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- ▶ **Reader Poll: Which Vendors Help You, Which Don't**
- ▶ **Tips & Tricks for Surviving Buggy Software**
- ▶ **10 Nastiest Bugs**
- ▶ **Where to Track Down Free Fixes**

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DVD/CD-ROM 6X DVD III ROM drive  
Modem 3Com U.S. Robotics 56K WinModem\*\*  
Graphics 16MB Diamond Viper 550 TriT 2X AGP graphics  
Sound System PCI 128-voice WaveTable sound  
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Cache 512KB internal L2 cache  
RAM 128MB 100MHz SDRAM  
Hard Drive 14.4GB 7200 RPM Ultra ATA hard drive\*\*  
Monitor 19" Micron 900Lx monitor (18" display)  
DVD/CD-ROM 6X DVD III ROM drive  
Modem 3Com U.S. Robotics 56K WinModem\*\*  
Graphics 16MB Diamond Viper 550 TriT 2X AGP graphics  
Sound System PCI 128-voice WaveTable sound  
Monsoon MW1000 flat panel speakers w/subwoofer  
Warranty 5-year/3-year Micron Power limited warranty  
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The #1 Ranked UltraPortable - CNET June '98  
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Cache 512KB L2 pipeline burst cache  
RAM 64MB EDO DRAM  
Hard Drive 3.2GB hard disk drive\*  
Monitor 12.1" SVGA display  
CD-ROM 24X CD-ROM drive  
Graphics 2MB/128-bit graphics accelerator  
Sound System 16-bit stereo/WaveTable sound  
Warranty 5-year/1-year Micron limited warranty  
Upgrades Add SuperBase battery for \$299  
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Lease, 36 mos.\*\*

Model Name **GoBook<sup>2</sup> 266**

Processor Intel Pentium II processor 266MHz  
Cache 512KB L2 pipeline burst cache  
RAM 32MB EDO DRAM  
Hard Drive 3.2GB hard disk drive\*  
Monitor 12.1" SVGA TFT display  
CD-ROM 24X modular CD-ROM  
Graphics 2MB/128-bit graphics accelerator  
Sound System 16-bit stereo/WaveTable sound  
Warranty 5-year/1-year Micron limited warranty  
Upgrades Add SuperBase battery for \$299  
Scholarship 1-year free\* tuition to Micron U online

Price **\$1,999** \$70/mo.  
TechRefresh Bus.  
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Model Name **TREK<sup>2</sup> 233**

Processor Intel Pentium II processor 233MHz  
Cache 512KB L2 pipeline burst cache  
RAM 32MB EDO DRAM  
Hard Drive 3.2GB hard disk drive (removable)\*  
Monitor 12.1" SVGA TFT display  
CD-ROM 24X CD-ROM drive (dedicated bay)  
Graphics 4MB AGP graphics accelerator  
Sound System Built-in stereo speakers & microphone  
Warranty 5-year/1-year Micron limited warranty  
Upgrades Upgrade to 128MB SDRAM for \$199  
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TechRefresh Bus.  
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Model Name **TREK<sup>2</sup> 266**

Processor Intel Pentium II processor 266MHz  
Cache 512KB L2 pipeline burst cache  
RAM 64MB SDRAM  
Hard Drive 3.2GB hard disk drive (removable)\*  
Monitor 14.1" XGA TFT display  
CD-ROM 24X CD-ROM (dedicated bay)  
Graphics 4MB AGP graphics accelerator  
Sound System Built-in stereo speakers & microphone  
Warranty 5-year/1-year Micron limited warranty  
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- PC World Magazine, August '98

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Micron University freshman.

#### Get Ahead.

#### The Critics Rave



Millennia 400 MAX  
 #1 Power Desktop  
 Dec '98



Millennia 400 MAX  
 #1 Gaming System  
 Dec '98



Millennia 450 MAX  
 Best Buy  
 Nov '98



Millennia 400 DVD  
 Sun '98  
 Oct '98



Millennia 350  
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Just ranked the #1 450MHz desktop by the editors of CNET and the #1 Power Desktop by the editors of PC World Magazine (Millennia 400 DVD • Oct '98, Millennia 450 MAX • Nov '98, Millennia 400 MAX • Dec '98), Micron's Millennia desktop product line continues a long tradition of industry-leading, award-winning performance. Perhaps that's why some of the most prominent power users around rely on Micron. But Micron offers far more than outstanding systems. We provide the new tools necessary to win in today's demanding new economy, the latest of which is called Micron University and it's absolutely free\* with the purchase of any new Micron system.

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A non-refundable up-front freight charge applies for participation in PowerXchange to cover cost of return packaging and processing.

\*Contract with outside Internet Service Provider required. Internet service questions must be resolved by ISP and is not included.



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\*Average yield based on two BC-23 Enhanced Black BJ Cartridges at 5% coverage. \*\*1440 x 720 dpi requires optional specialty paper. \*\*\*7-color printing with optional BC-22e Photo Ink cartridge and specialty paper. Based on estimated street price. Dealer prices may vary.



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E-3000 Series 200, 233	\$299.98	\$139.98	\$ 69.99	Client Pro P100, P120, P133, P150, P166, P200	\$359.96	\$179.98	\$ 91.98
E-3100 Series	\$299.98	\$139.98	\$ 69.99	Millennia LXA P100, P120, P133, P150, P166, P200	\$359.96	\$179.98	\$ 91.98
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G5-166, -200	N/A	\$151.98	\$ 75.99	Millennia MXE, LXE P166, P166 Plus, P200, P200 Plus	\$359.96	\$179.98	\$ 91.98
G6-150, G6-200	\$359.96	\$179.98	\$ 91.98	Millennia P100, P120, P133, P150, P166, P200 and Plus Series	\$359.96	\$179.98	\$ 91.98
G6-233 Best Buy and G6-233 Home Essentials	\$299.98	\$139.98	\$ 69.99	Millennia Pro 200	\$359.96	\$179.98	\$ 91.98
G6-266, G6-233	\$299.98	\$139.98	\$ 69.99	Pro2 180, 200 (RevA & RevB)	\$291.98	\$145.99	\$ 79.99
G6-300XL	\$299.98	\$139.98	\$ 69.99	Millennia Transport P120, P133, P150	N/A	N/A	\$ 99.98
G6-333, G6-300	\$299.98	\$139.98	\$ 69.99	Millennia Transport XKE P233(A), 233(B)	N/A	\$199.98	\$ 99.99
GP6-300, GP6-300-2	\$299.98	\$139.98	\$ 69.99	Millennia Transport XPE P133, P150, P166	N/A	\$199.98	\$ 99.99
P5-120, P5-120 XL, P5-133, P5-133 XL	\$359.96	\$179.98	\$119.98	Millennia XKU 233, 266, 300, 333	\$299.98	\$139.98	\$ 69.99
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P5-200 XL	N/A	\$151.98	\$ 75.99	Vetix EL 1000, 1000N, 2000, 2000N	\$291.98	\$145.99	\$ 79.99
P5-60, P5-66, P5-75, P5-90	\$399.96	\$199.98	\$119.98	Vetix LXI, LXI-N, 2LXI, 2LXI-N	\$291.98	\$159.98	\$ 85.98
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Professional PC G6-200, G6-200 XL	\$359.96	\$179.98	\$ 91.98				



## COVER STORIES

## BUG BUSTERS: TOP CURES AND FIXES FOR SOFTWARE SNARLS

Buggy software can interrupt your work, crash your PC, even trash your data. What can you do about it? Check out our consumer guide for the lowdown on the cleanest and most contaminated software, the most- and least-responsive vendors, and the best places to find the latest bug fixes. Then follow our step-by-step guide to surviving the mother of all infestations—the year 2000 bug—for practical advice on getting your PC ready for the millennium.

- 46 **Top of the News: Software Bugs Run Rampant**

- 90 **2000: The Year of Living Dangerously**

## FEATURES

- 90 **2000: THE YEAR OF LIVING DANGEROUSLY**

**HOW-TO** Think your PC won't be affected by the year 2000? The millennium bug could louse up everything from time stamps on e-mail to computations of time-based interest payments. Here's how some basic software testing, a little Web surfing, and a close look at your data can prepare you and your PC for the new century.

- 110 **V.90 MODEMS: THE END OF THE LINE**

**REVIEW** Call them the last of the red-hot modems—56-kbps models, destined to be the last analog modems you'll ever buy. Despite the bumpy road to Route V.90, two speedsters priced under \$100 manage to complete the circuit in style.



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Additional material  
available on PC World  
Online: [www.pcworld.com](http://www.pcworld.com)



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- 127 **CAN WE TALK?**

**REVIEW** Are voice-enabled PCs for real? We tested four voice-recognition packages, and while certain tasks still need a keyboard, we found one Best Buy that spoke to our need for a true productivity tool.

- 138 **BIG SHOTS**

**REVIEW** Better pictures, snappier features, cheaper prices: The latest megapixel digital cameras eclipse last year's simple point-and-shoot models.

## SPECIAL REPORT

## THE WEB AND YOUR BUSINESS

- 161 **GOT WEB?**

Getting your business online? You could put up a simple "billboard" page or manage a full-service commercial site. Here's how to figure what's right for you.

**COVER** Cover illustration by Glenn Mitsui



## TOP OF THE NEWS

### 46 BUGS RUN RAMPANT

Death, taxes...and software bugs. Should you submit to the inevitable? Eighty percent of the respondents in an exclusive survey say they've bought buggy software. Which companies correct bugs fastest? Which products are glitchiest? And what can you do? Read on—and bring a can of Raid.

### 54 CE PRO PORTABLES: BIGGER THAN PDAs, SMALLER THAN NOTEBOOKS

Superlight Windows CE devices may be the ticket for business travelers who do e-mail, basic browsing, simple presentations—and not much else.

### 60 WORDPERFECT SUITE BOASTS MS OFFICE COMPATIBILITY

WordPerfect Office 2000 offers minor tweaks and reads Microsoft Office files.

### 62 IE 5: LOOKS THE SAME, WORKS BETTER

Internet Explorer 5's new beta boasts revamped search tools, simpler off-line browsing, and a spam filter.

### 68 NET PORN ACT: PAIN FOR BUSINESS

Critics say the Child Online Protection Act threatens businesses on the Web.

## NEW PRODUCTS

### 70 Sharp AL-1010, Xerox WorkCentre XE80 copier-printers

### 71 Compaq Prosignia Desktop 330

### 72 IBM ThinkPad 11450 notebook; DaVinci personal digital assistant

### 74 Adobe ImageStyler 1.0 Web software; Mitsubishi Diamond Pro 9000 CRT

### 76 PGP for Personal Privacy 6.0 encryption utility; Logitech SoundMan speakers

### 77 PrintMaster Platinum 7.0, Publish It 3.03 desktop publishing programs; Enfish Tracker Pro file-organizing utility

### 80 WinZip 7.0 compression utility

### 81 Small Office/Home Office ComSuite connectivity software

### 82 Epson Perfection 636, Plustek Optic-Pro 9636+ scanners



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110

## TOP 100

### 187 PENTIUM II-450s: POWER MEETS BUDGET

**TOP 100** The first of the Pentium-II 450s muscled their way onto our power charts in November. What a difference a couple months make! Meet IDot.com's \$1999 Entrepreneur BX450, the first PII-450 to crack our budget chart.

### 190 POWER DESKTOPS

**TOP 20** Seven new Pentium II-450 systems populate the chart. Gateway's zippy entry, the GP6-450, gets a Best Buy nod plus bragging rights as this month's top-ranked newcomer.

### 204 BUDGET DESKTOPS

**TOP 20** Substantial price cuts keep Micro Express and Gateway ensconced among the Best Buys, while Dell and NEC help fill out the fab five.

