,[1] up to 105-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Graphics professionals will like the deep, rich colors this model displays. It is also great for word processing and spreadsheets. Includes one USB port but lacks advanced controls.
7	NEC MultiSync FE700 800/632-8324 www.nectech.com	Feb 00	$299	87	Very good/ Excellent	**FEATURES:** 15.6-inch viewable area, .25mm stripe pitch Diamondtron NF tube,[1] up to 97-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 11.5-hour weekday toll-free support. **SUMMARY:** Rich colors on photos and Web pages, but text in word processing documents and spreadsheets could be a little sharper. On-screen controls require lots of button pressing.
8	Mitsubishi Diamond Plus 73 800/843-2515 www.mitsubishi-display.com	July 00	$289	85	Good/ Excellent	**FEATURES:** 16-inch viewable area, .25mm stripe pitch Diamondtron NF tube,[1] up to 87-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 12-hour daily toll-free support. **SUMMARY:** Vivid colors, but text in word-processing documents and spreadsheets is not as sharp as on other monitors. On-screen controls lack word descriptors and can thus be hard to navigate.
9	MGC Technologies 797F 877/428-9642 www.mgcusa.com	NEW	$279	85	Very good/ Excellent	**FEATURES:** 16.2-inch viewable area, .25mm dot pitch tube, up to 120-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Vivid colors in graphics outshine text display, but overall image quality is top-notch. On-screen controls are tough to navigate (and the manual doesn't offer much help); their buttons are difficult to press, too.
10	Optiquest Q71 800/843-6784 www.optiquest.com	July 00	$239	84	Satisfactory/ Excellent	**FEATURES:** 16-inch viewable area, .27mm dot pitch tube, up to 87-Hz refresh rate,[2] Plug and Play ready, three-year warranty, 24-hour daily toll-free support. **SUMMARY:** Low price and deep, bright colors in graphics nudge this model onto the chart. A great buy for those on a budget, but for a few dollars less, you can find better all-around image quality.

Best Buy For reviews of products that didn't make the chart, visit www.pcworld.com/t10monitors.

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 text and graphics quality (25 percent each), price (25 percent), features and ease of use (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by PC World Test Center. All rights reserved. [1] Uses an aperture grille whose parallel wires near the sides of the screen are strung farther apart than those near the middle. [2] Highest refresh rate at 1024 by 768 resolution.

IT'S NOT OFTEN a newcomer jumps straight to the top of the chart. The ViewSonic EF70 unseats the Sony Multiscan CPD-E200 as the number one monitor, thanks to its excellent graphics quality and moderate price. The LG Flatron 795FT-Plus debuts at number four with vibrant colors, and newcomer MGC Technologies' 797F offers excellent graphics quality at a moderate price. Next month we look at 21-inch displays. ▶

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PC WORLD TOP 10 GRAPHICS BOARDS

	AGP BOARD	Month tested	Street price (7/5/00)	Overall rating	Mixed-media business rating	3D games rating	Features rating	Comments
1	**Matrox Millennium G400 Max** 800/361-1408 www.matrox.com/mga	Apr 00	$209	97	Excellent	Very good	Very good	**FEATURES:** 4X AGP, Matrox G400 Max chip, 32MB of SGRAM, 360-MHz RAMDAC, TV-out, two VGA ports, bundled Micrografx Picture Publisher and Simply 3D, plus 3D game—Rage Software's Expendable. **SUMMARY:** Solid speed and dual-display support keep this card on top. The $299 Marvel G400-TV offers TV tuning.
2	**Diamond Viper II** 800/468-5846 www.s3.com	June 00	$179	96	Very good	Very good	Good	**FEATURES:** 4X AGP, S3 Savage 2000 chip, 32MB of SDRAM, 350-MHz RAMDAC, TV-out, bundled 3D game—Acclaim's TrickStyle. **SUMMARY:** Renders excellent performance in Unreal Tournament. For the cost conscious, Diamond's $99 Stealth III S540 Xtreme is a good value.
3	**Cardexpert GeForce 256 DDR** 800/539-2273 www.gainward.com	June 00	$230	91	Excellent	Excellent	Good	**FEATURES:** 4X AGP, NVidia GeForce 256 chip, 32MB of DDR SGRAM, 350-MHz RAMDAC, TV-out, bundled 3D games—Psygnosis's Drakan and Rollcage. **SUMMARY:** Speedy gaming board looks good in Unreal Tournament and Quake 3. Still cheaper than most of its DDR competitors.
4	**Asus AGP-V6600 Deluxe** 510/739-3777 www.asus.com	Apr 00	$189	90	Excellent	Very good	Excellent	**FEATURES:** 4X AGP, NVidia GeForce 256 chip, 32MB of SGRAM, 350-MHz RAMDAC, video capture, TV-out, 3D glasses, Ulead Video Studio, bundled 3D games—Psygnosis's Drakan and Rollcage. **SUMMARY:** Pleasing performer loaded with video extras, but it generated dark scenes in some games.
5	**Hercules 3D Prophet II GTS** 877/484-5536 www.hercules.com	Aug 00	$319	90	Excellent	Excellent	Excellent	**FEATURES:** 4X AGP, NVidia GeForce2 GTS chip, 32MB of DDR SDRAM, 350-MHz RAMDAC, TV-out, no bundled applications. **SUMMARY:** With the latest NVidia chip set, this card beat all others in 3D performance. $40 price drop boosts it up two spots. 3D Prophet DDR-DVI sibling ($269) features digital output.
6	**Leadtek WinFast GeForce 256 DDR** 888/532-3835 www.leadtek.com	May 00	$249	90	Excellent	Excellent	Very good	**FEATURES:** 4X AGP, NVidia GeForce 256 chip, 32MB of DDR SGRAM, 350-MHz RAMDAC, TV-out, Asymetrix 3D/FX and Digital Video Producer, bundled color-calibration tools. **SUMMARY:** Costs less than most others with DDR memory and renders fine lighting effects in Quake 3.
7	**ATI Rage Fury Pro** 905/882-2600 www.ati.com	Feb 00	$139	88	Good	Good	Very good	**FEATURES:** 4X AGP, ATI Rage 128 Pro chip, 32MB of SDRAM, 300-MHz RAMDAC, video capture, TV-out, bundled 3D games—Activision's Heavy Gear 2 and GT Interactive's Need for Speed IV. **SUMMARY:** Affordable ATI board performs impressively in every game but Quake 3 and is a good choice for casual gamers.
8	**Creative Labs 3D Blaster Annihilator 2** 800/998-1000 www.creativelabs.com	NEW	$299	84	Very good	Excellent	Very good	**FEATURES:** 4X AGP, NVidia GeForce2 GTS chip, 32MB of DDR SGRAM, 350-MHz RAMDAC, bundled color-calibration tools. **SUMMARY:** One of two new cards to make the chart this month, this board equipped with NVidia's latest chip set offers high-powered 3D performance and a reasonable price.
9	**ELSA Gladiac** 800/272-3572 www.elsa.com	Aug 00	$329	84	Excellent	Excellent	Very good	**FEATURES:** 4X AGP, NVidia GeForce2 GTS chip, 32MB of DDR SGRAM, 350-MHz RAMDAC, 2 bundled 3D games. **SUMMARY:** The latest NVidia chip set helps this pricey card claim second place in 3D performance. Lighting effects look good in Quake 3. Comes with two free games, available online.
10	**3dfx Voodoo5 5500** 800/234-4334 www.3dfx.com	NEW	$299	84	Very good	Very good	Very good	**FEATURES:** 4X AGP, 3dfx VSA-100 chip, 64MB of SDRAM, 350-MHz RAMDAC, bundled color-calibration tools. **SUMMARY:** This eagerly awaited card pulled in slightly lower 3D performance than cards with the GeForce2 GTS chip, but it squeaks onto the chart with the highest score in Unreal Tournament.

Best Buy For reviews of other new graphics boards that we tested this month, visit www.pcworld.com/t10graphics.

TEST PC WORLD CENTER **HOW WE TEST** We test boards under Windows 98. Business tests include PC WorldBench 98. Our 3D-gaming score is based on four games, each evaluated on frame rate and image quality. We test AGP boards in a Dell Dimension XPS T600 with a Pentium III-600 CPU and 128MB of RAM. Overall AGP rating is based on performance (42.5 percent), features (27.5 percent), price (20 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.

TWO NEW BOARDS DEBUT this month. Creative Labs' 3D Blaster Annihilator 2 costs less than other boards we've seen with the GeForce2 GTS chip set. The Voodoo5 5500 from 3dfx outperformed others in Unreal Tournament. Meanwhile, the Matrox Millennium G400 Max retains first place. Hercules's 64MB version of the 3D Prophet II GTS performed well but was held back by its $420 price. A new Asus board also fell short. ■

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HERE'S HOW

WINDOWS
HELP

WINDOWS TIPS

SCOTT DUNN

First Aid for Windows Help

MICROSOFT'S HYPERTEXT Windows Help system was the envy of operating systems everywhere—until Microsoft decided to dump it in favor of a clumsy HTML-based version that doesn't let you bookmark topics, add annotations, or customize fonts. This is progress? A few applications continue to use the old system, but recent versions of Internet Explorer, Microsoft Office, and Windows itself are decidedly help-challenged. No instant fix is available to restore the hypertext version's features, but these tips will help you work around Windows Help's current limitations.

Bring text up to size: Though you can't directly alter the size of the font displayed in the HTML-based Windows Help window, the system will respond to certain Web-related settings. Begin by choosing either *Large Icons* or *Small Icons*, then adjust within those two ranges.

Open the Internet Options or Internet Properties dialog box: In Windows 98 SE, select *Start•Settings•Control Panel* and double-click the *Internet* or *Internet Options* icon. In Internet Explorer, choose *View•Internet Options* (IE 4) or *Tools•Internet Options* (IE 5). In Windows 2000 and Office 2000, you can open the dialog box from within Help by clicking the *Options* button and choosing *Internet Options* from the pop-up menu.

Make sure the General tab is in front, then click the *Accessibility* button near the bottom of the dialog box. To choose from a range of large sizes, check *Ignore font sizes specified on Web pages*. To choose from a range of small sizes, leave it unchecked. Then, either way, click *OK*. The ranges of available sizes overlap, but this is a good way to start (see **FIGURE 1**).

To make finer adjustments within these ranges in IE 4 or Win 98, click *Fonts* at the bottom of the Internet Options or Internet Properties dialog box. In the Fonts dialog box, choose an option from the 'Font size' drop-down list. If you have IE 5, Win 98 SE, or Win 2000, launch Internet Explorer, select *View•Text Size*, and choose a size option. Your selection will affect font sizes in Internet Explorer regardless of the Windows version you run. You may need to close and then reopen the Help window to see the change.

Put on a happy typeface: You can change the typeface visible in the Windows Help window, but if you use Internet Explorer to surf the Web, that choice will also affect how you see many Web pages. Return to the Accessibility dialog box using one of the methods explained earlier. Check *Ignore font styles specified on Web pages*, then click *OK*. Next click the *Fonts* button at the bottom of the Internet Properties (or Internet Options) dialog box. For 'Proportional font' (IE 4 or Win 98) or 'Web page font' (IE 5, Win 98 SE, or Win 2000), select a typeface from the list, and click *OK* twice to close all dialog boxes.

Make your own bookmarks: Another feature removed from Help is the ability to

ILLUSTRATION: PETER HOEY

CONTENTS

WINDOWS TIPS
224 Give Windows Help a much-needed face-lift; take screen shots you can be proud of.

ANSWER LINE
228 Find the solution to Windows boot-up error messages; add an in-box to Outlook 2000.

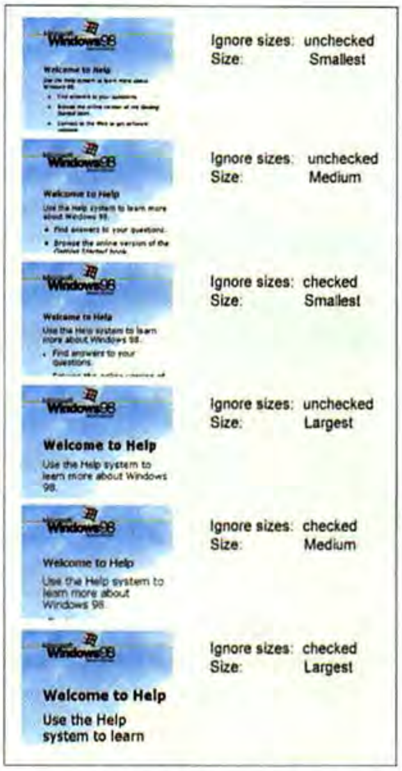
INTERNET TIPS
234 Read your AOL Mail with Netscape 6; a better way to paste Web pages into Office apps.

WORD PROCESSING
238 Add sparkle to your documents with text borders; see nonstandard file extensions in Word.

HARDWARE TIPS
240 USB makes connecting peripherals a snap; the limitations of Intel's DirectAGP.

Is it time to give up film? Find out the latest on new digital cameras at www.pcworld.com/how_it_works/digital_cameras.

If you're online, your data is at risk. A personal firewall will help keep it safe. For the latest on PC security, check www.pcworld.com/how_it_works/firewalls.


Ignore sizes: unchecked
Size: Smallest

Ignore sizes: unchecked
Size: Medium

Ignore sizes: checked
Size: Smallest

Ignore sizes: unchecked
Size: Largest

Ignore sizes: checked
Size: Medium

Ignore sizes: checked
Size: Largest

FIGURE 1: YOU CAN CHANGE the Windows Help font size through the browser settings.

bookmark topics you want to return to. In lieu of that, you can create shortcuts to specific Help topics. (**Note:** This technique may not work with early versions of IE 4 Help.) In any Help window, right-click in the right pane over the topic you want to bookmark, and choose *Properties.* In the Properties sheet, position the pointer at the beginning of the text to the right of 'Address:', then drag down and to the right to select the URL for that topic. Long URLs may not be entirely visible at first, but as you drag down, the text should scroll until you've selected it all.

Now right-click the selected text and choose *Copy.* Next, navigate to the folder where you want to store your bookmarks. If you want access to these files from the Start menu, create a folder within the Windows\Start Menu folder or the Windows\Start Menu\Programs folder. Right-click in the folder and choose *New•Shortcut.* Type **c:\windows\hh.exe** (or a similar path) followed by a space in the Command line box of the Create Shortcut Wizard. Then right-click in the space after this text and either choose *Paste* or press **<Ctrl>-V** to paste the URL you previously copied. Click *Next* and type a name for your shortcut that will help you remember the topic. Then click *Finish.* The next time you double-click your newly created shortcut (or choose it from the Start submenu you placed it in), Windows Help will open to the topic you "bookmarked."

If you're interested in additional tips on enhancing the Windows Help system, visit www.pcworld.com/sepoo/wintips.

MONITOR NETWORK CONNECTION STATUS

IF YOU'RE CONNECTED to a local area network or maintain an Internet connection through a network, Windows 2000 will allow you to keep an eye on your connection status. This is useful if, for example, you have a constant connection to the Internet but can't see the modem's status lights from your workstation. First, log on to Windows as an administrator. Right-click *My Network Places* and choose *Properties.* Double-click *Local Area Connection.* In the Local Area Connection Status dialog box, click *Properties.* At the bottom of that dialog, check the box for *Show icon in taskbar when connected.* Then click *OK* and *Close.* A networking icon will appear in the taskbar tray (near the clock) when you're connected. For more details, hold the pointer over the icon to see status information as a tool tip (see **FIGURE 2**). Alternatively, you can click the icon to see the same information in the Local Area Connection Status dialog box.

SCREEN SHOTS IN A HURRY

WHETHER YOU'RE writing a user manual, preparing a sales presentation, or sending helpful Windows tips to Aunt Martha, you may need to capture a picture of your computer screen. Fortunately, lots of good shareware programs can help you out (one of them is described in this month's "Windows Toolbox" on page 226). Alternatively, you can find freeware screen capture utilities, but in my experience they aren't worth the bother, especially since Windows has its own screen capture tools.

The basic shot: To get a picture of your entire screen, press the **<Print Screen>** button on your keyboard. This doesn't actually print anything, but it does put a picture of the screen (minus the pointer) in your Windows Clipboard. Now choose *Start•Programs•Accessories•Paint,* and in that application choose *Edit•Paste* to paste the image into the workspace. If your default Paint workspace is too small, Paint will prompt you; click *Yes* to let it enlarge the area to accommodate the shot. Once the image appears, click any tool on the left to complete the pasting process. Edit the picture, then choose *File•Save As* to save it as a file on your hard disk.

Current window only: To capture just the currently active window, follow the ▶

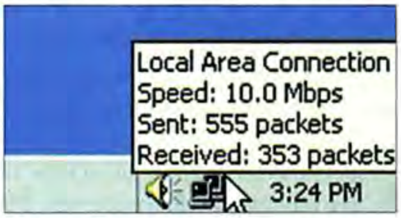

Local Area Connection
Speed: 10.0 Mbps
Sent: 555 packets
Received: 353 packets

FIGURE 2: GET AN INSTANT network status report when this icon is in the taskbar tray.

steps described above, but this time press **<Alt>-<Print Screen>** to copy just that part of the screen to the Clipboard. In this case, the image you paste into Paint will probably be smaller than the existing workspace. If so, don't click another tool after pasting. Instead, choose *Edit•Copy To* immediately after pasting to save the pasted area to a file. Designate a folder and name for the file, and click *Save*. That way you won't have to crop out an unwanted background. If you need to retouch the image you just saved, choose *File•Open*, select the newly created file, and click *Open*. Click *No* when prompted to save the workspace with the image you just pasted. Edit the file and save it again. You can use the same technique if you need to do other cropping: Use the rectangular select tool to demarcate an area, and use the *Edit•Copy To* command to save it as a separate file (see **FIGURE 3**).

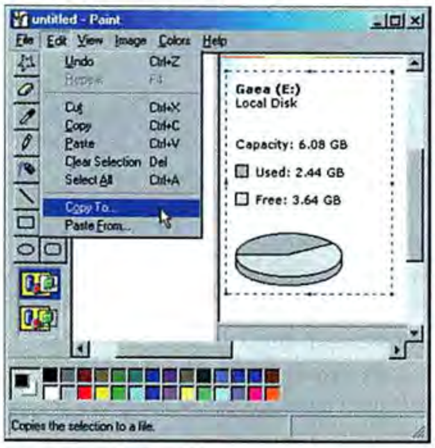

untitled - Paint
File Edit View Image Colors Help
Undo Ctrl+Z
Repeat F4
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Clear Selection Del
Select All Ctrl+A
Copy To...
Paste From...
Gaea (E:)
Local Disk
Capacity: 6.08 GB
Used: 2.44 GB
Free: 3.64 GB
Copies the selection to a file.

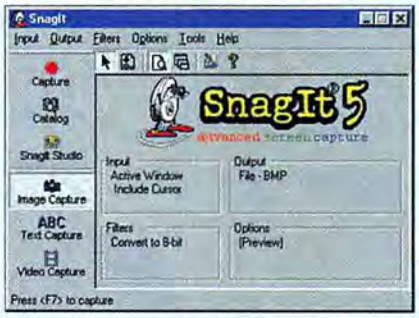
FIGURE 3: TO CROP IN PAINT, select an area and choose *Edit•Copy To* to save it as a separate file.

Save disk space: Paint's native .bmp format is a disk hog. If you want to save memory and maintain image quality—and you don't mind taking a few extra steps—right-click on your desktop and choose *Properties*. Click the *Settings* tab. From the 'Colors' or 'Color palette' drop-down list (the exact name depends on your video driver), select a lower level of color for your monitor—for example, *256 Colors* if you're currently using High Color (16 bit). The lower the number of colors you choose, the smaller the file Paint will create. Click *OK*, and follow any prompts to complete the process. If the elements you want to capture still look good, take your picture. If not, increase the video color level to the minimum necessary to get a good shot. When you're finished, you can return your video system to its normal color level.

WINDOWS TOOLBOX

Capture Screens Like a Pro

NOW IN ITS FIFTH major release, SnagIt is a veteran Windows shareware screen capture utility with features for the professional but ease of use for the rest of us. SnagIt 5 simplifies capturing static images from your computer. The program can record screen actions as a video and captures text screens to a text file, including text that has scrolled off the screen. SnagIt 5 has an Explorer-like utility for browsing images as thumbnails, and a retouching utility for adding callouts and other enhancements to your pictures. It's well worth the $40 registration fee. Download an evaluation version of SnagIt from PCWorld.com's FileWorld or from the developer's Web site at www.techsmith.com.


SnagIt
Input Output Filters Options Tools Help
Capture
Catalog
SnagIt Studio
Image Capture
ABC Text Capture
Video Capture
SnagIt 5
advanced screen capture
Input
Active Window
Include Cursor
Output
File - BMP
Filters
Convert to 8-bit
Options
[Preview]
Press <F7> to capture

Save more with FrontPage Express: If you don't mind sacrificing a little bit of quality, you can reduce file size even further without adjusting your video settings by using FrontPage Express, which is included in Windows 98, Windows 2000 Server, and some versions of Internet Explorer. Use **<Print Screen>** or **<Alt>-<Print Screen>** to copy the screen, then choose *Start•Programs•Internet Explorer•FrontPage Express*. Use the Internet Explorer option that has a folder icon, not the "e" icon. Or you can choose *Start•Programs•Accessories•Internet Tools•FrontPage Express*. Select *Edit•Paste* and then *File•Save*. Click *As File* and designate a name and location for the new HTML page (which you will discard later). Click *Save*, and when prompted, click *Yes* to save your picture in .jpg format. You can then exit FrontPage Express and delete the HTML file it created.

Unfortunately, in converting the image into a compressed .jpg file, FrontPage Express significantly lowers image quality. For more control, you could create the picture in Paint as previously described and then drag the .bmp file into a new FrontPage Express document. Right-click the picture and choose *Image Properties*. In the General tab, select *GIF* or *JPEG*; for JPEG, you can specify a quality level from 1 to 100 (see **FIGURE 4**). Lower numbers yield smaller files, but higher numbers provide better quality. Click *OK* and then save the file, following the steps described above. This technique won't work for pictures pasted directly into FrontPage Express, however. The pasting process irreversibly alters the pixels, which reduces the quality of the image.

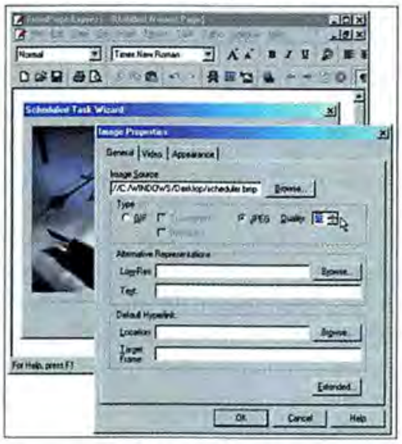

Normal
Times New Roman
Scheduled Task Wizard
Image Properties
General | Video | Appearance
Image Source
Browse...
Type
GIF
JPEG
Quality
Alternative Representations
Low-Res
Text
Default Hyperlink
Location
Target Frame
Extended...
OK
Cancel
Help
For Help, press F1

FIGURE 4: GET MORE CONTROL over .bmp-to-.jpg conversions in FrontPage Express.

For additional tips on making the most of your screen shots, point your browser to www.pcworld.com/sep00/wintips.

Find files in this article at www.fileworld.com/magazine, and find more tips at www.pcworld.com/heres_how. Send your questions and tips to scott_dunn@pcworld.com. Windows Tips pays $50 for published tips and questions. PC World Contributing Editor Scott Dunn is a principal author of The PC Bible, 2nd Edition *(Peachpit Press, 1995).* ■

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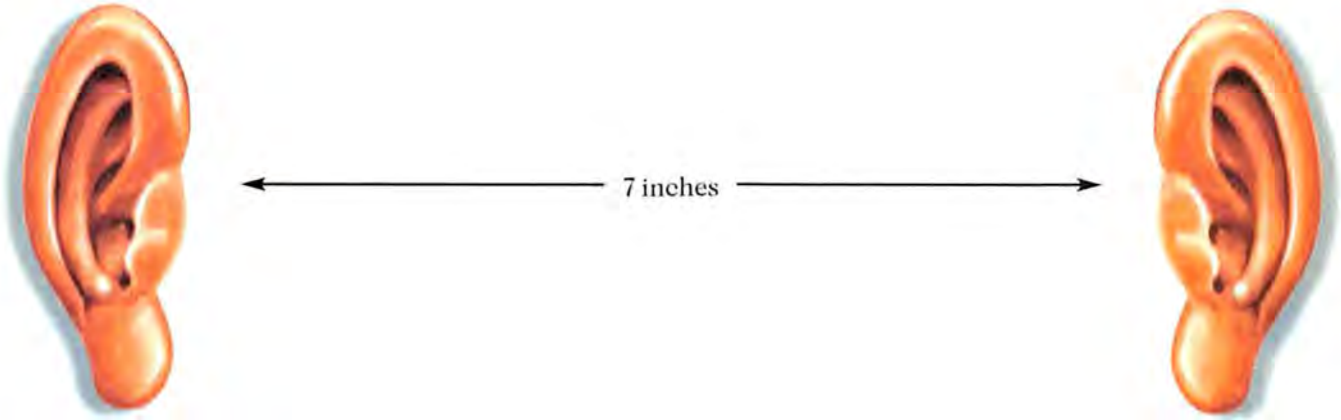

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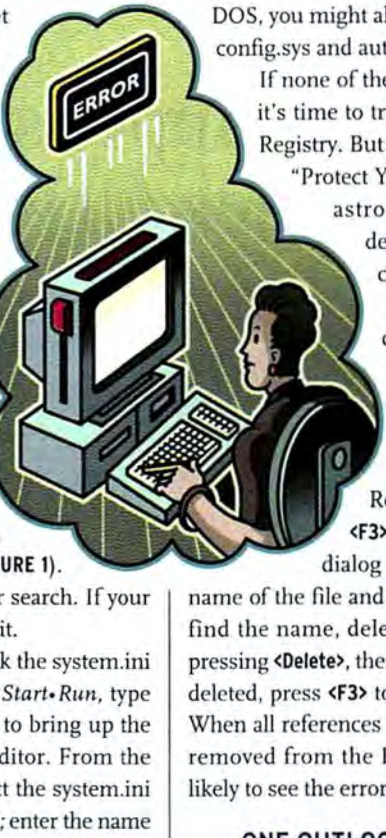
YOUR QUESTIONS ON: Multiple Outlook 2000 in-boxes ◆ **Saving Win 98 updates**

Stop Those Windows Boot-Up Error Messages

EVERY TIME I turn on my computer, I get an error message saying that a particular file is missing. Once I get past that, Windows loads and runs fine. How do I stop this message from appearing?