### 214 NOTEBOOKS

**TOP 10** Dell and Gateway retain their top-dog notebook status. But a new presentation model from WinBook makes a strong debut, buoyed by a DVD-ROM drive and an LS-120 SuperDisk drive.

### 218 HOME PCs

**TOP 10** FireWire, a faster interface for drives and multimedia, is the latest hot technology to hit the home PC. And Compaq's Presario 5600 and Sony's VAIO PCV-E308DS are the first to have it.

### 221 MONOCHROME PRINTERS

**TOP 10** Despite recent advances in color printers, small-office monochrome models are flooding the market. Newcomers from Minolta and Brother challenge the incumbent Okidata OkiPage 6e.

### 225 17-INCH MONITORS

**TOP 10** Great on-screen controls and well-designed buttons help Nokia's brand-new 447Xs squeak into the Top 10.

### 227 GRAPHICS BOARDS

**TOP 10** Duck and cover: Sharp 3D images come right at you, as just-released boards from Diamond and Guillemot pack an awesome one-two punch.



## HERE'S HOW

### 232 WINDOWS TIPS



Free up hard drive space with Disk Cleanup, put today's date on your desktop tray.

### 243 WINDOWS NT

Do essential housekeeping chores before you upgrade to Windows NT.

### 246 ANSWER LINE



Reinstall Win 98 onto a reformatted drive, use batch files to delete the contents of a folder.

### 248 INTERNET TIPS



Find tools, patches, and answers to your questions on Microsoft's site; different browsers for different destinations.

### 256 WORD PROCESSING



Create labels without using mail merge, indent text in table cells.

### 262 SPREADSHEETS

Convert rows to columns (and vice versa) in Excel, Quattro Pro, and 1-2-3.

### 264 HARDWARE TIPS



Use the System Configuration Utility for help in troubleshooting and fixing system conflicts.

### 266 UPGRADE GUIDE

How to install a new CD-rewritable drive, step-by-step.



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- 43 **BUGS AND FIXES** Internet Explorer and Navigator patch things up; the fix is in for Windows NT 4.0.
- 302 **FULL DISCLOSURE** Software bugs must die! But first, let's kill all the excuses.



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## PCW ONLINE

### EXCLUSIVE PRODUCT REVIEWS

**REVIEW** Check out the Top 400 for first looks at new hardware before it's reviewed in the magazine.

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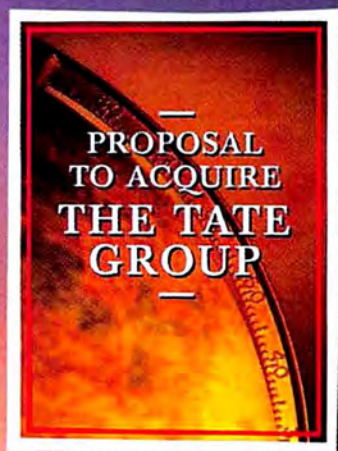


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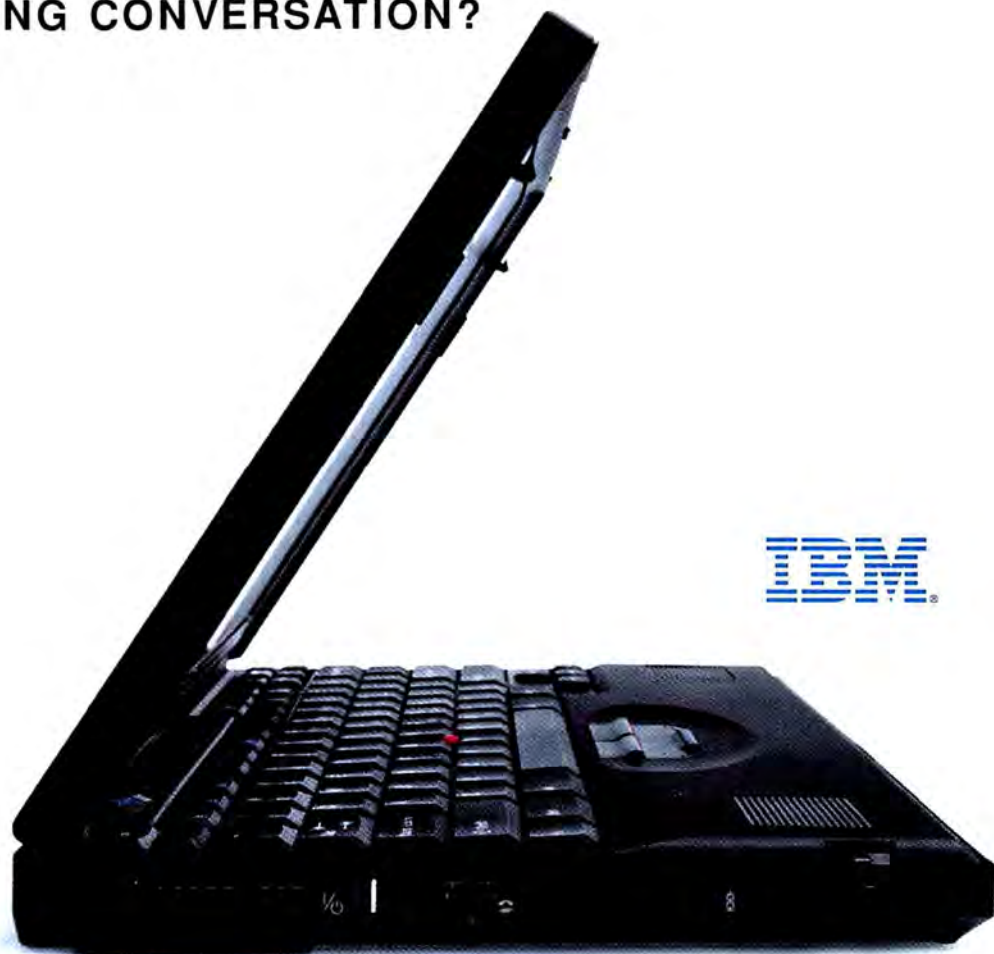
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# First Make It Work Right

THIS FALL, ONE BUZZWORD making the rounds in the PC industry is *simplicity*. Microsoft executives admit that software is still too difficult for most consumers to use. Intel says the complexities of today's PCs turn off too many potential buyers. Pundits proclaim the coming of simpler, single-purpose "information appliances" as heralding the death of PCs as we know them. PC makers are pushing

basic systems that forgo many of the usual features, à la Apple's all-in-one iMac.

To those of us already using the latest technology, the need for greater simplicity is glaring. We reboot our PCs daily trying to clear up inexplicable lockups. We place frantic calls to IS departments when network connections fail or upgrades take us two steps back instead of one step forward. We spend far too much time and money consulting with software tech support over the phone or downloading fixes for buggy software.

While all the talk about simplicity has been going on, the quality of software has reached new lows. To wit: Microsoft recently withdrew its latest service release for Office 97 after users ran into conflicts with earlier service releases when installing it. The long-delayed Service Pack 4 for Windows NT 4.0—a 31MB "patch" that purportedly fixes more than 600 bugs—includes Internet Explorer 4 with its service pack, but not with all the recent security fixes. The first in a series of service releases (read "bug fixes") for Windows 98 is due out in January. Also in the works for Windows 98 is Windows Critical Update Notification, which will automatically alert you not to all run-of-the-mill fixes but just to the most urgent. And Microsoft's products aren't the only ones plagued by problems.

## GET US OUT OF THIS MESS

IN ITS QUEST for simplicity, Microsoft says it will pursue many strategies. One route is to develop software for devices that are cheaper and easier to use than PCs, along the lines of the new, little Windows CE Pro notebooks. Also key to Microsoft's initiative are upcoming versions of existing products. In a recent speech, Microsoft chairman Bill Gates pointed to Windows 2000—the new name for Windows NT 5, with its 40 million-plus lines of



While all the talk about **simplicity** has been going on, the **quality** of software has reached **new lows**.

programming code—as evidence of the company's efforts to make products simpler. Along more ambitious lines, Microsoft has talked about simplifying PC and network use with a scheme called "Windows tone," a service akin to your phone's dial tone. For a fee, you'd store your data on a central server, from which you could access the data—anywhere, any time—as easily and reliably as by making a phone call.

For its part, Intel has showcased a space age-looking system dubbed the Legacy-Free PC or Concept PC. With a sealed chassis, this pyramid-shaped prototype is meant to illustrate the possibilities of more consumer-friendly designs. Gone are traditional ISA slots, serial and parallel ports, and floppy drives, all legacies of the PC's 17-year reign. In their place are USB and high-speed 1394 ports that let you add peripherals simply by plugging them into a port instead of loading drivers or adding boards. A DVD-ROM drive will store programs and video. A new digital display will replace old analog VGA-type monitors. Running at high speeds and without the complexities of old devices, the system will boot up the operating system in seconds instead of minutes.

Sounds great, right? Maybe in 2010.

## MAKE US BELIEVERS

THE PURSUIT of simplicity, if genuine, is an admirable goal. But if it's only a slogan, it's a huge disservice to consumers, especially those of us struggling with offices full of so-called legacy hardware and software. Are we supposed to ditch everything we have to run Windows CE on tiny notebooks hooked up to Windows 2000 running on a pyramid? Should we be so gullible as to believe that these new devices will work significantly better than our current ones?

In reality, the motivation for developing simpler PCs and software is to spur sales growth—and profits—in a period of declining prices and rising support costs. That's business, and it would be naïve to fault that motivation.

In the meantime, though, simple devices are no answer for those of us who now own and use full-fledged PCs. Neither are ballooning operating systems and applications that require never-ending streams of updates. Hardware and software that work together as promised would go a long way toward satisfying our needs and making us believers in a bright future for technology.

For many of us, *simplicity* ultimately translates into "better quality." If the drive for simplicity leads to higher quality, we're all for it. If not, we'll pass on the pyramids.

Cathryn Baskin is editor in chief of PC World.