Peter Creutz, Saline, Michigan

START BY GETTING the details. Boot your computer, and have paper and pencil handy. When the error message comes up, write the name of the missing file. Then press a key and let Windows finish loading.



The first place you should look is the StartUp folder. Select *Start•Find•Files or Folders*. Find the Named field and enter ***.lnk**. Then, in the box labeled 'Containing text', enter the name of the missing file (if you're using Windows 95, this field is on the Advanced tab). Next, find the 'Look in' field and enter **c:\windows\start menu\programs\startup** (see **FIGURE 1**). Press **<Enter>** to start your search. If your search finds a file, delete it.

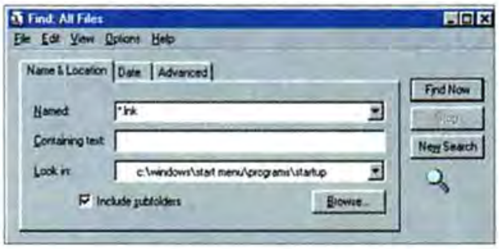
If no file turns up, check the system.ini and win.ini files: Select *Start•Run*, type **sysedit**, and press **<Enter>** to bring up the System Configuration Editor. From the cascading windows, select the system.ini window, then *Search•Find;* enter the name of the file, and then press **<Enter>**. If you find it, "comment out" the line containing the file by entering a colon (:) at the beginning of the line. (The term "comment out" refers to the programming practice of inserting special characters before lines of text in code to keep such non-code comments visible while at the same time preventing them from being processed.)

010101
What
Why
When
How

If you don't find the file in system.ini, go to the win.ini window and search for the file there, commenting it out, as described above, if you find it. If your error message is plain-text DOS, you might also try looking in the config.sys and autoexec.bat windows.

If none of these places bear fruit, it's time to try tinkering with the Registry. But first, back it up. See "Protect Yourself Against Catastrophic Installs" for details (www.pcworld.com/may00/al).

After you have completed your Registry backup, select *Start•Run*, type **regedit**, and press **<Enter>** to launch the Registry Editor. Press **<F3>** to bring up the Find dialog box. Then enter the name of the file and press **<Enter>**. If you find the name, delete the reference by pressing **<Delete>**, then select *Yes*. Once it's deleted, press **<F3>** to search for it again. When all references to the file have been removed from the Registry, you're not likely to see the error message again.



Named: *lnk

Containing text:

Look in: c:\windows\start menu/\programs\startup

☑ Include subfolders

FIGURE 1: CURE WINDOWS' BOOT-UP BLUES by finding and deleting the rogue start-up file.

Put Windows to Sleep Fast

READER LUKE STODOLA can put Windows 98 into standby mode with just two keystrokes, and now you can, too. Open the Start menu with the **<Windows>** key or **<Ctrl>-<Esc>**, then press **N**, and everything powers down. Or at least it should. Some programs and documents disable this function when added to the Start menu. Even so, you can still go into standby quickly: Press **<Ctrl>-<Esc>** (or **<Windows>**), then **U** (or **UU-<Enter>**) to open the Shut Down dialog box, and finally **T-<Enter>**. Good night, Windows!

ONE OUTLOOK 2000, WITH IN-BOXES FOR TWO

MY WIFE AND I both use Outlook 2000 to access different e-mail accounts on the PC we share. How can we have her mail and mine go into separate in-boxes?

Shannon L. Joseph, Indianapolis

THE TRICK IS to create a folder that one of you will use as an in-box, then set up a rule to send that person's new mail to that folder. Here's how it's done:

To create the folder, open Outlook 2000 and select *File•Folder•New Folder*. In the resulting dialog box's Name field, enter an appropriate name, such as **Shannon's In-Box**. Then press **<Enter>**.

Outlook will ask if you want this in the Outlook Bar; click *No*. A Folder List will appear to the right of the Outlook Bar. Drag the new folder—which will be on that list under the Inbox—to the Outlook Bar and place it directly under the In-Box icon. If you don't want the Folder List visible, select *View•Folder List* to hide it again.

Now you have to tell Outlook to send your messages to the folder named Shannon's In-Box. Select *Tools•Rules Wizard*, and click the *New* button. In the top text window of the new page, select *Check messages when they arrive*. Click *Next*. In the next page's top text window, select *when received through the specified account*. A warning will pop up; click *Yes*, and don't worry about it. In the bottom text win- ▶

ILLUSTRATIONS: PETER HOEY (LEFT); JEFFREY PELO (RIGHT)

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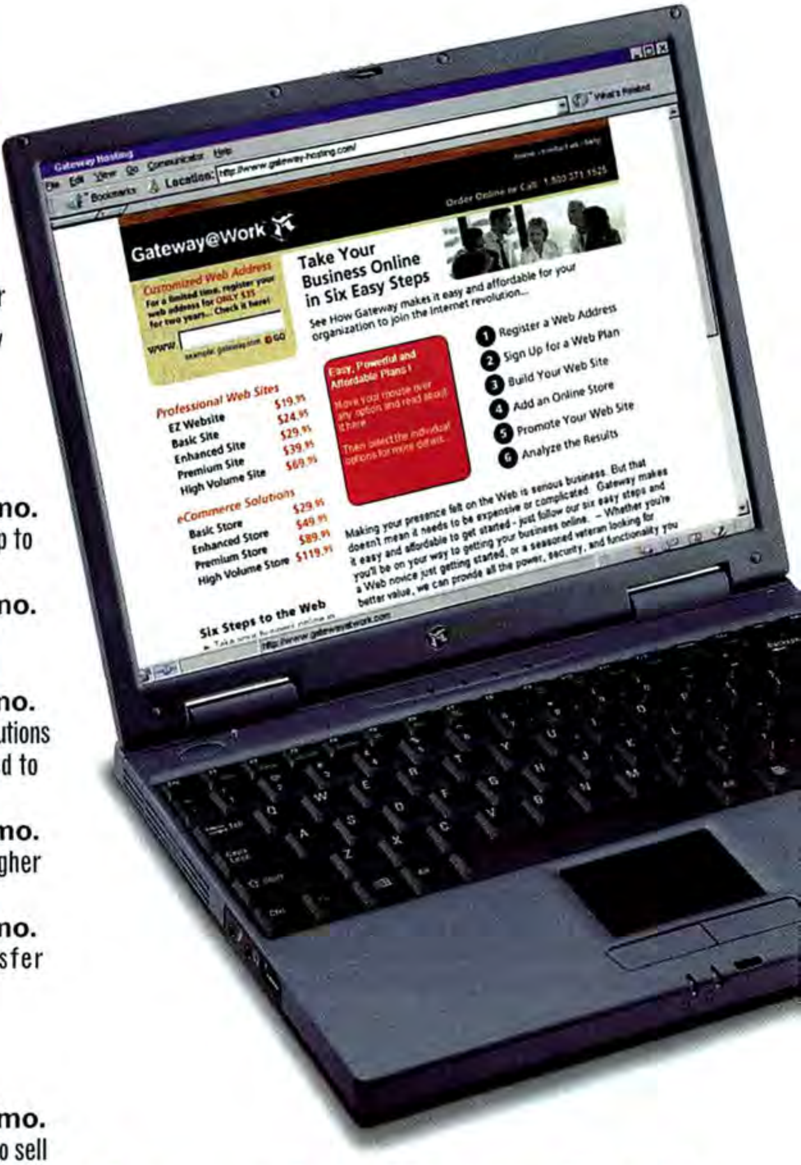

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dow, click the word *specified.* In the resulting dialog box, choose your account and click *OK.* Then click *Next.*

Now select *move it to a specified folder* and click the word *specified* again. Select *Shannon's In-Box* and click *OK.* Finish the wizard. From now on, your messages will be rerouted to your in-box, while your wife's will go to the original one.

CUT "SHORTCUT TO..."

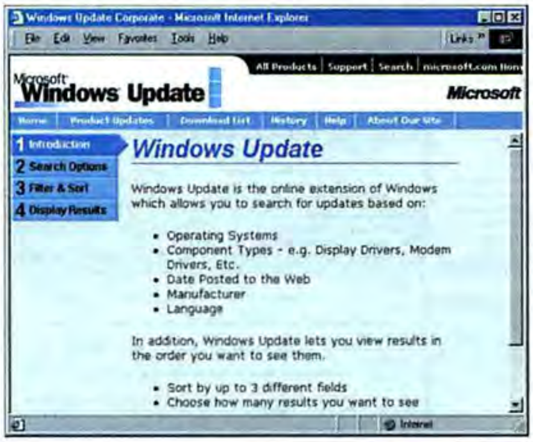
I DON'T LIKE the way the names of new shortcuts always begin with 'Shortcut to...' How can I stop Windows from adding these two extra words to every new shortcut I create?

Ray Blackburn, Nuevo, California

IF YOU HAVE INSTALLED Tweak UI (formerly part of Microsoft's unsupported PowerToys), there's an easy way to do this. Select *Start•Settings•Control Panel.* Double-click *Tweak UI,* then click the *Explorer* tab. In the Settings section, uncheck *Prefix "Shortcut to" on new shortcuts.*

If you don't have Tweak UI, there's a method that sounds like it shouldn't work but does. Open two folders side by side on your desktop: one full of files, the other empty. Right-drag a file to the new folder. At the pop-up menu, select *Create Shortcut(s) Here.* Now select the new shortcut and press **<F2>**. Then delete the words *Shortcut to* and press **<Enter>**.

Repeat the process, dragging another file to the once-empty folder to create the shortcut, then manually removing the unwanted words. Eventually, usually by the eighth repetition, Windows will create the shortcut without adding the extra verbiage. This is the only case I know where Windows actually seems to learn from experience.


Windows Update Corporate - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Links
All Products | Support | Search | microsoft.com Home
Microsoft Windows Update
Microsoft
Home | Product Updates | Download List | History | Help | About Our Site
1 Introduction
2 Search Options
3 Filter & Sort
4 Display Results
Internet

Windows Update

Windows Update is the online extension of Windows which allows you to search for updates based on:

- Operating Systems
- Component Types - e.g. Display Drivers, Modem Drivers, Etc.
- Date Posted to the Web
- Manufacturer
- Language

In addition, Windows Update lets you view results in the order you want to see them.

- Sort by up to 3 different fields
- Choose how many results you want to see

FIGURE 2: DOWNLOAD WINDOWS updates for later (not immediate) use, from some little-known Microsoft Web pages.

INSTALL WINDOWS 98 UPDATES WHEN YOU LIKE

THE WINDOWS UPDATE Web page automatically downloads and then installs the upgrades you choose. There are times when this isn't convenient, such as when you have more than one computer or want to save the updates for the next time you reinstall Windows. Is there a way to download the Windows 98 Update files but install them later?

Alex Hrapunov, Goldvein, Virginia

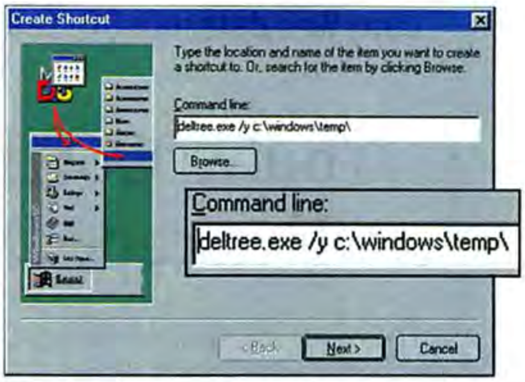
MICROSOFT DESIGNED its Windows 98 Update page, which you can access by selecting *Start•Windows Update,* for novice users. Unfortunately, this makes it more difficult for the rest of us.