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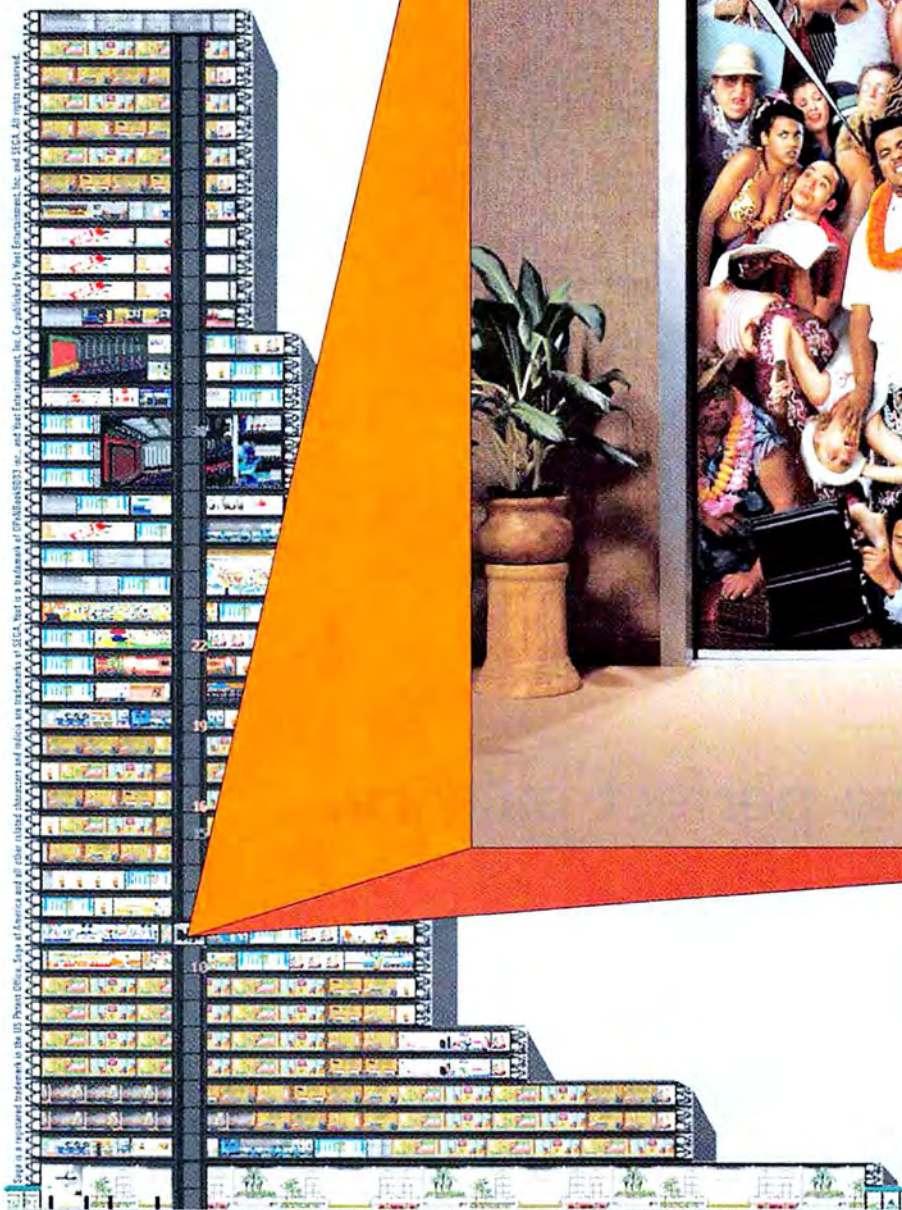
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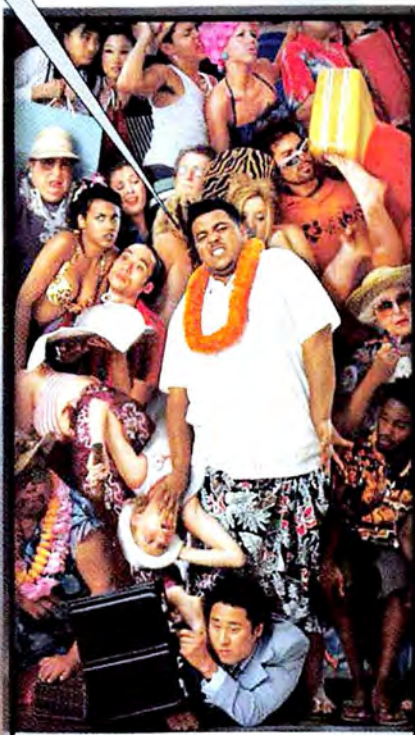
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### CAN YOU TRUST PC MAKERS?

DESPITE THE IMPRESSION left by your November issue ["PC Reliability and Service: Who Can You Trust?" page 97], most PC makers try to provide a good product. I find that customers (a real variable) make their system what it is, good or bad. PCs have stringent rules, and you must learn to follow them. Customers should take responsibility for their inadequate knowledge in the world of PCs. In the sad case of Stephen X., cited in your *Up Front* editorial ["Which PC Makers Can You Trust?"], I suspect he was too lazy to back up any files.

Gerald L. Lammers  
Poulsbo, Washington

**Editor's response:** We at *PC World* advise readers to back up their data regularly, knowing full well that hard drives can and do fail. At the same time, it's the responsibility of PC companies to make systems as reliable as possible in the first place. Although many companies do an adequate job of making

durable, problem-free systems, all companies and the industry as a whole can certainly improve their track records. —Cathryn Baskin

### INK JET REFILLS: SAFE, NOT SORRY

AN ITEM IN YOUR October issue, "Refilling Ink Cartridges: Will You Be Safe or Sorry?" [*PCW Advocate*, page 41] suggests that refill products could damage ink jet printers.

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Ian Elliott, Senior Vice  
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### PC DIAGNOSES OVER THE EDGE

THE CHART "Bring Your PC Back From the Brink" in your October cover story ["The Trouble-Free PC," page 103] lists a few common system problems and their suggested fixes. The first two of the five problems, however, are poorly diagnosed.

The first symptom is, "You experience frequent system crashing or Windows general protection faults." Your diagnosis, "Poorly seated CPU, CPU fan, or RAM," is like saying the problem is with your car's engine when your radio doesn't work.

The first suspect should be a software conflict. Try closing programs that are running in the background and see if that helps. Many times, reinstalling the software may solve the problem. Reinstalling Windows is often the best or only fix. But advising people to reseat CPUs and RAM is only asking for trouble.

The second symptom is, "You turn on the system, but nothing shows up on the screen." Your diagnosis, "Poor monitor cable connection or dead monitor." Poor monitor cable? Okay, I'll give you that. But many things can make your screen blank at start-up. Provided that cable connections are okay, the probable culprit is the video card. If you hear the PC starting up but don't see anything on the screen, then it may be a monitor issue.

Mark Taylor  
Laurens, South Carolina

**Author's response:** All the things you mention are likely sources of the listed problems, and there are undoubtedly many others. Our chart was not intended to be exhaustive.

—Scott Spanbauer



### CROSS FIRE

#### Online Shopping: Advice No Bargain

"WHERE THE BUYS ARE" [October, page 167] by Harry McCracken fails to tell users how to find the best deals on the Internet. Here's how:

1. Find the best prices by using an Internet searching resource like [www.pricescan.com](http://www.pricescan.com).
2. View product descriptions from the Web pages of various suppliers as well as price rankings from search sites. Load two copies of your browser to get simultaneous views you can compare.
3. Choose suppliers—starting from the one with the lowest price—and decide how much more than the minimum you are willing to pay to deal with a firm more likely to satisfy you.

The article's prices are terribly high. For example, for a package of ten Zip disks, the chart on page 170 gives prices of \$106 to \$131. More than ten suppliers on PriceScan.com quote less than \$100.

John Durkee  
Lake Jackson, Texas

#### Take It From Him, Tips Were Sound

THANKS FOR "Where the Buys Are." Planning to buy a Palm III PDA, I ignored your advice to stay with a reputable vendor and ordered from a Web site that priced the Palm III nearly \$130 off retail. The site assured me I'd receive it inside a week. Eight days later I was still waiting for a shipping confirmation.

The customer service number was constantly busy. After redialing for almost 2 hours and being put on hold for another 30 minutes, I talked to "Larry." He said that my order had still not been processed, that the vendor was having a problem with credit cards, and that I'd be lucky to receive my product within the next 10 days. I canceled my order.

I reread your article, ordered my Palm III from NECX (for just \$25 more than the other site), and received it by express delivery two days later. I will heed your words better next time.

Paul Wilson, Provo, Utah





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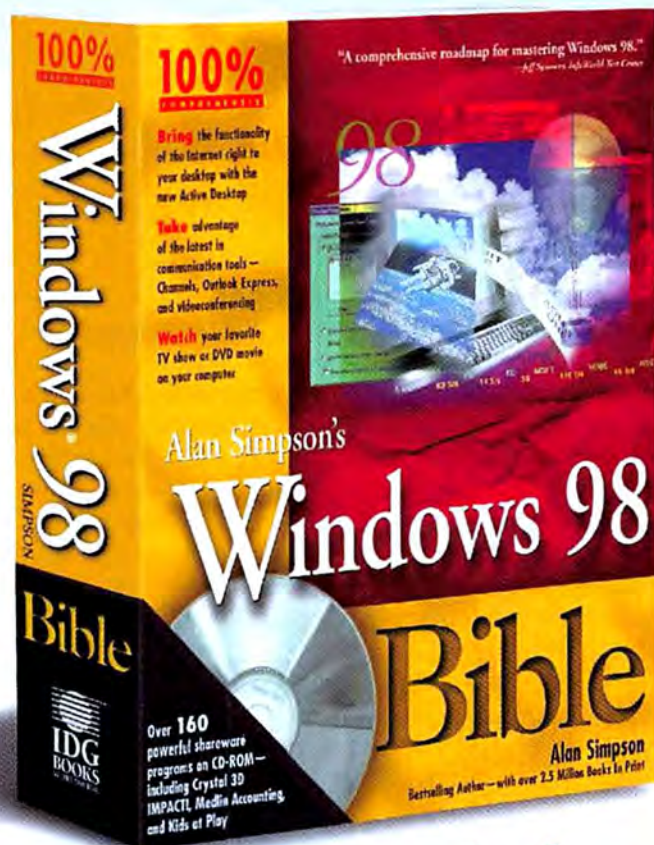
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## LETTERS

### FTC SUPPORTS NET PRIVACY

SEPTEMBER'S SPECIAL section, "Privacy in the Internet Age," provides all readers with an excellent discussion of online privacy and why the protection of personal data is so important. It also comes at a significant time in the development of electronic commerce.

The FTC's study confirms that the vast majority of commercial Web sites are collecting enormous amounts of information from consumers without telling them how it will be used. It is important for magazines like yours to tell readers there are steps they can take to protect themselves. We were pleased you mentioned our Web site, [www.ftc.gov](http://www.ftc.gov). I recommend that your readers browse through it, particularly the tips on protecting online privacy and how to guide your children on a safe trip through the Internet.

Mozelle W. Thompson, Commissioner  
U.S. Federal Trade Commission  
Washington, D.C.

PC World welcomes your responses, ideas, and other letters to the editor. See page 14 for contact information.

### CORRECTIONS AND CLARIFICATIONS

IN DECEMBER'S "7 Smartest PC Upgrades for Under \$200," Evergreen Technologies' URL should have been [www.everttech.com](http://www.everttech.com).

December's *Top 20 Budget Desktops* should have stated that the Gateway E-3200 400 has two free drive bays.

In November's *Top 20 Power Desktops*, we should have reported that PowerSpec's phone support is open for 17 hours each day.

In November's *New Products*, we said Logitech's Cordless Wheel Mouse requires a serial port. In fact, it also works with a PS/2 port (users may need to sync the unit by pressing the button on the underside of the mouse).

November's *Top of the News* story on floppy drive replacements stated that SyQuest's SyJet is not bootable; in fact it is. (SyQuest is considering filing for bankruptcy; see *PCW Advocate*, page 35.)

Contrary to a note in November's *Letters*, the URL for the Homestead Web page creation service has not been changed; it remains [www.homestead.com](http://www.homestead.com).

PC World regrets the errors.



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# Resolutions for Savvy Consumers

*Take advantage of these seven steps for protecting yourself, online and off, all year long.*



THERE ARE TWO TYPES OF PEOPLE in this world: those who make New Year's resolutions and those who don't. I'm of the former persuasion. Year after year, I dutifully make a list of things I'm going to do differently—better, smarter, or more efficiently. But like most people, despite having the best of intentions, I've never quite managed to follow through on all of my New Year's plans.

This year, though, I'm preparing a different type of list—one that has nothing to do with exercising more often, eating more wholesome meals, or starting projects a reasonable length of time before

their due dates. This year my list is devoted to items that will make me a smarter, more discerning PC consumer. Taken individually, none of them is nearly as taxing as working out daily on a treadmill or laying off junk food in favor of fresh vegetable medleys. But each resolution will go a long way toward making the many hours I spend at the computer more productive, more enjoyable, and even more healthful.