Luckily, Microsoft has provided other Web pages from which you can download the updates. These pages aren't as slick and user-friendly as the default Windows Update page—for instance, they can't filter out the updates you already have—but they let you download the files without having to install them immediately.

For a wizardlike search tool that will help you find the updates you need, go to corporate.windowsupdate.microsoft.com (see **FIGURE 2**). Among the site's features is the ability to create search profiles for updates based on operating system, component, type, and manufacturer.

The site also allows search filtering by date, title, operating system, manufacturer, and type, as well as by language. You can also search by a specific term and set the maximum number of results to be displayed.

If all you need is a list of downloadable upgrades, go to www.microsoft.com/windows98/downloads/corporate.asp. There, you'll find upgrades categorized as 'critical', 'recommended', 'multimedia', and 'previews'. What you won't find is the option to install the update later.



Type the location and name of the item you want to create a shortcut to. Or, search for the item by clicking Browse.

Command line:

```
deltree.exe /y c:\windows\temp\
```

Command line:

```
deltree.exe /y c:\windows\temp\
```

FIGURE 3: EMPTY THE WINDOWS TEMP folder on bootup by putting the deltree command in the StartUp menu.

A BETTER WAY TO EMPTY WINDOWS' TEMP FOLDER

I WAS STUNG with criticism for my advice on deleting the contents of C:\Windows\Temp every time you boot (see "Empty the Temp Folder Automatically," www.pcworld.com/mayoo/al). Readers pointed out, correctly, that I used two DOS commands where the single command line **deltree /y c:\windows\temp\** (don't forget that final backslash) would also do the job (see **FIGURE 3**).

Certain installation programs leave files in the Temp folder, reboot your computer, then use those files to finish the installation. If you empty Temp via autoexec.bat as I stated, the installation won't work.

The solution is to put this deltree command in the StartUp menu, since programs in this menu run only after any such installation routines. Right-click the taskbar and select *Properties.* Click the *Start Menu Programs* tab, then the *Add* button. For the Command line, enter **deltree /y c:\windows\temp\**. Click *Next.* For the rest of the wizard, pick the defaults.

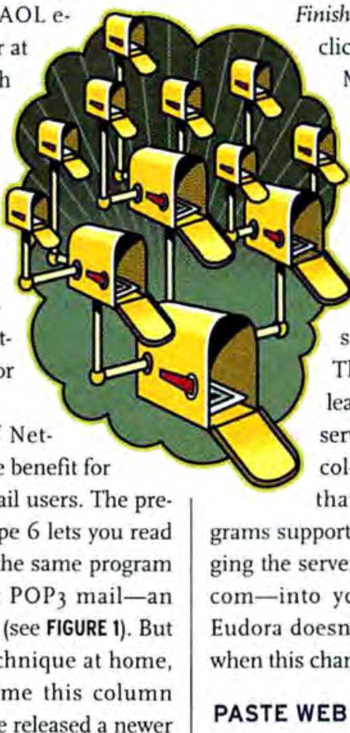
Once you're done with the wizard, select *Start•Programs•StartUp,* right-click *deltree,* and select *Properties.* (If you have Windows 95, right-click *Start* and select *Explore.* Navigate to the Programs\StartUp folder, right-click *deltree* and select *Properties* there.) Click the *Program* tab, check *Close on exit,* and click *OK.*

Send your questions to answer@pcworld.com. We pay $50 for published items. Contributing Editor Lincoln Spector writes the syndicated humor column Gigglebytes. ■

Copy Web data into Office apps ◆ Free Usenet news servers ◆ A great FTP client

You've Got (Real) Mail: Netscape Does AOL

AMERICA ONLINE IS popular, but it isn't a real Internet service provider. It's simply an online service that offers limited Internet support. AOL doesn't provide standard POP3 and SMTP servers for receiving and sending e-mail. The AOL Mail system's proprietary nature (more on that below) means you can't use the feature-rich e-mail client of your choice.



Sure, you can read AOL e-mail via a Web browser at AOL, but this approach is limited—it doesn't let you read your e-mail offline, back up your address books and messages, create message filters and folders, or read AOL e-mail with Outlook, Outlook Express, Eudora, or other mail clients.

AOL's purchase of Netscape has yielded a side benefit for long-suffering AOL Mail users. The preview release of Netscape 6 lets you read your AOL Mail using the same program you use to read your POP3 mail—an unprecedented benefit (see **FIGURE 1**). But before you try this technique at home, a warning: By the time this column appears, AOL may have released a newer beta of Netscape 6. Until a final version comes along, remember that preview releases are not fully tested and stable—use them at your own risk. (The only problem I've noticed so far with Netscape 6 is slow performance.)

STOP
W
ww.com
Back
Forward
Load

To read your AOL Mail with Netscape's Mail program, first visit **home.netscape.com/download/previewrelease.html** to download and install the program. Next, launch the browser, choose *Tasks•Mail* to open the Messenger mail and news app, choose *Edit•Mail/News Account Settings*, and click on the *New Account* button. Select the *Existing Mail account* and *America Online* radio buttons, click *Next*, fill in your AOL identity information, and click *Finish*. To check your mail, right-click the AOL account in the Mail Folders list and select *Get Messages for Account*. If AOL Mail is the default account in the Mail/News Account Settings dialog box, you need only click the *Get Msg* button.

AOL Mail may not stay proprietary for long. The Netscape Preview Release connects to AOL's mail server using the IMAP protocol—an alternative to POP3 that most other e-mail programs support. Unfortunately, just plugging the server address—imap.mail.aol.com—into your copy of Outlook or Eudora doesn't work. I'll let you know when this changes.

PASTE WEB PAGES INTO OFFICE APPS

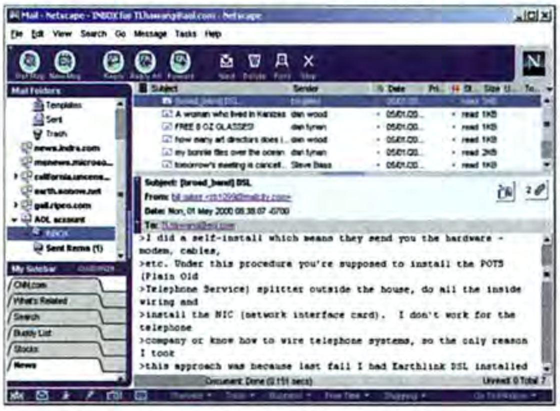
IF YOU WANT to copy all or part of a Web site into Microsoft Word, Excel, or other business app, you may not be able to simply select, copy, and paste. Here are a few basic techniques I've grown accustomed to. I'd like to hear about any you have come up with.

Copying text to Word: Nothing beats plain text for compactness, portability, and simplicity. If you just want to copy and paste unadorned text from a Web page into a Word document, it's easy—if you take one extra step. First, select the Web page text using your mouse, press **<Ctrl>-C**, switch to your Word document, and position the cursor where you want to paste the text.

Here's where the extra step comes in: Resist the temptation to simply press <Ctrl>-V to paste the text—you'll end up with the original HTML, including tables, text formatting, inline images, and anything else embedded in the area you selected. (This includes the "invisible" tables Web designers use to format their pages.) If you don't want all that, choose instead *Edit•Paste Special*, select *Unformatted Text*, click *OK*, and the selected text will appear. If you slip up and press <Ctrl>-V out of habit (something I probably do at least once a day), press ▶

Use AOL Under Windows 2000

IF YOU USE America Online version 4 and upgrade to Windows 2000 from Windows 95 or 98, your AOL and Dial-Up Networking connections could be disabled. AOL is still working on the Windows 2000 version of AOL 5. Before trying the AOL/Win 2000 combo, check out AOL's Win 2000 information page at www.aol.com/win2000, and then download and install Microsoft's 269KB AOL update for Windows 2000 at www.microsoft.com/windows2000/downloads/recommended/aolfix/default.asp.



Mail - Netscape - INBOX for TLhawang@aol.com - Netscape
File Edit View Search Go Message Tasks Help
Get Msg
New Msg
Reply
Reply All
Forward
Next
Delete
Print
Stop
Mail Folders
Templates
Sent
Trash
news.indra.com
msnews.microso...
california.uncens...
earth.acsbow.net
gall.ripco.com
AOL account
INBOX
Sent Items (1)
My Sidebar
CNN.com
What's Related
Search
Buddy List
Stocks
News
Subject
Sender
Date
Size
A woman who lived in Kansas
dan wood
FREE 8 OZ GLASSES!
dan tynan
how many art directors does i...
my bonnie flies over the ocean
tomorrow's meeting is cancel...
Steve Bass
Document: Done (0.151 secs)
Unread: 0 Total: 7

Subject: [broad_band] DSL
Date: Mon, 01 May 2000 08:38:07 -0700

```
>I did a self-install which means they send you the hardware -
modem, cables,
>etc. Under this procedure you're supposed to install the POTS
(Plain Old
>Telephone Service) splitter outside the house, do all the inside
wiring and
>install the NIC (network interface card).  I don't work for the
telephone
>company or know how to wire telephone systems, so the only reason
I took
>this approach was because last fall I had Earthlink DSL installed
```

FIGURE 1: AT LAST, A REAL AOL MAIL PROGRAM, courtesy of Netscape 6 Internet suite beta. A sign of things to come?

ILLUSTRATIONS: PETER HOEY (LEFT); JEFFREY PELO (RIGHT)

This morning, Rudy Williams single-handedly transformed his home into a techno-palace where he can play DVD's in the living room and watch 'em on every TV in the house...control his stereo from anywhere, including the patio ...check on baby Sally or see who's at the front door on any TV or computer screen ...send e-mail from his home office while Rudy, Jr. surfs the web in his bedroom (on the same high-speed connection) ... all at the same time, for just about $1,400.

And hooking it up was a piece of cake.

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<Ctrl>-Z to undo the HTML-format paste.

Copying tables into Word: Both Web and Word documents can contain tables, and when copying and pasting an HTML table into Word, you get the table, its borders, and its contents. If you want only the table's text, choose *Edit•Paste Special•Unformatted Text,* and click *OK*—you'll end up with the table cells' contents in a single column without borders or images.

Copying tables into Excel: This procedure is much the same as in Word: Do a regular paste operation to keep the same arrangement of table elements as in the original Web page, or paste each line of the table as plain text into column A. With some HTML tables, Excel doesn't do as good a job as Word at pasting table data. For example, cells containing bulleted lists get split into separate cells for each list item, and background colors disappear. Try pasting the table into Word, then copying and pasting it into Excel.

USENET WANTS TO BE FREE

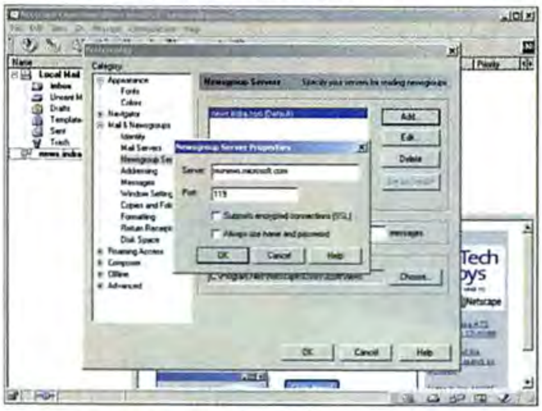
MY ISP DOES NOT have a newsgroup server; neither do they know of any. Could you please give me a public newsgroup server address that I can configure in my newsreader?

Saurabh Gupta,
Ahmedabad, Gujarat, India

YOU CAN READ and post Usenet messages for free using your Web browser at Deja.com and RemarQ.com, but like Web-based e-mail, the messages stay on the server, not on your computer. And forget about using your favorite newsreader program to grab or block out specific messages. The good news: There are hundreds of free news servers out there. The bad news: As usual, you get what you pay for. They're often bogged down, they may not be around tomorrow, and they may not carry the groups you're looking for.

There's no single best place to begin a search for free servers, but as good a place to start as any is usenet.startshere.net. It claims to have a database of 5785 news servers, of which 574 are open to the public.

You can also check the many lists of favorite servers that are maintained by free-news fans. To find these sites, just browse over to your favorite search engine and enter **free news server** in the search box. And don't forget to check in with the source itself: Usenet's own alt.free.newsservers group.


Category
Appearance
Fonts
Colors
Navigator
Mail & Newsgroups
Identity
Mail Servers
Addressing
Messages
Window Settings
Formatting
Return Receipts
Disk Space
Roaming Access
Composer
Offline
Advanced
Newsgroup Servers
Add
Edit
Delete
Newsgroup Server Properties
Server
Port
OK
Cancel
Help
Choose...

Server: msnews.microsoft.com
Port: 119

FIGURE 2: FREE NEWS SERVERS ARE easy to add to Netscape Messenger via the Mail & Newsgroups option.