Here's my list for 1999:

**Shop only at consumer-friendly Web sites.** I like the convenience of shopping online, and I love not having to pay sales tax on goods I purchase over the Internet. But this year I won't do business with Web merchants who fail to put their customers first, no matter how tantalizing their prices. Online merchants must offer the following before I'll buy: a secure server displaying the trusty padlock symbol, an easy-to-locate privacy policy that affirms the site's commitment to keeping customers' personal information private, a hassle-free return policy, and the company's telephone number (preferably toll-free) and physical address. Thanks to the Better Business Bureau's certification of Web merchants (see [www.bbbonline.org](http://www.bbbonline.org) for more details), I can easily identify businesses that have passed the BBB's review and have agreed to binding arbitration when necessary to settle disputes with unhappy customers.

**Read product warranties carefully before making purchases.** Hardware warranties aren't what I would call compelling reading material. But hidden in the sea of disclaimers and other fine print are critical details about my rights and available recourse in the event that a dreaded hardware failure occurs. Most PC companies make their warranties available online to would-be customers. Similarly, retail stores are required by law to make copies of their products' warranties available to shoppers. To receive one, all you should have to do is ask. A word of caution, though: Stores don't always keep their warranty information up to date, so make sure the product name and model number on the warranty you're looking at match those of the item you're considering purchasing. And if a company fails to follow through on its warranty claims, or if it neglects to mention a critical policy in its warranty, send complaints to your state attorney general's office and the Federal Trade Commission. Lately, these law enforcement groups have taken a keen interest in computer companies' policies and practices. ▶



# COMING UP

## IN FEBRUARY

### YOUR PC IN THE MILLENNIUM

Several computing revolutions are now under way, including waves of palm-size PCs, smarter and faster ports, stunning flat-panel displays, and natural-voice speech recognition that really works. Here's a peek at your future PC.

### CD-RW AND DVD-ROM DRIVES

Your days of spinning discs on a creaky CD-ROM drive are numbered. Should you upgrade now to CD-Rewritable and higher-capacity DVD-ROM drives, or wait? We'll help you decide.

### PHOTO EDITING: PICTURE PERFECT

Tinkering with a CEO's photo for the company Web site? Doctoring those storm clouds in the photo of your house for sale? We look at 11 photo-editing packages that'll improve your image.

### ANTIVIRUS: INOCULATE YOUR PC

Viruses are smarter, sneakier, and more damaging than ever before. How should you defend yourself? We test eight merciless virus-killing packages.

### ALSO NEXT MONTH

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

► **Stock Trading Online:** Point, click, trade: Is it really that easy? We put our money on eight online brokerage firms to see which ones work for investors.

► **Here's How:** Windows Tips on the quickest ways to find free hard drive space, Internet Tips on searching with your browser, and Upgrade Guide on moving to Windows NT 4.0.

# PC WORLD

**Follow up on rebates and free offers.** Almost every hardware or software product I purchased this past year included some free offer or another. My 56-kbps modem and computer speakers came with mail-in rebates; my new card- and calendar-making software threw in a bonus CD-ROM of clip art as my reward just for registering. Although I wouldn't recommend buying a product exclusively on the basis of its accompanying freebies, I'm certainly not averse to snapping up the rebates and free gifts that come with products I would have purchased anyway. The trouble is, I tend to follow up on these offers very infrequently. But from here on out, I firmly resolve to mend my ways: I'll fill out rebate forms, send in receipts, and make sure to cash in on special offers. And because I know that these promotions rarely go smoothly (see "Rebate or Rip-Off?" October 1998, [www.pcworld.com/oct98/rebate](http://www.pcworld.com/oct98/rebate)), I will make copies of everything I submit—in case I need to follow up with a company or salesperson at a later date.

**Guard my privacy more closely.** These days just about every Web site that has something interesting or useful to offer demands that I divulge important details about myself before it will grant me access to its services. Sharing is fine, provided you know what the site intends to do with the information. Will the site use it to customize its services to fit my needs, or will it sell what I reveal to the first direct marketing firm that comes along? An explicit (and detailed) privacy statement goes a long way toward answering these questions. And if I see the Trust-e logo displayed on a site, I know that the company has agreed to the privacy standards established by Trust-e ([www.truste.org](http://www.truste.org)), a nonprofit organization formed to monitor the privacy practices of Web merchants (and, in turn, to boost online commerce).

**Track down junk e-mailers.** In 1999, to reduce the flow of spam at its source, I intend to do something with junk e-mail before I toss it: I'll forward one copy to my

Internet service provider and one to the FTC ([uce@ftc.gov](mailto:uce@ftc.gov)); then I'll complain to the sender's ISP with the help of an online tutorial called How to Complain to the Spammer's Provider ([spam.abuse.net/howtocomplain.html](http://spam.abuse.net/howtocomplain.html)). This step-by-step guide explains how to decipher e-mail

**Sharing important details about yourself is fine, provided that you know what the site intends to do with the information.**

headers to determine the spam's source and offers a sample complaint letter to an ISP.

**Take regular typing breaks.** Several years ago I suffered from debilitating pain in my arms and hands

due to the repetitive nature of work at the keyboard. After hours of physical therapy, chiropractic treatments, and other experimental procedures, I've been working pain-free for some time—so long, in fact, that I often forget to take brief, regular breaks from computer work. But in 1999, instead of typing for hours on end, I'll stop every half hour to open some mail, return a call, or walk around the block. For information about keyboard-related repetitive strain injuries, visit the Typing Injury FAQ ([www.tifaq.com](http://www.tifaq.com)), the most comprehensive online resource on the subject.

**Voice my complaints and praises to PC vendors.** Most businesses pay close attention to consumer feedback. Even so, the task of sending companies letters of kudos or complaint always sinks to the bottom of my to-do list. But e-mail makes it more convenient than ever to let vendors know what you think of their products and services. So now, instead of just ranting to a friend about the lousy technical support I received, I'll fire off an e-mail to the offending business. And when my rebate check arrives two weeks early (I can always dream, can't I?), I'll take time to congratulate the company, too.

*Have you made any PC-related New Year's resolutions? Tell Consumer Watch about them by e-mailing us at [consumerwatch@pcworld.com](mailto:consumerwatch@pcworld.com). Roberta Furger is a contributing editor for PC World and the author of Does Jane Compute? Preserving Our Daughters' Place in the Cyber Revolution (Warner Books, 1998).* ■



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PC Magazine, October 6, 1998 - page 202

It's one thing for a company to claim its products are the best. But when a publication like PC Magazine honors it with their respected Editors' Choice, you sit up and take notice. Optique took the concept of a large screen monitor, combined it with a small footprint, and designed a winner – the 19" (18.0" viewable) **V95**.

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Optique V95  
October 1998

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**WE HELP WITH:** Quantex shipping problems ♦ TigerDirect rebates ♦ Auction woes

# Hey Quantex: Where's My Computer?

JOHN WALKER OF Ann Arbor, Michigan, writes: "After reading every review I could find, I ordered a Quantex H 1331 notebook. I was about to enter an MBA program and wanted to have the PC before it started. After waiting for five weeks, I had to get a loaner desktop PC. Finally, I canceled my order and bought a Dell."

I received several similar complaints last month bemoaning missing Quantex machines. According to Quantex spokesperson Jessica Porchetta, the shipping delays are a result of increased orders and changes to its notebook product line. "To combat those problems," she says, "we opened a couple of new production lines. In no time, things will be back to normal."

Porchetta adds that the company is offering free shipping to customers who've endured major delays (four weeks would be considered major).

## TigerDirect Pounces on Problem

"I ORDERED some Synchronys software from TigerDirect," writes Shawn Rasmussen of Las Vegas, New Mexico. "The

advertised price was \$20 after a \$20 manufacturer's mail-in rebate and a \$25 TigerDirect mail-in rebate. I mailed both rebate forms with proper documentation, but haven't received either rebate. Can you help me get my money?"

Rasmussen isn't the only person who has written me recently to complain about TigerDirect's service. Richard Wallet, the company's vice president, couldn't find a reason for the complaints, but he and his staff responded quickly to all those I forwarded. As for Rasmussen, he received his \$25 from TigerDirect. But his manufacturer's rebate was another story: Synchronys filed for Chapter 11 bankruptcy protection in July 1998.

"It's not Tiger's policy to kick in and fund a defunct manufacturer's rebate program," explains Wallet. "But in this case, I'm going

to do it in order to make up for the customer service problems Rasmussen encountered." Wallet gave Rasmussen a \$20 credit to cover the never-received Synchronys rebate.

## Auction Site Incommunicado?

A FEW READERS have complained about Bid.com (www.bid.com), an online auction site. Customers say they didn't get the merchandise they'd ordered and couldn't get an explanation from the company. Sarah Sheaves, a customer service representative at Bid.com, told me the company experienced problems as a result of moving at the end of September. Servers went down, e-mails were lost, and customer response times suffered. Even today, she says, the company's e-mail system isn't working as well as it was before. If you're waiting for products (or for an answer) from the company, send another e-mail. It's possible your previous communications were lost.

## The Body Count

MODEM MAKER Hayes filed for Chapter 11 bankruptcy in October. Hayes will continue to provide service to customers while it reorganizes. According to reports published in November, SyQuest, maker of removable-storage drives, temporarily ceased operations and was considering filing for Chapter 11 bankruptcy. SyQuest was unavailable for comment. Finally, Cleveland-based computer maker and mail-order supplier Micro Experts has apparently closed shop, stranding customers without the equipment they ordered.

## GOTTEN A RAW DEAL?

Or a great one? Send PCW Advocate the details at [advocate@pcworld.com](mailto:advocate@pcworld.com). We'll investigate complaints and publish items of the broadest interest. Christina Wood is a contributing editor for PC World.



## THE FINE PRINT

### Beware Hidden Restocking Fees



THE RESTOCKING FEE is one of the slipperiest hidden costs of buying via mail order. Policies on restocking fees vary wildly. Dell and other big-name vendors never charge them. Others charge them only under specific circumstances. Restocking fees usually run about 15 percent, but as the fine print from this ad for UnitekUSA illustrates, some companies charge as much as 20 percent. Say you buy a \$2000 laptop from an outfit that charges a 20 percent restocking fee, only to decide you don't like it. Simply taking that laptop for a spin and returning it would cost you \$400.

Non-defective returns are subject to a 20% restocking fee. Software adjustments due to changing market conditions, manufacturer





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but not the  
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# Don't Let Your ISP Cut You Off

**PROBLEM** *Your Internet service provider kicks you offline when you're in the middle of important work.*

**SOLUTION** *Install an anti-timer utility, reconfigure your e-mail package, or choose a regional ISP.*



USERS HATE THEM. Internet service providers don't like to discuss them. And no one sees them disappearing soon. They're Internet service timers, those pesky dialog boxes that pop up when you're "idle" and ask if you want to stay online—usually, it seems, when you're composing a long e-mail, downloading a huge file, or trying to finish researching a vital project. If you're lucky, you notice in time to respond and keep your online connection. But if not, all bets are off. With some timers nagging you as often as every 5 minutes, it's easy to get knocked offline—over and over again.

Staying online long enough to get crucial business done became a problem for Jeff Berger, owner of JMB Communications, a marketing and PR firm in Plymouth, Massachusetts. "I use America Online on the road because it has so many points of presence to dial into," he says. But AOL's 10- and 46-minute prompts pushed his patience to the limit—such as the time he had to connect to a database while attending his daughter's wedding in California. "I had AOL minimized, so I never saw any warning," he remembers. "After I got knocked off, I had to re-establish the tunnel into my client's intranet, re-establish the connection to Lotus Notes, and get back into the document I was working in. It was unbearable having to deal with this repeatedly."