If you're like me, you'll soon tire of entering addresses for slow or expired servers into your newsreader. But you can pay for better news server access. Because Usenet generates gigabytes of traffic each day, smaller ISPs often farm their Usenet service out to a large commercial NNTP news service such as Supernews (supernews.com) or Giganews (giganews.com). Both these companies also sell individual Usenet accounts at rates ranging from $12 to $60 a month, depending on your connection speed and/or how much raw data you plan to retrieve.

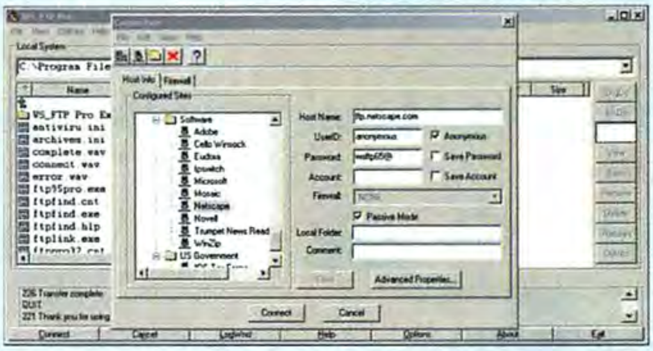
Many companies maintain free public newsgroup servers that may have information you want. They just don't carry the Usenet groups. You can access these servers by creating a new account in your newsreader software. To add Microsoft's news server to Netscape's Messenger, for example, choose *Edit•Preferences,* select *Newsgroup Servers* under Mail & Newsgroups, click the *Add* button, enter **msnews.microsoft.com** in the server field, and click *OK* (see **FIGURE 2**). If you want to add the Justice Department's news server, you're on your own.

Find files from this article at www.fileworld.com/magazine. Send your questions and tips to nettips@spanbauer.com. We pay $50 for published items. Scott Spanbauer is a contributing editor for PC World. ■

DOWNLOAD OF THE MONTH

WS-FTP PRO 6.5: FTP CHAMP

THE LATEST version of WS-FTP Pro, the all-time world's-greatest FTP client, is now available. Any browser will let you download a file from an FTP server, but if you deal with FTP sites frequently, WS-FTP Pro can streamline your work. The program integrates with your browser and launches automatically when you browse to an FTP site. If you're tired of multimegabyte downloads failing just before completion, WS-FTP Pro's download-resume feature will pick up the download right where it stopped. The utility tracks your FTP passwords and your default remote and local directory paths (see **FIGURE 3**). It even retries busy servers automatically. WS-FTP Pro 6.5 costs $40; download a 30-day demo version from Ipswitch Software's Web site at www.ipswitch.com/products/ws_ftp. You can also download the full version from FileWorld.com. If you can live without the download-resume and other features, the free WS-FTP LE 5.08 may do, but most FTPers will find the full version a genuine bargain. Find a download link at www.ipswitch.com/cgi/download_eval.pl.


Local System
Name
Host Info
Firewall
Configured Sites
Software
Adobe
Cello Winsock
Eudora
Ipswitch
Microsoft
Mosaic
Netscape
Novell
Trumpet News Read
WinZip
US Government
Host Name
UserID
Password
Account
Firewall
Anonymous
Save Password
Save Account
Passive Mode
Local Folder
Comment
Advanced Properties...
Connect
Cancel
LogWnd
Help
Options
About
Exit

Host Name: ftp.netscape.com

FIGURE 3: IPSWITCH SOFTWARE'S WS-FTP PRO 6.5 file transfer protocol client speeds up and automates FTP uploads and downloads.

48-HOUR
V.I.P.C.
48
12
36
24
GUARANTEE

...tick,tick,tick,tick,tick

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Add Pizzazz to Documents by Using Edge Effects

LOOKING FOR A FAST, easy way to highlight text and graphics in your document? Apply borders to set material off and add impact. Here's a guide to the formatting associated with text borders in Word and WordPerfect. For additional tips on creating page borders and borders around objects, check online at www.pcworld.com/sep00/wptips.

TEXT BORDERS

Word 97 and 2000: Word 97 and 2000 can place a border around any block of text, down to an individual character. To surround text with a border, select the text, then select *Format•Borders and Shading*. In the resulting dialog box (see **FIGURE 1**), select a quick border to surround the text by choosing one of the preset border style icons under Setting. To selectively add borders to one or more sides of the text, select the *Custom* icon and then click the boxes in the Preview section to add lines to individual sides.

Control the style of border lines by choosing a pattern from the Style list. Pick a thickness for the lines in the Width list, and set the color for the lines in the Color list; in Word 2000 you can select *More Line Colors* for access to additional colors. To add a background color or shading to your bordered area, click the *Shading* tab in the Borders and Shading dialog box. Then select a fill color and a pattern, and finally click *OK* to apply the new border to the selected text.

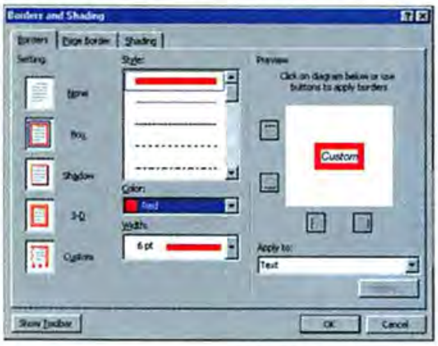


FIGURE 1: PUNCH UP PROSE: Adding borders to Word elements is easy with this dialog box.

WordPerfect 8 and 9: WordPerfect 8 and 9 let you add borders to only one or more paragraphs of text. Click in a paragraph or select multiple paragraphs, then select *Format•Paragraph•Border/Fill*. Choose a border style from the examples in the 'Available border styles' list. Select the text you want to surround, and then choose *Apply border to current paragraph only*. Be sure to scroll through the entire list of style choices. To set colors for your border, click the *Color* button and either pick a color from the preset colors or click *More* to choose from the entire color palette.

To add a shadow to your border, click the *Shadow* tab (in WP 9) or the *Drop Shadow* button (in WP 8), and then pick a direction from the examples. In WP 9, set the Shadow Height and Shadow Width by watching the examples in the preview window. WP 8 doesn't give you as much control: Select the *Advanced* tab, click the *Width* button, and select an option. In both versions, the Color button lets you set a color for the shadow.

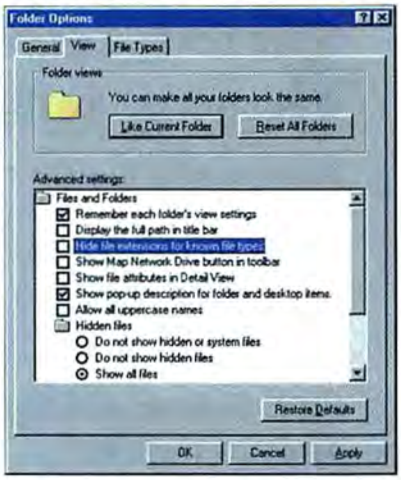
To apply a fill color or pattern inside the bordered area, click the *Fill* tab. Choose a fill style from the examples, again after scrolling through all possible styles, including gradient fills. Click the *Pattern* button to display other available patterns. Choose a foreground and background color for your fill. For gradient fill styles, you can choose start and end colors. You can gain even more control over gradient fills by clicking the *Advanced* tab and adjusting the settings there. Watch the preview window to see the effects.

Eliminating Too-Wide Text

WHEN VIEWING THE TEXT of Word pages formatted in landscape orientation or displayed in a reduced-size window, you often find the words running off the right edge of the screen. To see all the text in its normal size but wrapped to fit the screen, select *View•Online Layout* in Word 97 or *View•Web Layout* in Word 2000. To see all the text with normal line endings but reduced in size, select *View•Zoom*; then select *Page width* in the Zoom dialog box and click *OK*. Neither setting affects how the document prints.

VIEW ANY DOS FILE EXTENSION IN WORD

NONSTANDARD FILE extensions don't always appear in the Open dialog box list in Word 97 or 2000. To force Word to display them, open Explorer, select *View•Folder Options*, and click the *View* tab in the Folder Options dialog box. In the 'Advanced settings' scroll box, clear the *Hide file extensions for known file types* check box, as shown in **FIGURE 2**. To make this apply to all settings on your PC, click *Like Current Folder*, and then click *Yes*.



Advanced settings:
- Files and Folders
  - ☑ Remember each folder's view settings
  - ☐ Display the full path in title bar
  - ☐ Hide file extensions for known file types
  - ☐ Show Map Network Drive button in toolbar
  - ☐ Show file attributes in Detail View
  - ☑ Show pop-up description for folder and desktop items.
  - ☐ Allow all uppercase names
- Hidden files
  - ○ Do not show hidden or system files
  - ○ Do not show hidden files
  - ● Show all files

FIGURE 2: FIND ELUSIVE DOS FILES by changing this setting in Windows Explorer.

Find additional tips at www.pcworld.com/heres_how. Send questions and tips to george_campbell@pcworld.com We pay $50 for published items. You can reach PC World *contributing editor George Campbell on his Web page at www.osomin.com.* ■

ILLUSTRATION: JEFFREY PELO

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DELL
HEWLETT PACKARD
IBM
TOSHIBA

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PCWEEK BEST OF COMDEX FALL 1999 Winner

split bridge™

*Visit the Mobility Web site or call your local reseller for full product compatibility. Some notebooks may require a different cable configuration.

Mobility

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Dedicated USB hubs ◆ DirectAGP's limitations ◆ Hide Control Panel applets

Ride the Bus: Faster, Easier Connections With USB

IF YOU'RE THINKING of adding a new peripheral to your PC, consider one that uses a Universal Serial Bus connection. USB is faster and easier to use than parallel, serial, or PS/2 connections, and it lets you plug in and unplug devices without rebooting or reconfiguring your PC.

Though USB ports have been standard on most PCs for well over two years, many users have shunned the new technology. Two factors account for their diffidence: Some early USB systems suffered from compatibility problems, and until recently stores stocked relatively few USB products.

Over the last year, however, many new USB peripherals, hubs, and converters have reached the market, helping cement USB's reputation as the PC connector of the future.

USBASICS: DAISY-CHAIN GANG

USB CONNECTIONS move data at up to 12 mbps, about 100 times faster than a typical serial port, and over 4 times faster than the speediest parallel port. A USB mouse or keyboard won't work any faster than its PS/2 or serial equivalent, but demanding devices like printers and scanners can deliver substantially faster performance.

Because USB devices can be linked, or daisy-chained, a single USB port can accommodate up to 127 devices. In practice, you could probably link only half that number—but that's still more than you'd ever need. All devices attached to a USB port run off a single IRQ, avoiding one of the PC's most formidable barriers to supporting multiple devices.

The two USB ports on the back of your PC—and any others on the case—are part of a single USB hub. Every device directly connected or daisy-chained to either port shares the 12-mbps bandwidth. If you need more bandwidth for running multiple data-hungry devices like high-end scanners and printers, you must add a second USB hub.

GETTING ON BOARD

A SMOOTHLY functioning USB port has three prerequisites: a PC motherboard equipped with the proper hardware and BIOS; an appropriate version of Windows; and a power supply that can accommodate all the peripherals attached through the port.

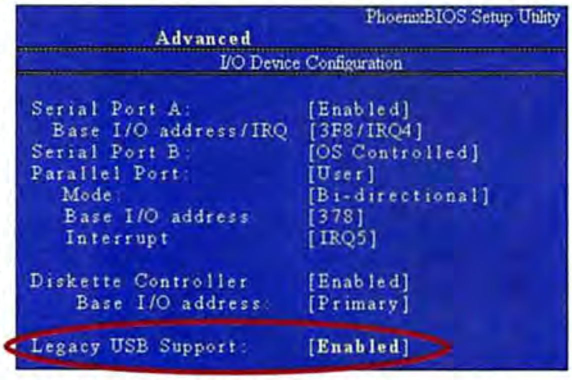
If you purchased your PC within the last two years, the hardware and BIOS should be no problem. But having a couple of USB ports on your PC is no guarantee that they'll work properly. To see if your PC is USB-ready, download and run the free usbready.exe utility from the USB.org Web site at www.usb.org/data/usbready.exe. This program looks at your hardware, installed drivers, and Windows version and tells you what you need to run USB successfully.

USB works best with Windows 98. If you're still using Windows 95 and want to use USB, your best bet is to upgrade to Windows 98. The later OSR2 version of Windows 95 provides some support for USB, but finding USB devices that come with Windows 95 USB drivers may be difficult. If you choose not to upgrade to Win 98, always check with the manufacturer about Windows 95 driver availability before buying a USB peripheral. Usbready.exe will tell you which version of Windows 95 you're using and whether it supports USB.

Having trouble getting a USB device to work? Here are a few tips:

Check your CMOS settings. Often the CMOS setup program includes a setting to enable and disable USB (see **FIGURE 1**). If USB is disabled and you have installed a USB keyboard, you won't be able to access the CMOS settings unless you install a PS/2 keyboard first.