## KEEPING CONNECTED

DESPERATE FOR AN Internet connection that would last longer than several minutes, Berger eventually found relief through an anti-timer utility. Also known as disconnect stoppers, anti-timers answer timer dialog boxes or perform busy-work tasks over your modem to convince the timer that you're really hard at work.

Berger's anti-timer of choice is Terminator from TPA Software ([www.tpasoft.com](http://www.tpasoft.com)). This \$5 shareware program, which automatically responds to AOL's nag dialogs, is simple to understand and very reliable, he says. The Terminator works only with AOL, but numerous anti-timers that will work with other ISPs sell for \$30 or less, including RascalPro and Stay Connected 2.0 (see "Pump Up Your Browser," July 1998, [www.pcworld.com/jul98/browser](http://www.pcworld.com/jul98/browser)).

Don't want to install a utility? Internet e-mail packages such as Outlook Express and Eudora Pro can check periodically for new messages, thereby keeping your connection active. In Outlook Express, choose *Tools•Options* and then select *Check for new messages every 30 minute(s)*. Depending on your ISP, you may need to tell the package to look for mail as often as every 5 minutes. Though this trick works with many ISPs, some service timers reportedly can detect that your PC is performing one action repeatedly in automated fashion, and disconnect you anyway. (Utilities such as Stay Connected perform a range of tasks at differing intervals.)

One last option to consider: switching to a regional ISP. Smaller services tend to offer unlimited access plans that live up to the name. For instance, Red Shift, an ISP based in Monterey, California, waits 8 hours to drop connections ►



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### GOT A PROBLEM?

that appear to be idle. Regional ISPs don't have the huge access networks of bigger services, but if you just need local service, they're the simplest way to stay connected.

#### NOT-SO-UNLIMITED ACCESS

IS THWARTING A SERVICE timer playing by the rules? Most ISPs don't think so. AOL's user agreement prohibits "the use of tools that defeat AOL's automatic log-off feature." However, AOL spokesperson Trish Primrose says that this rule has not been enforced, as far as she knows.

Primrose contends that timers aren't a big source of complaints among users; but all you need to do is browse the right newsgroups to know people are miffed. Many customers who pay an ISP for "unlimited access" believe they should get what's advertised—or at least be allotted more generous chunks of connect time.

Unfortunately, it's not that simple, says Joe Bartlett of the Yankee Group, a Boston-based research firm. "If you look at the fine print, it says unlimited *access*, not unlimited *use*," he says. "ISPs can't make a go of it by satisfying [flat-rate] customers....So they don't care if timers cause them to lose the 3 to 5 percent of users who act like they have a dedicated line."

Still, timers frustrate ordinary ISP users, too. Just ask Jeff Berger, who typically wants to stay online for only a few minutes to a couple of hours. "What I'm doing online is serious work," he says. "ISPs and online services have to develop technology that understands when people are using the connection for important work—and not just playing in chat rooms."

*Carla Thornton is a contributing editor for PC World. If you're having trouble resolving a PC-related hardware or software problem, we'd like to hear from you. See page 14 for contact information.* ■

#### Terminator

\$5 shareware; TPA Software; [www.tpasoft.com](http://www.tpasoft.com)

#### RascalPro

\$30 shareware; Basta Computing;  
[www.basta.com](http://www.basta.com)

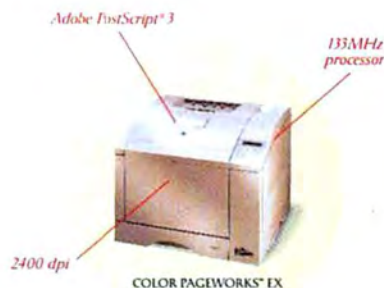
#### Stay Connected 2.0

\$20 shareware; InKline Global;  
[www.inklineglobal.com](http://www.inklineglobal.com)



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Color PageWorks, 3/98



Color PageWorks, 1/98

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# Unclog the Net: Eliminate Web Ads

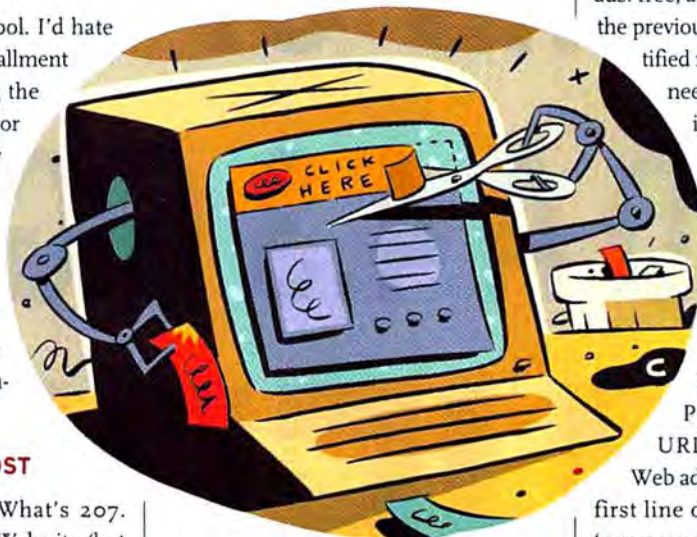
HEY, YOU FOUND ME. Cool. I'd hate for you to miss the third installment of my fascinating "Unclog the Net" series (soon to be a major motion picture). From now on, I'll be up front, right before *Bugs and Fixes*. This month: a quick trick for getting Web pages to load a little faster, and a couple clever ways to banish those aggravating (and bandwidth-hogging) banner ads.

## HOST WITH THE MOST

FIRST, A QUICK QUIZ: What's 207.46.131.137? It's Microsoft's Web site (but you knew that). Use the IP address—the numbers—instead of 'www.microsoft.com' in your browser, and you'll arrive at the site in what feels like almost 5 seconds less. (You'll also turn into a technodweeb.)

See, when you type a URL, a Domain Name Server on the Internet translates the name into an IP address. The trick is to tell your PC to look at a file on the hard drive—called a hosts file—so it doesn't need to bother your network's DNS. You probably already have a sample hosts file, *hosts.sam*, in your Windows directory. You can use that file, or create a new one using Windows Notepad; just save the file in your Windows folder as "**hosts**" (use quotes to avoid the standard .txt extension). You can also use the hosts file to turn off banner ads; more on that in a sec.

If you're a dedicated propellerhead, you'll have fun with this next part. Each



You **see** them everywhere:  
insidious **Web** page ads.  
Well, I've found a **way** to  
**banish** them.

line in the hosts file needs to have a URL along with a matching IP address. You could look up the IP address of every Web site. A better idea is to grab yourself a copy of Legion, a \$10 shareware hosts utility. Import your Netscape Bookmarks or Internet Explorer Favorites into Legion, and it pings each Web site, looks for the IP address, and enters it into the hosts file. You can download Legion from PC World Online.

## BAN THE BANNERS

"CLICK HERE TO SAVE!" "Want SUPER prices? Click NOW!!" You see them every time you browse the Net: insidious, pervasive, pain-in-the-butt Web page ads. My response? "Get out of my face!" Good news—I've found ways to banish almost every blinking one of them.

Don't get me wrong: I can deal with the

occasional banner ad (listen, the ones on PC World Online help pay my enormous salary). But some pages are covered with the things—flashing, winking, and gobbling up precious bandwidth. So it's time to tick off all those Web advertisers and banish the banners.

There are two ways to eradicate Web ads: free, and easy. Let's start with free. If the previous tip didn't turn you into a certified nerd, this one surely will. You'll need to stick the banner ad's URL into your hosts file, then tell your browser to look for the ad on your hard drive instead of on the Net. (Since the ad is not there, it won't show up on screen—sneaky, eh?)

To make this work, you need to insert your PC's local IP address (127.0.0.1 for all PCs) in front of the advertiser's URL. In other words, if the ad's Web address is *ad.doubleclick.net*, the first line of your hosts file would read '127.0.0.1 *ad.doubleclick.net*'. For more details, check out Junkbusters, a very cool banner-free site (*www.junkbusters.com*).

If that's too complicated for you, I have an easier route: WRQ's @Guard, a great, if overpriced, utility. The \$30 @Guard eliminates banner ads and script-based pop-up windows. It also selectively filters cookies and builds a firewall that lets me protect myself from data being transmitted without my permission. The program even stops those annoying, disk-thrashing animated GIFs (God, I hate them).

A side benefit to using @Guard is faster-loading, cleaner Web pages. The program's available for a 30-day free trial.

Now that you know my new location, you can put a bookmark here—the paper kind. Or maybe we can persuade PC World's printer to insert a subscription card at my column.



Find files from this article on PC World Online at *www.fileworld.com/magazine*. PC World Contributing Editor Steve Bass is a licensed marriage and family therapist and the president of the Pasadena IBM Users Group. See page 14 for contact information.

### @Guard


\$30; WRQ; 800/872-2829; *www.atguard.com*

PC WORLD INFONET NO. 601

### Legion

\$10; Warever; *www.actionplus.com/products/legion*





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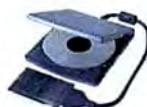
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- 32 MB SDRAM (expandable to 96 MB)
- 4.3 GB hard drive
- V.90 modem
- 128-bit graphics accelerator
- Windows 98 pre-installed
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## Browser saga continues ♦ NT Service Pack 4—finally ♦ Nitpickin' on Quicken

# IE and Navigator Patch Things Up

LAST MONTH'S COLUMN ([www.pcworld.com/dec98/bugfix](http://www.pcworld.com/dec98/bugfix)) described a series of JavaScript security flaws that left both Internet Explorer 4.01 and Navigator 4.07 open to some serious, if theoretical, attacks. Microsoft has released a patch for the IE 4.01 "Cuartango" hole at [www.microsoft.com/windows/ie/security/paste.htm](http://www.microsoft.com/windows/ie/security/paste.htm). Meanwhile, the company fixed another flaw at [www.microsoft.com/windows/ie/security/dotless.htm](http://www.microsoft.com/windows/ie/security/dotless.htm). To install both, select *Help•Product Updates*. Not to be out-patched, Netscape released version 4.08 of Communicator/Navigator to fix the Injection Bug, or Son-of-Cache Cow flaw (fixed also in version 4.5). The only way to get 4.08 is to download one of four packages from [ftp://ftp.netscape.com/pub/communicator/4.08/english/windows/windows95\\_or\\_nt/](http://ftp.netscape.com/pub/communicator/4.08/english/windows/windows95_or_nt/). Communicator 4.0x users can upgrade to version 4.08 by choosing *Help•Software Updates*.



## Windows NT 4.0 Service Pack 4

AFTER DELAYING more than six months, Microsoft has finally posted Windows NT 4.0 Service Pack 4 at [www.microsoft.com/windows/downloads/contents/Updates/NT4SvcPk4](http://www.microsoft.com/windows/downloads/contents/Updates/NT4SvcPk4). (Note: You must register at [support.microsoft.com](http://support.microsoft.com) before you can gain admission to the download site or view the site's content.) Service Pack 4 may have been worth the wait. By Microsoft's account, it packs more than 600 new bug fixes into one large but cohesive package that a mere mortal can install. The whopping 31MB patch is cumulative, including all the fixes from preceding Service Packs.

In addition to year 2000 bug fixes and support for the Euro currency character, SP4 contains numerous updates aimed at tightening Internet security. Notably, NT LAN Manager log-in encryption is now much more difficult to hack, Virtual Private Networking connections to NT servers are faster and more secure, and the Service Pack closes the door on a flaw that allowed ordinary users to elevate themselves to administrator status. You'll find a complete list of SP4's hundreds of bug fixes at [support.microsoft.com/support/kb/articles/Q150/7/34.asp](http://support.microsoft.com/support/kb/articles/Q150/7/34.asp).