Check for a custom driver. You may need to install a driver before adding some ▶



```
                                        PhoenixBIOS Setup Utility
                  Advanced
                         I/O Device Configuration

Serial Port A:                 [Enabled]
  Base I/O address/IRQ         [3F8/IRQ4]
Serial Port B:                 [OS Controlled]
Parallel Port:                 [User]
   Mode:                       [Bi-directional]
   Base I/O address            [378]
   Interrupt                   [IRQ5]

Diskette Controller            [Enabled]
    Base I/O address:          [Primary]

Legacy USB Support:            [Enabled]
```

FIGURE 1: MAKE SURE USB IS TURNED ON in your CMOS setup program. Some devices may also require a special driver.

Protect Your System Settings

IT MAY NOT be high-level security, but you can make it much more difficult for anyone to change your display, network, printer, Device Manager, Internet options, or other settings in Windows' Control Panel simply by moving a file from one folder to another. Each Control Panel applet has a file with a .cpl extension stored in the Windows/System folder. If you move a .cpl file to any other folder, the applet associated with it disappears from Control Panel. To run the applet, you simply double-click its .cpl file in Explorer.

ILLUSTRATIONS: PETER HOEY (LEFT); JEFFREY PELO (RIGHT)

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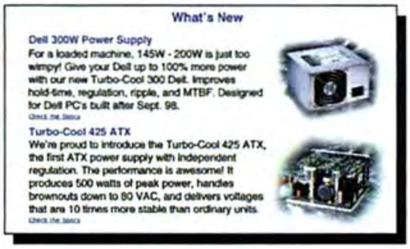

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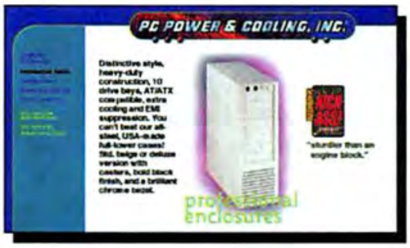

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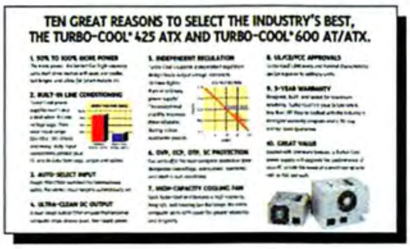

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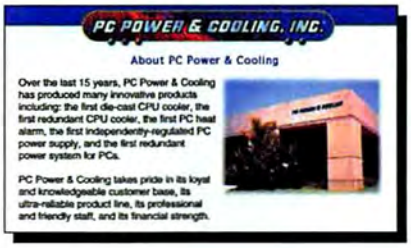

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devices—a fancy joystick, for example. Check your documentation.

Call your manufacturer. Some of the first USB systems came with all the proper internal hardware but no ports, while others were designed before the specifications were finalized. If you're having a problem with your USB system, ask your manufacturer if it was designed before the final USB specifications were completed, and if your USB system has no ports, ask if you can be sent an updated model.

Add a second USB hub. For users whose existing USB hardware is faulty, who need to move more data than the 12 mbps a single hub can provide, or who just want to add USB to a non-USB system, several PCI-to-USB adapters are on the market, including the $60 BusPort from Belkin.

HUB HEAVEN

THE SOCKETS THAT let you daisy-chain numerous USB devices make up a hub. The two rectangular connectors found at the rear of your PC are known as the root hub. Other hubs may connect to the root hub either as built-in components of a monitor, keyboard, or other USB device, or as dedicated, stand-alone devices.

Dedicated hubs come with clusters of two, four, or more additional sockets. The $100 BusStation seven-port hub from Belkin, for example, is a handy, modular stack to which you can add adapters (see **FIGURE 2**). Three of the BusStation's modules are removable and interchangeable with serial, SCSI, ethernet, PS/2, and other adapters, allowing you to create your own multifunctional hub. Once you've experienced the ease of plugging and unplugging USB devices from a hub on your desktop, you'll never want to deal with serial and parallel ports again.

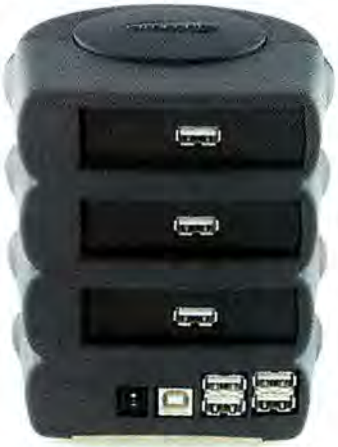

FIGURE 2: BELKIN'S BUSSTATION USB hub lets you create your own multifunctional hub.

You can't simply attach devices to any port, however. USB ports deliver electricity as well as data to peripherals. Just as all devices attached to a root hub must share its 12 mbps of bandwidth, they must share a finite amount of electrical power. You need to plan your USB setup around the energy needs of your USB devices.

Bus-powered hubs draw power from the incoming USB connector and can output up to 100 milliamps per port. Self-powered hubs draw electricity from their own power cord (or from the PC, in the case of the root hub or PCI-to-USB adapter) and provide up to 500 mA per port. A single low-power peripheral, such as a keyboard or mouse, typically uses 25 to 40 mA, and a 100-mA port on a bus-powered hub easily accommodates it. Power-hungry devices such as cameras and hubs must be attached to the 500-mA port of a self-powered hub. Before you buy a USB peripheral, make sure your USB hub can meet its power needs.

Maximum Data Rates

BUS	Megabytes per second
1X AGP	264
2X AGP	528
4X AGP	1056
PCI	132

FIGURE 3: AGP MOVES texture data between a PC's main memory and the graphics card much faster than PCI.

If your attached USB peripherals draw more current than the bus can support, the entire bus may shut down. To see whether your USB peripherals are drawing more current than the bus can support, look for a warning icon next to the Universal Serial Bus controller entry in Windows' Device Manager. Aside from the warning icon, the only signal you'll get that an overload has occurred is the malfunction of one or more USB devices.

3D DILEMMA

I PURCHASED a new, 500-MHz Celeron system for a very good price from a local computer shop, but it runs all my 3D graphics programs very slowly. I was told that the system supported DirectAGP. I'd like to add a more powerful 4X AGP graphics card, but my PC's documentation doesn't specify whether the system's DirectAGP is 2X or 4X. How can I find out?

Peter Wang
Vancouver, British Columbia

CHANCES ARE you can't. DirectAGP is a modified form of standard AGP—or Accelerated Graphics Port—technology that lower-cost systems use. Their graphics chips are usually attached directly to the motherboard, and they use the Universal Memory Architecture, which cuts costs by relying on the system's main RAM instead of using its own RAM to process graphics. Unfortunately, these systems almost never come with an AGP port to accommodate an upgrade.

AGP moves complex texture data over a superfast connection between the graphics card and the PC's main memory; this frees the dedicated graphics memory to perform other 3D calculations. A PCI-based card can transfer graphics data at a top speed of 132 MBps, and it must share the PCI bus with other parts of the PC. A 1X AGP card's dedicated channel moves data twice as fast (see **FIGURE 3**). Intel says architectural differences exclude DirectAGP's transfer rates from comparison.

You may be able to disable your onboard graphics chip and add a PCI-based graphics card, but the only way for you to realize the 3D performance of the latest graphics cards is to upgrade the motherboard (which may not even be possible) or to buy an entirely new PC.

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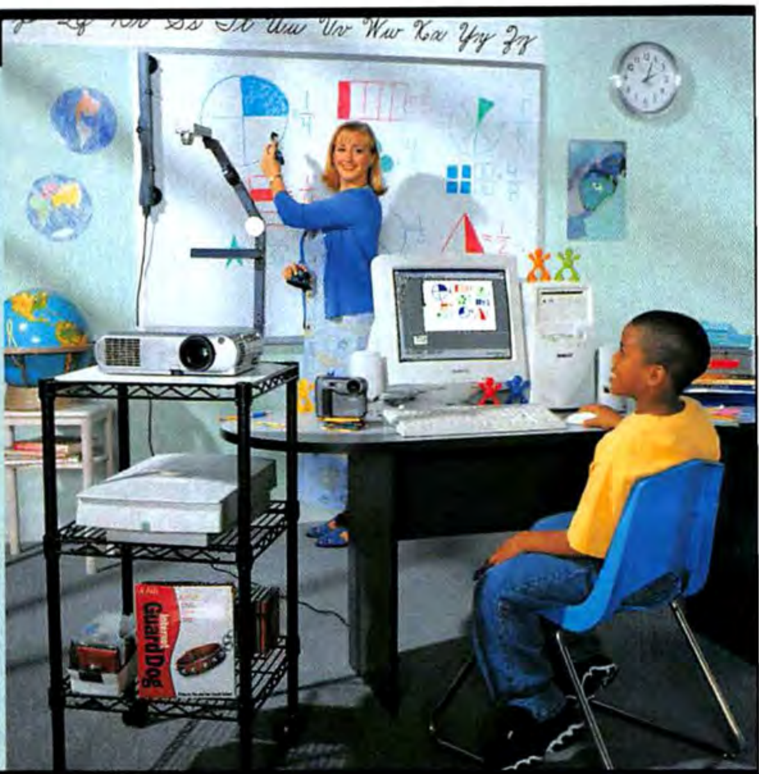

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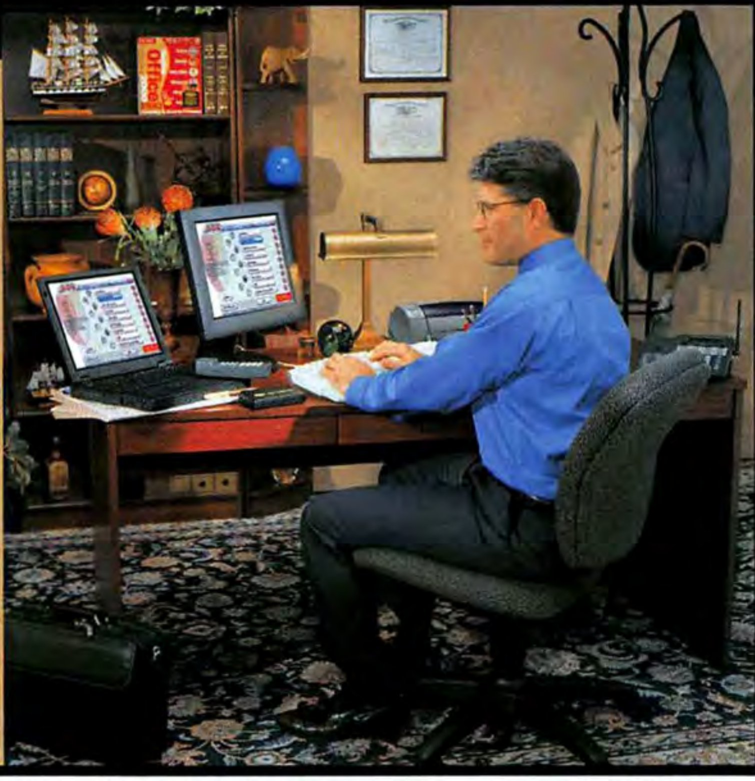

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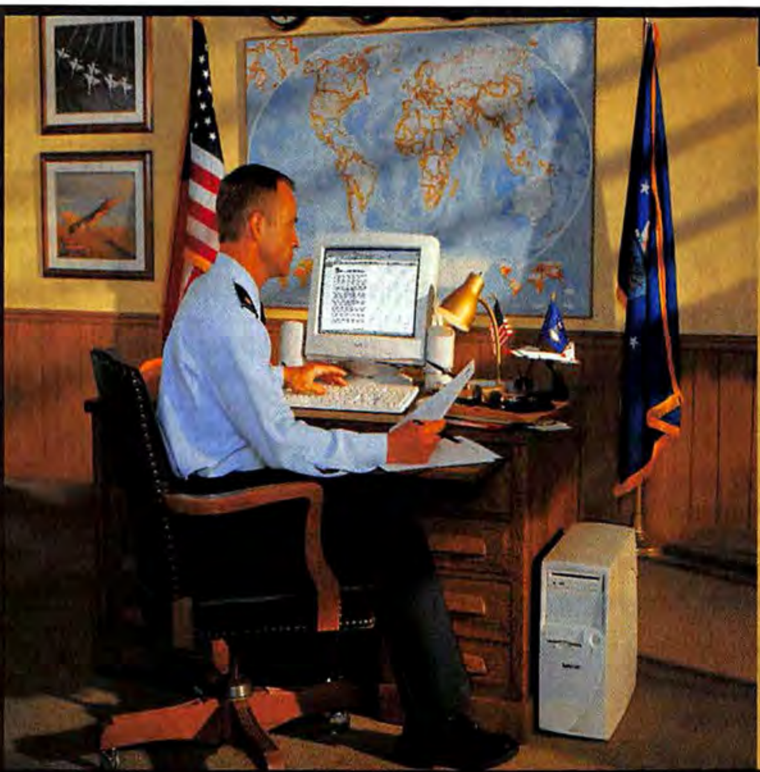