SP4 also includes Internet Explorer 4.01 with Service Pack 1—the latest shipping version of Microsoft's browser—but it doesn't contain all the most recent security fixes. If 31MB is more than you can reasonably download (the process might take hours), you can order the Service Pack on CD for \$20 by calling Microsoft at 800/370-8758.

## B R I E F

### NU You See It, NU You Don't

IN NOVEMBER'S *Bugs and Fixes* ([www.pcworld.com/nov98/bugfix](http://www.pcworld.com/nov98/bugfix)), we reported a small patch to Norton Utilities 3.0 that prevents lockups when shutting down Windows. The URL and file name we reported for the fix are no longer valid, but the patch lives on in the 6MB Live Update 6a. If you've installed Live Update 6, using 6a will download just the new patch.

### WinBatch 98 Out

WHEN WINDOWS 98 came out, users of the WinBatch scripting utility by Wilson WindowWare found themselves out in the cold, due to a change in the way Windows interprets keystrokes for switching between apps. You can download WinBatch 98 from [www.windowware.com/winware/download.html](http://www.windowware.com/winware/download.html); the \$30 upgrade offers a free 30-day trial.

### QUICKEN 99 NOT SO DIVINE

THE LAST VERSION of Intuit's flagship personal finance software (last in this century, anyway) packs an unprecedented set of online banking and investing features. But users are also starting to register complaints about frustrating bugs and finding little comfort or information forthcoming from the manufacturer.

Quicken 99 users report problems ranging from the trivial to the severely troubling. Among the former are interface glitches and conflicts with Netscape Navigator. More serious problems include transactions that disappear, automatic online payments that vanish, securities entered in an earlier Quicken version that fail to appear in some Quicken 99 screens, and difficulty downloading securities transactions from online brokerage accounts.

As we went to press, Intuit's site contained acknowledgments of some problems, and several work-arounds ([www.intuit.com/support/quicken](http://www.intuit.com/support/quicken)—see *Frequently Asked Questions*). Company sources promised that a free maintenance release—Quicken 99 release 2—would be available by the end of 1998. When the fix becomes available, Quicken 99 users who take advantage of the software's online capabilities will receive the patch automatically as a background download, says Intuit. The program will then ask permission to install the update. Quicken 99 users can also download fixes from [www.intuit.com/support/updates](http://www.intuit.com/support/updates).



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

## B U G G E D ?

FOUND A HARDWARE or software bug? Tell us about it via e-mail at [bugs@pcworld.com](mailto:bugs@pcworld.com).





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**GRAPHICS.**



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## STORY #97:

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[ *"If I can't give my team their own all-in-one tool, it throws a wrench in my sales strategy,"* ]

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We listened to what you wanted, and responded with a slim and light notebook with innovations like an optional detachable Multi-function Bay and an optional Mobile LAN

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[ *"We need notebooks with options. I can't hammer on that point enough,"* ]

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# TOP OF THE NEWS





# Software Bugs Run Rampant

**Swat those bugs:** Tired of buggy software?

You've got plenty of company. Our **exclusive survey** shows how severe the problem is, which companies give you the most help, and which won't give you the time of day.

◆ **By Scott Spanbauer**

## ANALYSIS

*"The company has no idea when or if these bugs will be corrected."*

*"Is this a known problem or did I do something wrong?"*

*"If I was selling the kind of crap they do, I might well distance myself from customers."*

THESE ARE THE words PC World readers used to describe software products that don't work, and software makers that don't seem to care. While many aspects of PC ownership have improved over the years, software quality doesn't appear to be one of them.

Take Windows 98. When the new version of Microsoft's

flagship operating system was released last June, the Internet was immediately flooded with accounts of bugs and glitches. Now Microsoft is about to release Windows 98 Service Pack 1. No matter what the software giant chooses to call it, SP 1 is largely a bug fix. Whether it plugs the operating system's holes or pokes new ones remains to be seen, but if history is any guide, Windows 98 will still be as buggy as a Louisiana swamp.

Unusual? Not at all. An exclusive poll conducted by PC World and World Research of San Jose, California, shows that most software users are

living with bugs in their software. Almost 80 percent of the 773 PC World subscribers who responded said they had bought software that turned out to have bugs. About 29 percent of them said they think all or most of the software they use contains bugs. And these people place the blame squarely on software companies: A whopping 86 percent said they believe companies rush their products to market before the bugs are worked out.

The awful truth is that every operating system, utility, office suite, browser, and ►



## Communicator 5 Slims Down

THE NEXT version of Netscape Communicator will sport a new layout engine that should make it smaller and faster. (A layout engine interprets HTML code and converts it to what you see on screen.) Based on a demo and our own estimates, the Communicator 5 download could be as small as 5MB, or one-third its predecessor's size. The smaller size also means that Communicator could be compact enough to work on handheld devices and wireless phones. Moreover, in a demo, the new layout engine rendered Web pages much faster than anything we've seen. We expect Communicator 5 to ship by midyear.

## Humongous Hard Disks for PCs

THERE'S A NEW high in high capacity. IBM has announced bigger hard drives for desktop PCs and notebooks. For desktops, the Deskstar 25GP (\$599 list) holds 25GB and spins at the industry-standard speed of 5400 rpm. If you need more speed, for \$599, the 22GB Deskstar 22GXP IDE drive will crank at 7200 rpm. For laptops, the Travelstar 14.1GB 14GS hard disk is about the size and weight of existing notebook drives but will cost \$845. The new products will appear first in high-end desktops ►



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**BITTEN BY QUICKEN:** Bugs in Intuit's personal finance program ate through Kevin Osborn's data.

personal finance program—in short, every application you use—is defective. Incompetence, indifference, and an endless variety of PC configurations contribute to the problem. As does the competitive pressure to hurry ever more

complex applications to market. But the biggest factor may be the success of the personal computer. As hardware prices continue to nosedive, software prices (with a few notable exceptions) drop as well, eating into developers' profits.

"[Software firms] want to be profitable, so they cut back on quality," says Gary Ulaner, director of product management at Quarterdeck (which is being acquired by Symantec). "And because of the competitive nature of the business, they have to rush things out very quickly." Toss in holiday shopping seasons, quarterly profit statements, stock prices, and similar financial pressures, and it's a wonder software works as well as it does.

## BUGS EVERYWHERE

WITH BUGGY SOFTWARE a virtual certainty, the question is, do you feel lucky? Bugs can force Windows to crash or cause other programs to lock

up. A particularly nasty bug can eat years of valuable data (see the tale of Kevin Osborn on the next page). How do you defend yourself? First, assume any software you buy contains bugs. Then you can take necessary precautions. Some safeguards: Save your files often; make frequent backups; and avoid installing beta software or even brand-new programs if you can afford to wait (see "8 Tips to Take the Sting Out of Buggy Software").

"There's no product out there that doesn't have bugs," says Jim Matthews (not his real name), a former product manager for three different makers of software utilities. "That's just part of the game."

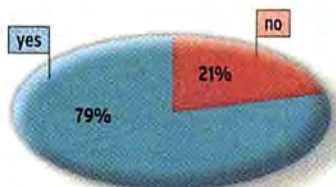
Also part of the game is squashing bugs as they pop up. Here, some companies keep customers happier than

PHOTOGRAPH: KATHERINE LAMBERT

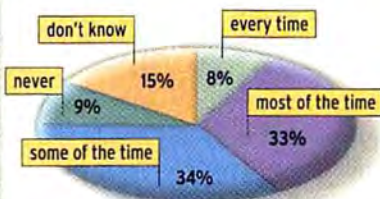
## BUGGY SOFTWARE PC WORLD WEB SURVEY

### Users Say Bugs Are on the Rise and Software Vendors Are to Blame

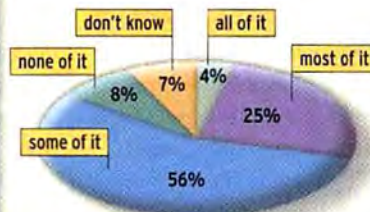
In the last three years, have you purchased or downloaded a software program that you later discovered contained a bug?



When you have discovered bugs in your software, how often were the bugs fixed by the software maker?



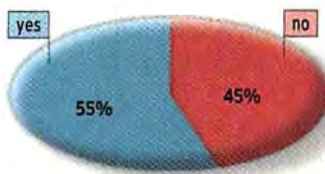
In your experience, approximately how much of the software that you use contains bugs?



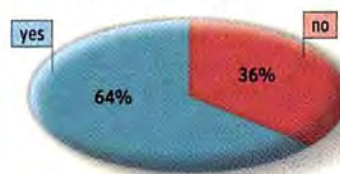
In your experience, how big a problem are software bugs?



Would you be willing to pay more for a software program if you knew it would be bug-free?



Would you be willing to buy a software program that had fewer features if you knew it would be bug-free?



**Methodology:** Last October, PC World conducted a Web-based survey hosted by World Research of San Jose, California. We mailed 3000 invitations to PC World subscribers asking them to participate. Of those, 773 people answered our survey questions. Percentages do not always add up to 100 due to rounding or multiple-answer questions.



others. We asked people if they were satisfied with their vendors' efforts to fix bugs. Of the respondents, Intuit users were the most satisfied overall (although Quicken 99 has presented a new challenge; see *Bugs and Fixes*). Others lauded as bug zappers include Adobe, Netscape, and Corel. At the other end of the spectrum, America Online, Quarterdeck, and Microsoft users registered the highest levels of dissatisfaction (see "Software Bugs: Which Vendors Care, Which Don't").

### COMPLEX PROBLEMS

PRODUCT VENDORS aren't out to ruin your day. But the complexity of Windows and the infinite variety of installed,



Toss in **holiday shopping seasons**, **quarterly profit statements**, **stock prices**, and similar **financial pressures**, and it's a wonder software works as well as it does.

and often buggy, applications and peripherals make problems unavoidable. Quarterdeck's Ulaner blames the existence of many bugs on unsophisticated developers who create software that behaves poorly and lacks routines for recovering gracefully from other programs' flaws.

Another big problem, says Ulaner, is the multiplicity of hardware configurations. "I can take two identical Compaq Presarios, and they'll have different chip sets inside, different BIOSes, different hard drives. With the huge number of software and hardware products out there, it's impossible to test every application on every system possible."

Even without these factors working against it, software breaks down. Take the case of Kevin Osborn of Bowie, Maryland, a satisfied user of Quicken 6 before he upgraded to Quicken 98. He appreciated the new version's ability to download investment transactions from the Web, but the added features came at a cost: The new version corrupted his securities database, misidentifying stock symbols and creating other problems.

Osborn worked around the glitch for several months, hoping it would be corrected in Quicken 99, but he would have no such luck. Eventually, he was able to repair his database by exporting and then importing it into a new Quick-

en database—but not without corrupting checking, securities, and loan transactions spanning about seven years. "I think all of this additional functionality is great,"

Osborn concedes, but the product "just isn't solid."

Osborn is not alone in his woes. Nearly half the people we surveyed said they have lost data or files as a result of a software bug.

### BUGGIER SOFTWARE

AS OPERATING systems and other programs expand with new features and capabilities, bugs seem to be increasing. In our survey, 53 percent of respondents said they believe software is buggier today than it was three years ago.

Microsoft Windows Group General Manager Chris Jones agrees that bigger programs seem to breed more bugs, but he believes the solution is to test aggressively during development. "Software is a little bit like watches," Jones says. "If you've got a lot of moving parts and you change them all, you'll probably have to do more testing to get the moving parts all working right."

Not even a company as dominant in the software industry as Jones's employer can get all the parts working right. In our survey, 88 percent of respondents said they'd used a Microsoft program that

and notebooks early this year. The Deskstar drives will also be included in retail upgrade kits for desktop PCs by spring.

### Quick, Cheap E-mail for Small Businesses

THE FIRST product to be released in Intel's new line of easy-to-use, specialized networking "appliances" is InBusiness EMail Station (\$700 street). This paperback-size device includes server hardware and software for managing both internal and Internet e-mail. Just connect it to an ethernet network and a router or modem, and then run through the browser-based configuration. It works with POP3-compliant e-mail clients, including Microsoft's Outlook Express and Eudora. Later this year, expect to see more single-function networking devices from Intel, including a print server.



### TidBytes:

**Fastest CD-Rewritables:** New \$399 CD-RW drives from Ricoh and Verbatim are the first to write to rewritable media at speeds of 4X (600 kilobytes per second). They format media in under a minute (current drives take 20 minutes or more). Both drives can also write to nonrewritable CD-R media at 4X speed, and read CD-ROMs at 20X. **Turbulence at Storm Technology:** The maker of low-cost scanners has filed for Chapter 11 bankruptcy protection. Pending court approval of its reorganization plans, the company expects to continue offering technical support, according to spokesperson Carol Kruse.

#### What do you believe are the primary reasons bugs exist?





had bugs. The trick to keeping customers happy, Jones says, is to listen to them and to fix the glitches that they say are the most important.

Ulaner, Jones, and other developers we spoke to say that most companies are genuinely dedicated to reducing the number of bugs in order to win customers. Ex-product manager Matthews believes that if a firm is led by someone who cares about shipping high-quality software, that concern becomes the corporate ethic. But the opposite also applies. Matthews recalls a vice president of engineering at one of his former employers whose philosophy was "just ship the [expletive]."

"Since that was his attitude, that became the attitude of

his developers and of the company—just get the product out the door, who cares," Matthews says.

Easy access to customers via the Internet may also tempt some vendors to cut corners. "As we ship products on Internet time, we're shipping them sooner and buggier," says Cem Kaner, a software development consultant, consumer advocate, and coauthor of *Bad Software* (Wiley, 1998). "We can fix things for free by putting the patches or service packs on our Web sites, so we don't have to test or fix as much before the first release."

Cranking out products on "Internet time" helps companies answer to a higher author-

ity: the bottom line. According to product managers that we spoke to, top management at public companies may pres-

Windows product manager. "And once you do, you hope you've left yourself enough time to get everything out."

**Matthews recalls one vice president of engineering's philosophy on selling high-quality software:**  
**"Just ship the [expletive]."**

#### THE FIX IS IN

EVENTUALLY, the software ships and the bug reports start rolling in. What happens next is what separates the companies you want to patronize from the slack-

ers. While almost every vendor provides bug fixes eventually, some companies do a better job of it than others.

Companies that do poorly at getting fixes out to their customers may have their reasons. According to Andy Benjamin (not his real name), vice president of sales and marketing for a utilities maker, accountants fear bug fixes will shift the product to a less profitable, subscription-based model. "And then you have the investors," Benjamin says. "Let's face it, some companies have better customer service for their investors than they do for their users."

Even when a company provides bug fixes, locating them at the vendor's Web site can be a challenge (see "Useful URLs: Where to Get Relief"). At the site, you may find patches that you can download, or knowledge bases describing common problems and recommendations for resolving them. Some software companies have made updates part of the program itself. Such features automatically download the latest fixes.

However, for update features to benefit customers, companies must publish bug fixes regularly. To date, Windows 98's update tool has proved to be less than useful

## 8 Tips to Take the Sting Out of Buggy Software

BUGS ARE a fact of life. Follow some of these guidelines to keep from being bitten.

**1. Know your software.** Find out if the few programs you use day in and day out have known bugs and patches. See "Useful URLs: Where to Get Relief" for a list of sites that offer the latest information. Also, keep your eye on *PC World's Bugs and Fixes* column.

**2. Back up your data.** This dictum should be tattooed on every monitor bezel. Get your important data onto a floppy disk, tape cartridge, or second hard disk. Don't forget to back up e-mail messages and address books, dial-up networking settings, and so on.

**3. Stash away a stable base system.** If you spend 90 percent of your time using three or four programs, create a lean, mean installation of just your operating system and those essential apps (without the data), then back it up to a tape or removable drive. This will save you time when the only escape from a buggy program is to delete everything and start over. If you have the extra disk space, a disk-imaging tool like PowerQuest's \$70 Drive Image lets you back up an entire hard disk partition into a single compressed file.

**4. Don't upgrade—yet.** That \$20 upgrade to Timewaste 99 is tempting, but when Timewaste 98 is working great, why chance it? Wait a few months, check out other users' experiences with the upgrade

on Usenet newsgroups or the vendor's own discussion forum, and then go for it. But only if you must.

**5. Take it slow.** If you decide to upgrade the PCs in your office, allow yourself at least a month to test the upgrade on a separate system before you install it on the computers you rely on every day.

**6. Bag the betas.** Installing beta software on your primary computer is a game of Russian roulette. If you really have to play with beta software, get a second computer.

**7. Move on, if you can.** If a program turns out to be a lemon, don't stick around for more abuse. If you just bought it, try to return it. If you're persistent, you can probably get a refund. Find out if another product (with a better reputation for quality) is available, and make sure it can read your current program's data files. Then install, convert your data, and use the program for a few days or weeks before uninstalling the first one.

**8. Complain.** The more you complain about bugs and demand remedies, the more costly it is for vendors to ship buggy products. It's like voting—the more people participate, the better the results.

• **Drive Image;** \$70 street; PowerQuest; 801/437-8900; [www.powerquest.com](http://www.powerquest.com)

PC WORLD INFONET NO. 770



# The Ugly Bug Hall of Shame

WHEN YOU CONTROL as much of the software market as Microsoft does, you've pretty much cornered the market on software bugs as well. In our look back at the most shameful bugs of the last several years, the software giant hogs a big share of the limelight—but it's not the only one to reap blame.

**Windows 98 hates your PC.** Many programs, systems, and peripherals that worked fine under Windows 95 wouldn't function under the new operating system. A service pack is coming soon, but it probably won't fix most conflicts. Check with the third-party product's manufacturer instead.

**Office 97's patch hell.** The modest Service Release 1 resolved some glitches. Unfortunately, it also introduced new ones. The same thing happened with the more extensive

SR2 patch. You have to wonder who's flying this plane.

**Internet Explorer 4.0 security breaches.** Turns out Web browsing is a great way for hackers to read your mail, run nasty programs on your system, see where you've surfed, and so on. Microsoft has been diligent about patching newly discovered holes. For the latest on browser bugs and their free patches, see *PC World's Bugs and Fixes*.

**Netscape Communicator 4.0 security breaches.** As with IE 4.0, dozens of flaws in Navigator's security allowed hackers to look over your shoulder as you surf. Netscape released eight successive updates to Communicator before declaring victory

because of the dearth of bug fixes that are available on the Windows Update site.

gram with fewer features if it were bug-free. This sentiment runs counter to what most software developers believe.

"People buy features, plain and simple," explains Freedman. "There have been attempts to release stripped-down word processors and spreadsheets, and they don't sell. If you had to go back to using Lotus 1-2-3 Release 2, you'd rip your hair out."

Although Freedman says a trend toward fewer features will "never happen," Microsoft recently took a small step in that direction. According to Microsoft product managers, Internet Explorer 5, due out in early 1999, will be a slimmer, simpler browser than its bug-riddled predecessor.

and moving on to version 4.5. Users are advised to stay tuned.

**Fortress Windows NT 4.0—not.** This is supposed to be the "secure" version of Windows. The first bug to appear discarded data instead of writing it to disk. Since then, Microsoft has posted hundreds of mostly security-related fixes, recently pulling them together into the 32MB Service Pack 4.

**Norton Utilities 3.0 hates your PC, too.** After eight Live Update patches, Symantec has worked out most glitches. The worst culprit corrupted Registry files and zapped Iomega Zip drives. Other utility software programs (such as First Aid and Nuts & Bolts) also contained bugs.

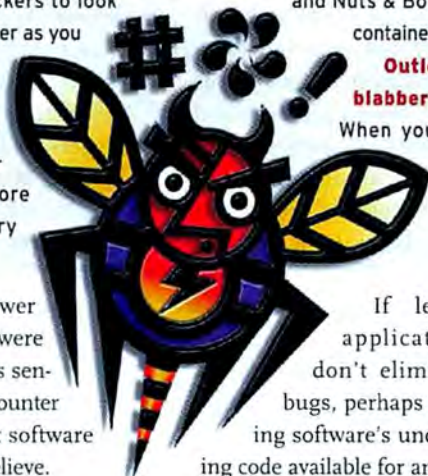
**Outlook 97, blabbermouth.** When you blind-

carbon-copy (bcc:) someone on an e-mail message, that fact is supposed to be a secret. But Outlook 97 mistakenly included these potentially embarrassing addresses in the message header.

**Windows 95 password amnesia.** Microsoft released Win 95 Service Pack 1 to fix little problems and beef up password security. Unfortunately, the fix corrupted the password list file (the one that remembers your Dial-Up Networking password). The fix? Download another patch.

**Tax software needs an audit.** Every year, tax-software makers release last-minute patches to fix bugs. Our favorite flub was a Parsons Tax Mate bug that always printed the total tax owed on form 1040A as zero.

**The plot quickens.** As far back as version 5.0, Intuit reported that Quicken sometimes loses transactions and bungle online banking. Save that pocket calculator.



If leaner applications don't eliminate bugs, perhaps making software's underlying code available for anyone to examine and improve will. Both the Linux operating system and Netscape's forthcoming Navigator 5 employ an open source software model, based on the theory that if many people collaborate on a program, they'll find and eliminate bugs, yielding stable software.

It's too soon to tell whether open source software will benefit PC users, but the OSS model has caught the software giant's attention. In an internal memo published on the Web this fall, a Microsoft programmer wrote, "The ability of the OSS process to collect and harness the collective IQ

of thousands of individuals across the Internet is simply amazing." The memo continues, "[OSS] promotes rapid creation and deployment of incremental features and bug fixes in an existing code." Despite this praise, the memo makes it clear that Microsoft views OSS as a potential threat. Each of the Microsoft product managers we spoke to denied that Microsoft would ever publicize its code.

Some observers view Microsoft's competitiveness and market dominance as a roadblock to bug-free software. Todd Paglia, an attorney with the Washington, D.C.-based Consumer Project on Technology, says, "If actual competition for operating systems existed and we had greater competition for some of

## SQUASHING BUGS

WILL SOFTWARE ever be bug-free? Not likely. Each revision is usually bigger and more complex than its predecessor. That means new places for bugs to hide.

Former Microsoft manager Freedman agrees that the potential for defects increases as software becomes more complex. But he believes software users ultimately win more than they lose. "I'd say the features have gotten exponentially better, and the product quality has degraded a fractional amount."

Still, 64 percent of users who responded to our survey said they'd buy a software pro-



## Useful URLs: Where to Get Relief

TRACKING DOWN INFORMATION on bugs and their patches is a chore. Here are some Web pages that give you the latest.

- ▶ [www.spanbauer.com/bugs.htm](http://www.spanbauer.com/bugs.htm). A page with links to all of PC World's recent *Bugs and Fixes* columns.
- ▶ [www.bugnet.com](http://www.bugnet.com). A clearinghouse of bug-related news and information.
- ▶ [support.microsoft.com](http://support.microsoft.com). The place to start digging for known issues and bug fixes regarding Microsoft's programs. Requires registration. To get the latest Internet Explorer updates, choose *Help•Product Updates* from the IE menu bar; Office updates are at [office-update.microsoft.com](http://office-update.microsoft.com); for Windows service packs and patches, see [www.microsoft.com/windows/downloads](http://www.microsoft.com/windows/downloads), or pick *Start•Windows Update* in Windows 98.
- ▶ [help.netscape.com](http://help.netscape.com). From here you can check for the latest patch-



es in Netscape's File Library or read about other problems in the Knowledge Base. To update your copy of Communicator, select *Help•Software Updates* from your browser.