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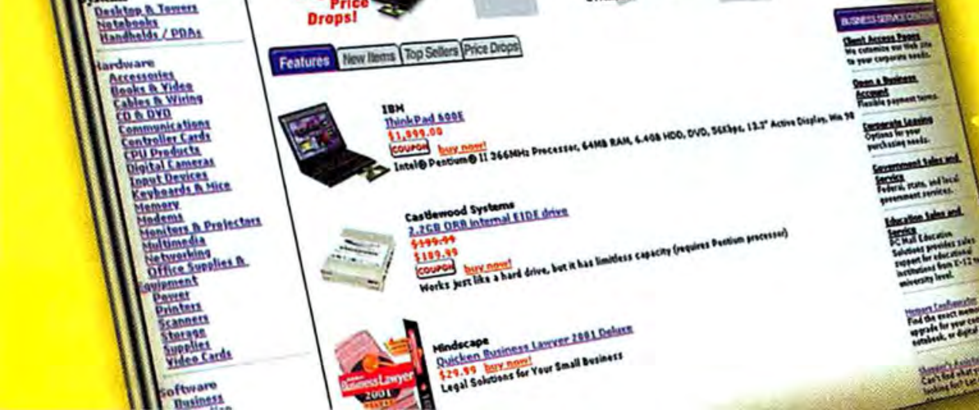

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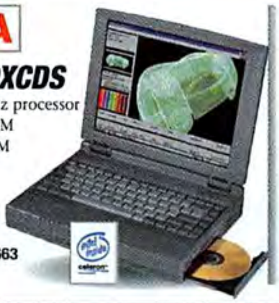

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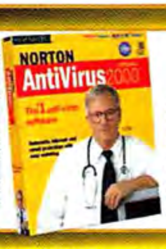

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Your monthly gross profit @ $19.95 domain	N/A	$498.75	$1,496.25	N/A	**$623.75	N/A
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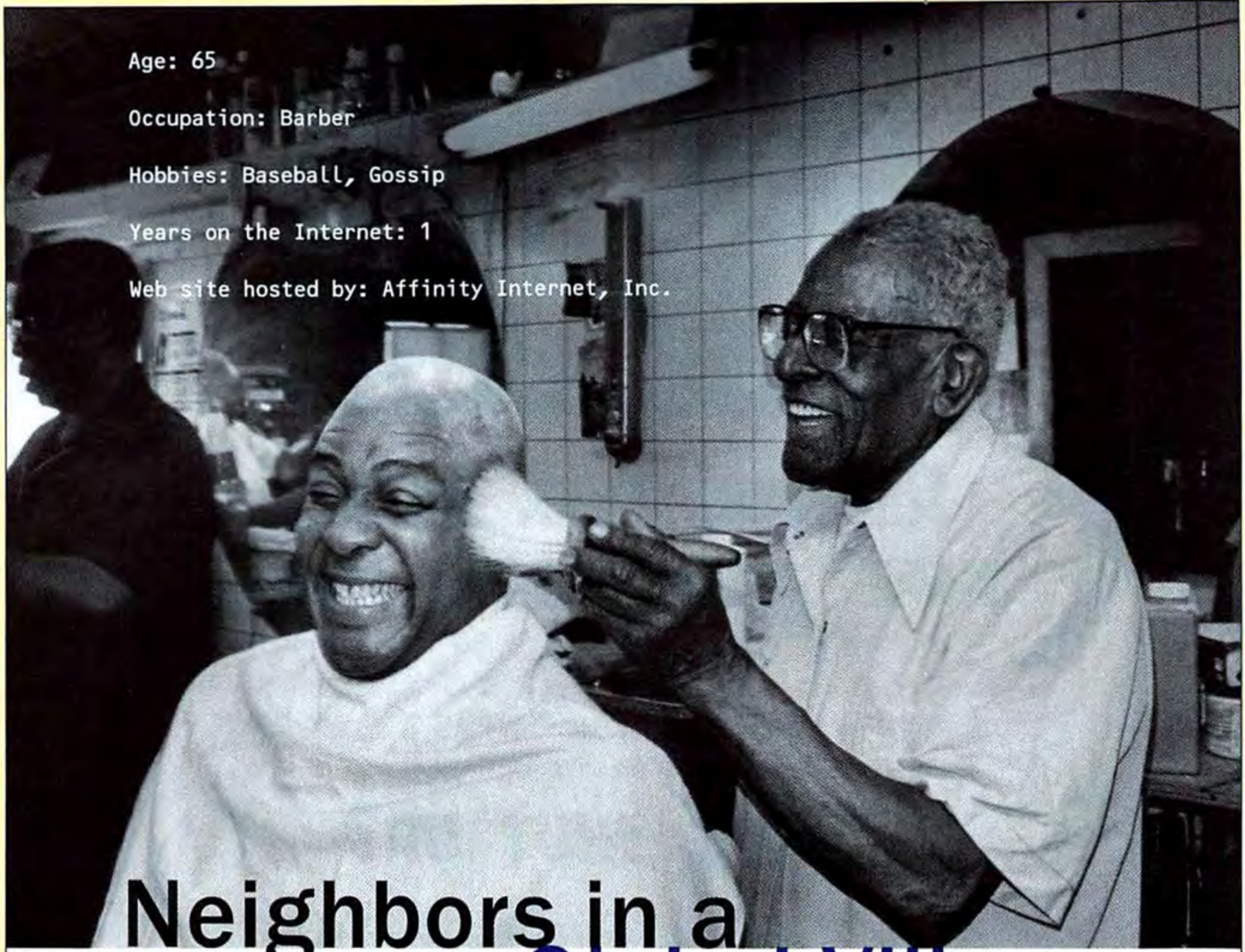
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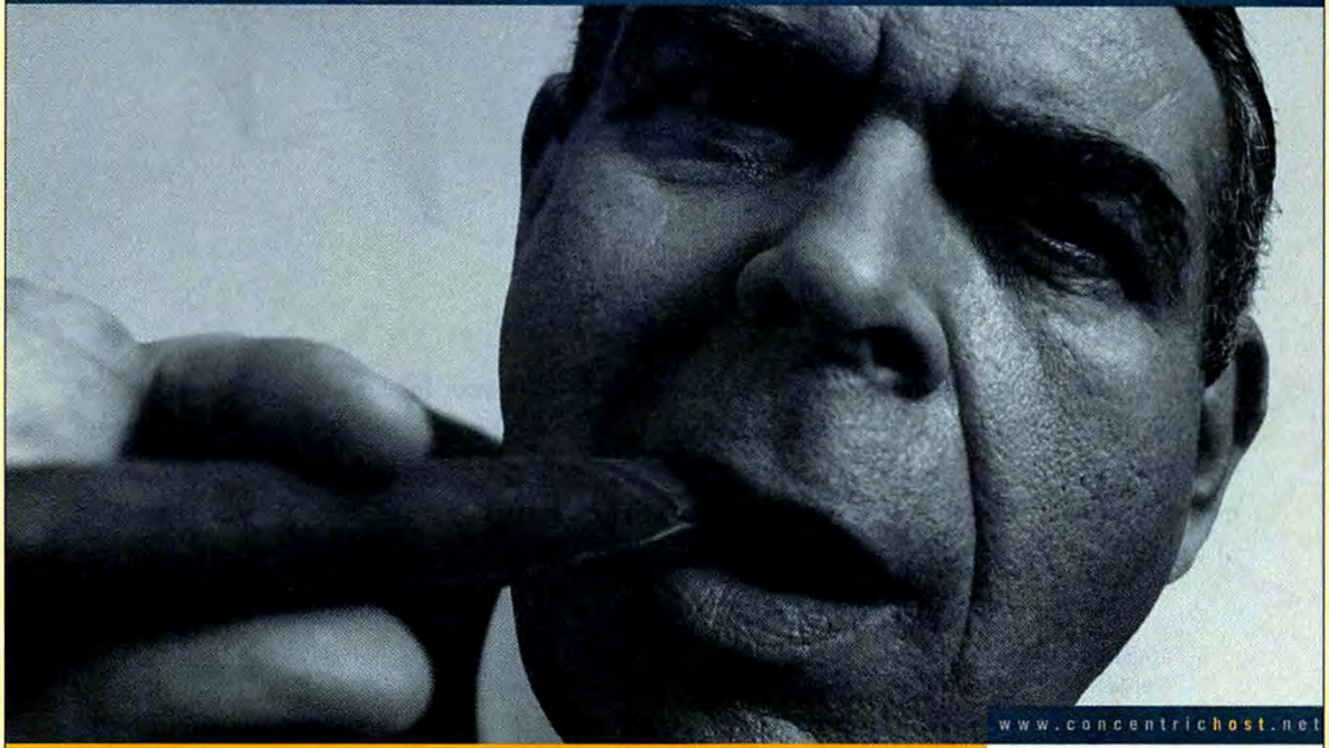

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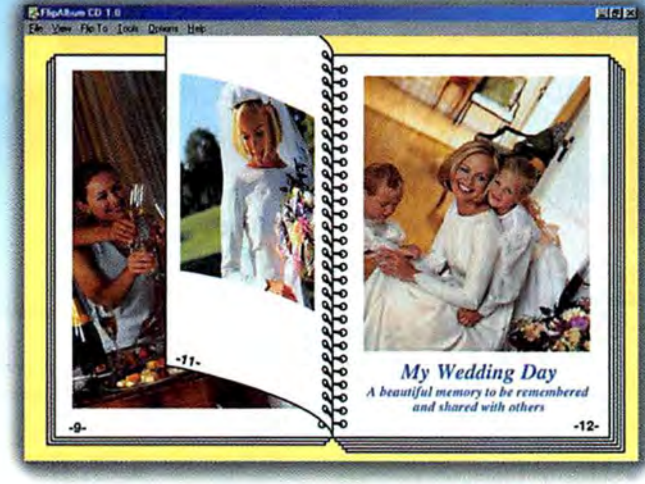

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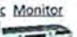

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INDEX

Page number	Advertiser	URL
28-29	AMD	www.amd.com/productivity
13	Acer America	-
79	ACT! from Interact	www.actsoftware.com/trial
192	Alienware	www.alienware.com
46	Alpha Vega	vegapc.com
119	Antec Inc.	www.antec-inc.com
45	APC	http://promo.apcc.com
91	APC	http://promo.apcc.com
235	Belkin	www.belkin.com
82	Brother International Corporation	-
126-127	Buffalo Technologies	www.buffalotech.com
30-31	Buy.com	www.buy.com
2-3	Canon Computer Systems	www.csi.canon.com
67-69	CDW Computer Centers, Inc.	www.cdw.com
93	CDW Computer Centers, Inc.	www.att.com/business_services
195	CDW Computer Centers, Inc.	www.cdw.com
48-49	Compaq Direct Plus	www.directplus.compaq.com
61	Compaq Consumer	www.athome.compaq.com
186-189	Compaq Consumer	www.athome.compaq.com
16-17	Crucial Technology	www.crucial.com
191	Crucial Technology	www.crucial.com
173	CTX	www.ctxintl.com
107-111	Dell Computer Corp.	www.dell.com
112-113	Dell Computer Corp.	www.delleworks.com
133-136	Dell Computer Corp.	www.dell4me.com
C3-C6	Dell Computer Corp.	www.dell.com
216	Envision Peripherals, Inc.	www.epius.com
155	ePeople.com	www.epeople.com
36-37	Epson	www.epson.com
222	Executive Software	www.diskeeper.com
C2-1	Filemaker	www.filemaker.com
38	Fujitsu PC Corporation	www.fujitsupc.com
44	Fujitsu PC Corporation	www.fujitsupc.com
75	Gateway	www.gatewayatwork.com
231-232	Gateway	www.gatewayatwork.com
144-145	Hughes Network Systems	www.direcpc.com
177	Hughes Network Systems	http://bizinfo.direcpc.com
8-9	IBM Direct	www.ibm.com/smallbusiness7055
96-97	IBM Direct	ibm.com/smallbusiness7055
85	Imation Corporation	www.imation.com/moving
87	Intermedia	www.intermedia.com
65	International Correspondence Schools	-
95	Iomega Corporation	www.iomega.com
128	Ipswitch	www.ipswitch.com

Page number	Advertiser	URL
86	Jasc Software	www.jasc.com
203	Kensington Technology Group	www.turboring.com
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76	Lexar Media	-
101,103,105	Matrox Graphics Inc.	www.matrox.com
104	Micron Electronics	www.micronpc.com
4-5	Microsoft Corporation	www.microsoft.com
227	Microsolutions	www.micro-solutions.com
237	Midwest Micro	www.mwmicro.com/VIPC4
243-245	Midwest Micro	www.mwmicro.com/pw1
83	Minolta/QMS	www.qms.com
207	Minolta/QMS	ww.qms.com
239	Mobility Electronics	www.mobilityelectronics.com
14-15	NEC-Mitsubishi Electronics Display of America, Inc.	www.necmitsubishi.com
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157-168	Office Depot, Inc.	www.officedepot.com
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246-247	PC MALL	www.pcmall.com
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32	Proxima	www.proxima.com
52-53	Quantum Corporation	www.quantum.com
27	Quotesmith.com	www.quotesmith.com
50	Replay TV	ww.replaytv.com
94	Robert Half International, Inc.	www.rhi.com
151	Samsung America	www.samsungmonitor.com
42	Samsung Electronics	-
63	Skillsvillage.com	www.SkillsVillage.com
6-7	Sohoware	www.sohoware.com
24	State Farm Bank	www.statefarm.com
269	Tiger Direct	www.tigerdirect.com
40-41	Tiny Computer	www.tiny.com
22-23	Toshiba America	www.toshiba.com
19	Toyota	www.toyota.com
153	Trend Micro, Inc.	-
35	Umax Technologies	www.umax.com
71	Viewsonic	www.ViewSonic.com
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The Net Doesn't Change Everything

A STERN RECKONING AWAITS the dot-com world. I call it the Kaneing, after the classic business model revealed in Orson Welles' visionary media-mogul movie, *Citizen Kane* back in 1941.

"You're right," Charles Foster Kane tells his money manager. "I did lose a million dollars last year. I expect to lose a million dollars *this* year. I expect to lose a million dollars *next* year. You know, Mr. Thatcher, at the rate of a million dollars a year, I'll have to close this place—in 60 years."

Adjust for inflation, and you have in essence the business plan of many an ailing dot-com. All of a sudden, many stars of a year or two ago are short on cash or fresh out, cutting back, selling out, shutting down. Start-up–meisters once fawned over in magazine profiles are now drawing snide chuckles. Stocks in companies formerly beatified for their amazing "wealth creation" are now available at fire-sale prices.

PHOTOGRAPH: ERIK BUTLER

On or off the Web, companies that don't deliver something of value to customers are doomed to fail.

LOSING THEIR RELIGION

WHAT HAPPENED? An unexamined religious belief that "the Internet changes everything." It turns out there are plenty of things that the Internet doesn't change—like the need for a business to deliver something of value to customers. And there are also plenty of other things that the Internet in its present form doesn't handle as well as long-standing technologies do.

So, Violet.com, hale and farewell. This was a site with crummy gifts you'd be embarrassed to give anyone but your enemies, coupled with some sort of tricked-up search engine designed mainly to hide how few products the site actually offered. That the concept might work in the brick-and-mortar world is unimaginable, so why was anyone convinced it might work online?

Content sites turn out to be problematic, too. Remember when Microsoft's Slate briefly tried to charge for its wares? Somebody must have believed that the Web would magically increase the minuscule number of people willing to pay for policy-wonk journals like *The New Republic*. And despite the American public's willingness to accept almost anything for free, giving content away may not be a great strategy either, as money-bleeding Salon.com is finding out.

I first realized that plenty of ad-centered dot-coms would soon be toast when I saw them throwing money at print and even TV ads. If your business is selling ads on the Web, aren't you sending a somewhat contradictory message when you take out a full page in the dead-tree edition of the *Wall Street Journal?*

LACKLUSTER LOOK-ALIKES

THEN AT A COUPLE of conferences last spring, I saw the beginning of the end. Every young biz-school graduate in attendance seemed to have the same idea. Basically, it amounted to this: A user would download a 2MB plug-in, then customize a news feed and stock quotes to appear in a little ad-filled floating bar instead of in a browser pane. Revenue was always supposed to come from three sources: ads, partnerships, and a third that the young entrepreneurs hadn't quite figured out. Too bad nobody noticed that most users don't bother to customize existing Web portals in any but the most trivial ways.

The religious fervor of dot-com–business magazines is another tip-off that the party's over. One editor suffering from an overdose of Silicon Valley smog recently went so far as to advise readers to "go for it" and start their own companies, since "all you need is an idea and some moxie" to join the ranks of those "who have amassed staggering wealth." The venturesome editor, of course, has worked for the same media company for a decade and a half.

And judging by *The Industry Standard's* recent study of 408 Web start-ups, you'd better have a darned good idea and powerful moxie, mixed with lots of cash and luck. Most of the companies were at least partly self-financed; just under half had 1999 revenues of less than $100,000. Profits were not studied, presumably because they did not exist.

A fortunate few Net entrepreneurs will, of course, get rich. But most would-be Kanes will "have to close this place"—and in a lot fewer than 60 years.

PC World *contributing editor Stephen Manes is cohost of* Digital Duo, *a series appearing on Public Television stations nationwide. For program information, see www.digitalduo.com.* ■

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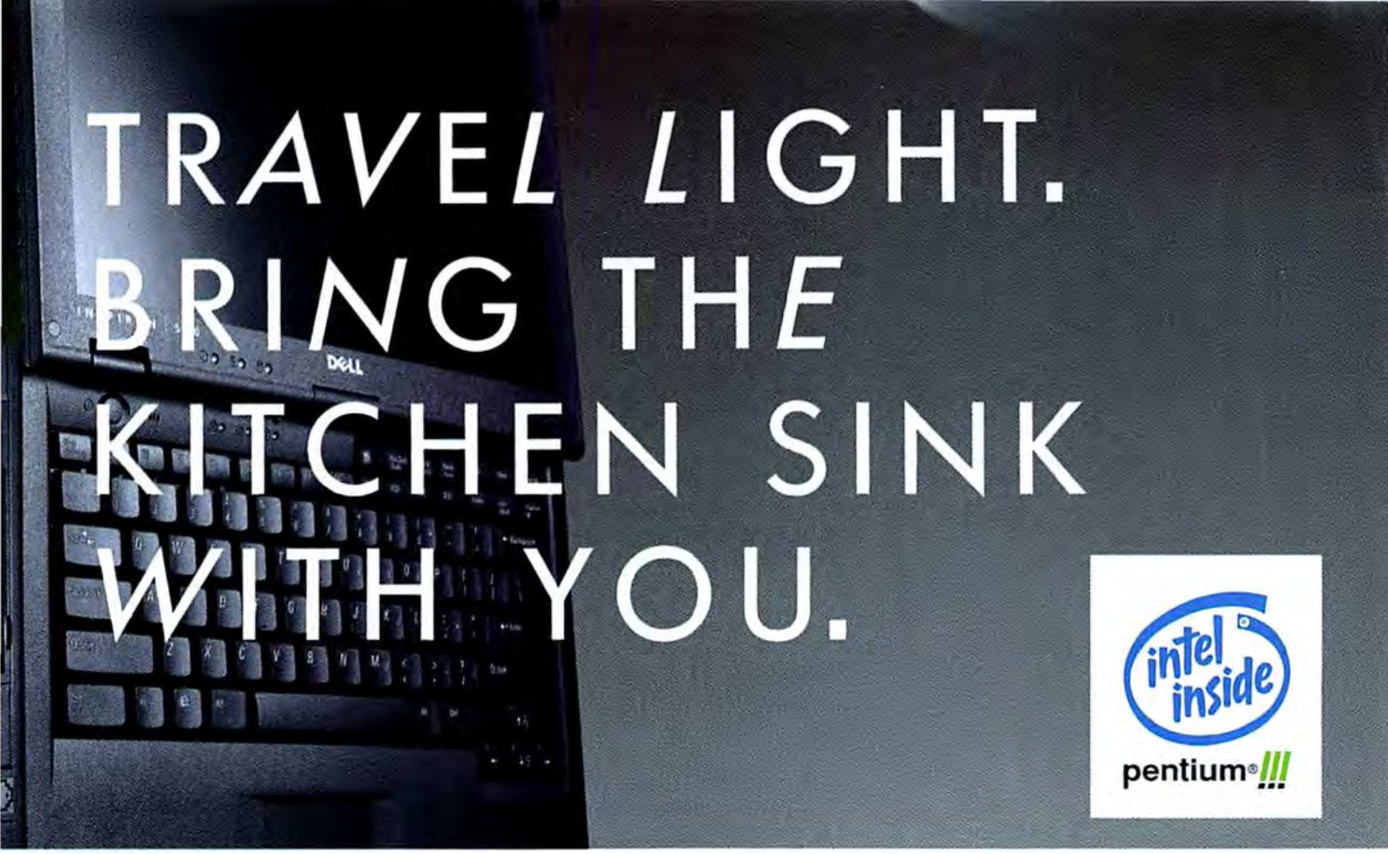

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- 48X Max CD-ROM Drive
- SoundBlaster 64V PCI LC Sound Card
- PC Speakers
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- 48X Max CD-ROM Drive
- SB Live! Value Digital
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- 32MB 100MHz SDRAM
- 4.8GB[5] Ultra ATA Hard Drive
- Modular 24X Max CD-ROM
- 2X AGP 8MB ATI RAGE Mobility™-M1 3D® Video
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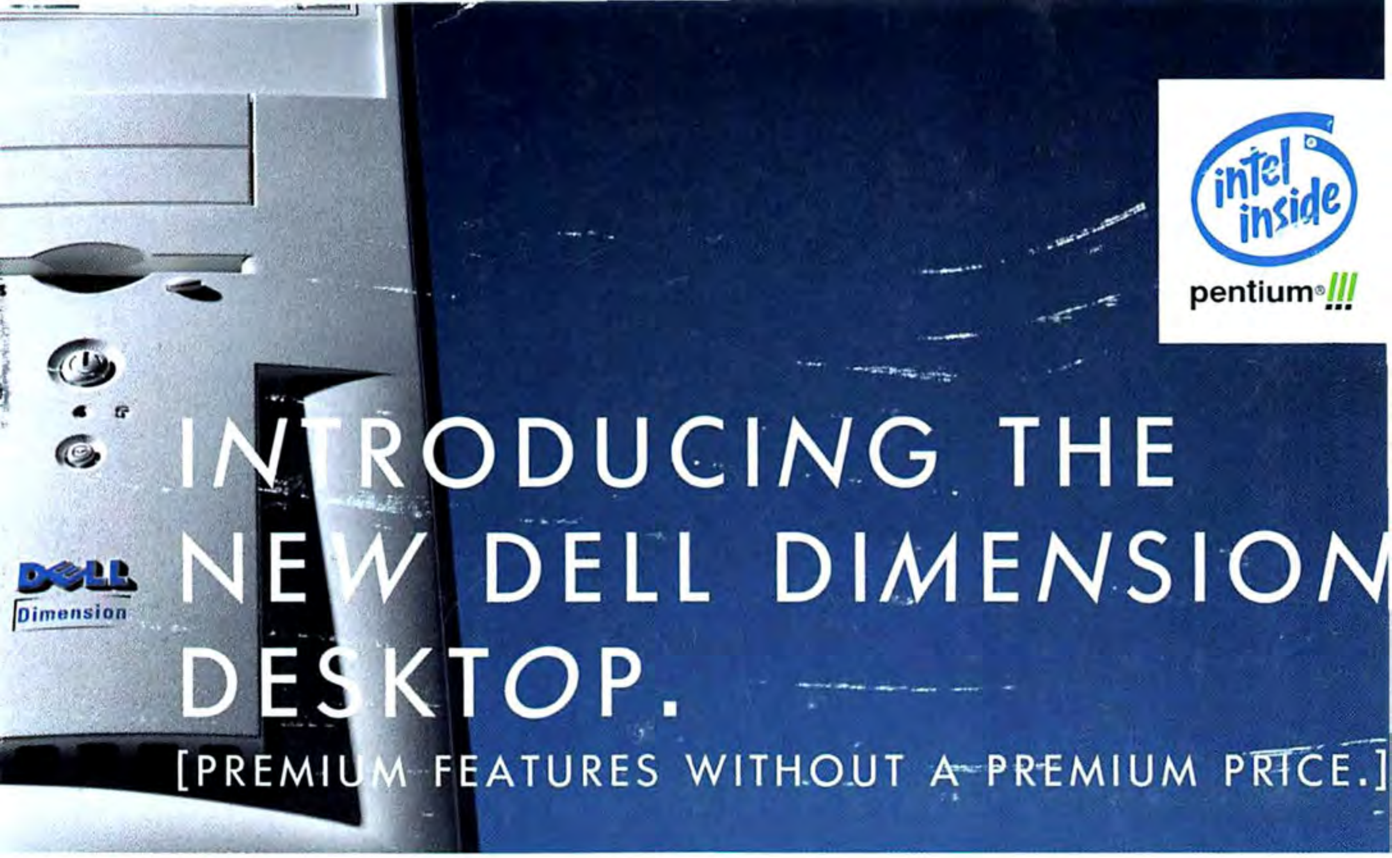

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