- ▶ [www.corel.com/support/ftp/site/ftpindex.htm](http://www.corel.com/support/ftp/site/ftpindex.htm). Corel software patches come with descriptions of problems that they will fix.
- ▶ [www.intuit.com/support/updates/index.html](http://www.intuit.com/support/updates/index.html). Good for finding out how TurboTax might miscalculate your taxes, but Intuit generally directs you to the program's own update feature.
- ▶ [www.symantec.com/techsupp/index.html](http://www.symantec.com/techsupp/index.html). Choose the *File Downloads* option to find patches for Symantec software, or go to the Knowledge Base to find out what problems users have experienced. But you're better off using your app's Live Update feature.
- ▶ [www.support.lotus.com](http://www.support.lotus.com). Start looking here, but don't expect a lot.

the software that runs on the Microsoft operating system, we would have higher quality than we have now."

The Project advocates anti-trust action against Microsoft, but its sights aren't trained solely on Redmond. Paglia says he would like to see all software makers held to a standard of quality.

"Would software improve?" he asks. "The answer is yes. The problem is, we're not in a situation where it's required. People who buy software have accepted a lot of low-quality stuff over the years."

### NO STANDARDS

SOFTWARE SALES and marketing vice president Benjamin agrees that standards would benefit everyone, and that they are "absolutely doable." He adds that many leading developers already follow extensive internal quality guidelines, but that most manufacturers don't want the burden of submitting their products to a standards group.

"There are a lot of very good and honest people in this business," says Benjamin. "But some companies get a little out of control and lower their

standards. I hate to put the responsibility on users, but they can simply choose not to accept poor software."

According to the software developers we spoke to, doggedly filing bug reports and griping to technical support representatives definitely has an impact. Consultant Cem Kaner says that companies often perform cost/benefit analyses to determine whether shipping a buggy product and dealing with the subsequent complaints is cheaper than fixing the bug in the first place. The more customers

complain, he says, the more expensive shipping a buggy product becomes.

For his part, Quicken user Osborn took his complaint to Intuit's tech support. "I think they have a personal obligation to ensure my database integrity," he says.

Unfortunately, many software makers don't see it the same way. They support a new section of the Uniform Commercial Code that would limit their liability for defects in software. The new section, known as Article 2B, is being considered by the National Conference of Commissioners of Uniform State Laws, a group responsible for drafting laws governing commercial transactions.

Paglia's group is working to defeat Article 2B. "Surprise, surprise. People are becoming more insistent on software actually working," he says. "But as long as there's almost no pressure to make a product that meets any kind of standard, there won't be a reduction in the number of bugs."

For now, that pressure must come from software users. ▶

### BUGGY SOFTWARE PC WORLD WEB SURVEY

## Software Bugs: Which Vendors Care, Which Don't

#### Best Five Software Companies

Percent of satisfied users<sup>1</sup>



<sup>1</sup>Percentage of respondents who said they encountered bugs in the company's software and were "somewhat satisfied" or "very satisfied" with the way the company handled the problem.

#### Worst Five Software Companies

Percent of dissatisfied users<sup>2</sup>



<sup>2</sup>Percentage of respondents who said they encountered bugs in the company's software and were "somewhat dissatisfied" or "very dissatisfied" with the way the company handled the problem.

SOURCE: PC WORLD WEB SURVEY, OCTOBER 1998



PlexWriter 8/20 & PlexWriter RW 4/2/20

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WRITE RELIABILITY

HUGE 4MB  
BUFFER

ALSO A GREAT  
CD-ROM READER  
(20X MAX/170 ms)

8X CD  
RECORDABLE

TWICE AS  
FAST AS  
4X RECORDER

PROVEN MEDIA  
COMPATIBILITY

ARCHIVE 74 MIN  
DATA IN < 10 MIN

PLEXWRITER 8/20  
CD-RECORDABLE DRIVE

BACK UP 650 MB  
DATA IN < 20 MIN

2X CD-  
REWRITABLE

TWICE AS FAST  
AS 2X  
RECORDERS

FAST SCSI  
10MB BURSTS

ALSO A GREAT  
CD-ROM READER  
(20X MAX/170 ms)

4X CD-  
RECORDABLE

PROVEN MEDIA  
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PLEXWRITER RW 4/2/20  
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The PlexWriter 8/20 CD-R. Available late November 1998.

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Fast SCSI burst rates and a 2MB buffer ensure read-and-write accuracy every time. Fool-proof media recognition automatically adjusts power and burn time—so you can write without failure. And bundled software supports CD to CD-R direct duping, digital audio capture/playback and HDD recovery from bootable CD.

The PlexWriter RW 4/2/20. Available after January 1, 1999.



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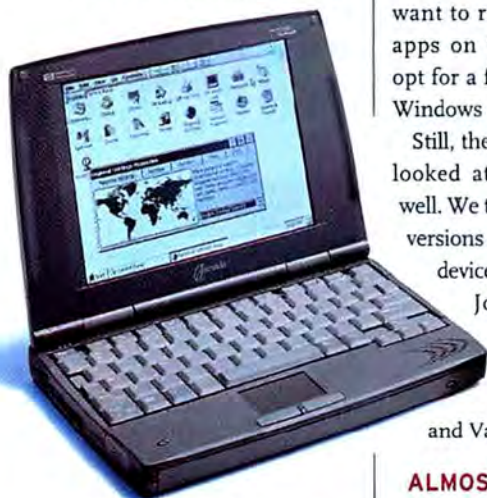
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## CE Pro Portables: Bigger Than a PDA, Smaller Than a Notebook



WHAT LOOKS and acts like a notebook PC but isn't one? Any of a new class of devices based on Windows CE Pro, the latest version of the Windows CE operating system.



The devices (code-named Jupiter) borrow capabilities from personal digital assistants and notebooks. Consequently, CE Pro products offer full notebook-size screens and usable keyboards in a package that weighs about 3 pounds, lasts 8 to 10 hours or more on a single battery charge, and costs less than \$1000.

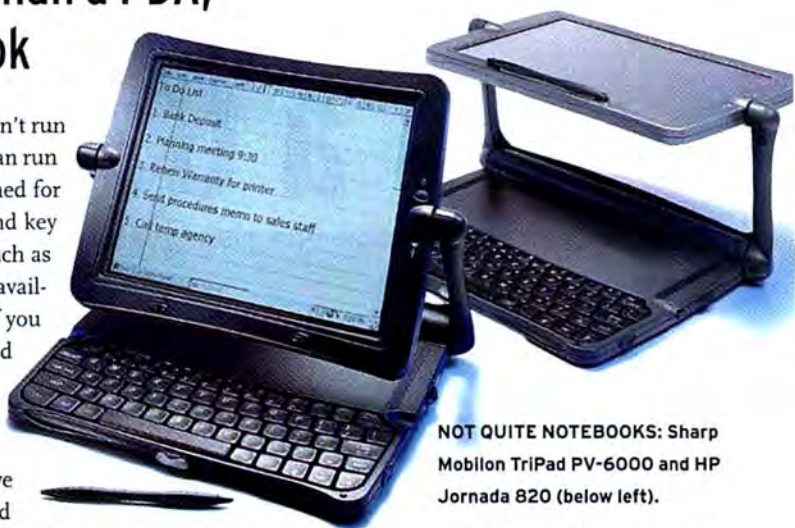
But these devices can't run Windows apps; they can run only programs designed for the miniature OS. And key business packages, such as Lotus Notes, are not available for CE Pro. So if you want to run standard apps on the road, opt for a full-blown Windows notebook.

Still, the products we looked at performed well. We tested preproduction versions of four \$999 CE Pro devices: Hewlett-Packard's Jornada 820, NEC's MobilePro 800, Sharp's Mobilon TriPad PV-6000, and Vadem's Clio.

### ALMOST A NOTEBOOK

ALL FOUR MACHINES have small, dual-scan color displays—adequate for most apps, except for fancy presentations. The keyboards, slightly smaller than full-size, are fine for touch-typing. If you'd rather scribble notes, three of the products have touch screens.

The devices are driven by RISC processors, which are



**NOT QUITE NOTEBOOKS:** Sharp Mobilon TriPad PV-6000 and HP Jornada 820 (below left).

smaller, lighter, and consume less power than conventional CPUs. The products did well in our tests, even on the most demanding CE Pro programs, such as Pocket PowerPoint. In an informal battery test running one application continuously, the Vadem Clio lasted about 9 hours on a single charge. In the same test, a Pentium II-266-based Toshiba Satellite 4015 CDS, a midrange notebook with an average-rated battery life, lasted about 4 hours. (Vadem claims a 12-hour battery life in normal use.) In addition, because the CE Pro OS resides in ROM, no boot-up is required; the devices turn on

and off at the flick of a switch.

However, CE Pro devices have little built-in storage: Instead of using hard drives, they keep data and programs in RAM. (The RAM is continuously powered by batteries, so it retains your data when the devices are turned off.) The units we looked at come with 16MB to 32MB of RAM. You can store additional data on PC Cards or CompactFlash cards. Still, CE Pro devices can't use floppy or CD-ROM drives. You must download apps from a desktop PC with the included synchronization software.

### SOFTWARE TRADE-OFFS

WHILE THE DEVICES can't run Windows programs, software is by no means scarce. CE Pro notebooks are bundled with the same Pocket apps offered in previous versions of CE: Word, Excel, PowerPoint, Outlook, and Internet Explorer. A key new addition is Pocket Access. Each device also had apps for faxing and other tasks.

Furthermore, CE Pro offers other new capabilities. It is the first version that lets Pocket Word and Excel read and ▶

### \$999 CE PRO NOTEBOOKS

### FEATURES

## Cheap, Light, Long-Lasting—but They Don't Run Windows

NOTEBOOK	Dimensions (inches)/weight (with battery)	Screen size/type/resolution	RAM (MB)	Modem speed (kbps)	PC World InfoNet number
Hewlett-Packard Jornada 820 800/443-1254 www.hp.com	9.7 x 7.0 x 1.3/ 2.5 pounds	8.2-inch/dual-scan/ 640 x 480	16	56	763
NEC MobilePro 800 888/863-2669 www.nec-computers.com	9.6 x 7.5 x 1.1/ 2.5 pounds	9.4-inch/touch screen/ 800 x 600	32	56	764
Sharp Mobilon TriPad PV-6000 800/237-4277 www.sharp-usa.com	11.4 x 8.8 x .96/ 3.2 pounds	9.4-inch/touch screen/ 640 x 480	16	33.6	765
Vadem Clio 888/468-2336 www.vadem.com	11.4 x 8.8 x .96/ 3.2 pounds	9.4-inch/touch screen/ 640 x 480	16	33.6	766



It's your client.  
Forgot his number?  
Just say his name  
and let Voice  
Command do  
the dialing.

It's your mother.  
Using Caller ID\*, it can  
identify her and deliver  
a personalized promise  
to call more often.

It's your main man.  
And he has seats for  
the game. Set Caller  
ID Announce to say  
his name out loud.

It's Scruffy.  
Time for his walk.  
So use the 900 MHz  
cordless handset  
to return calls from  
the backyard.

It's crazy.  
Don't worry, Microsoft  
Call Manager has been  
tracking and prioritizing  
your calls.



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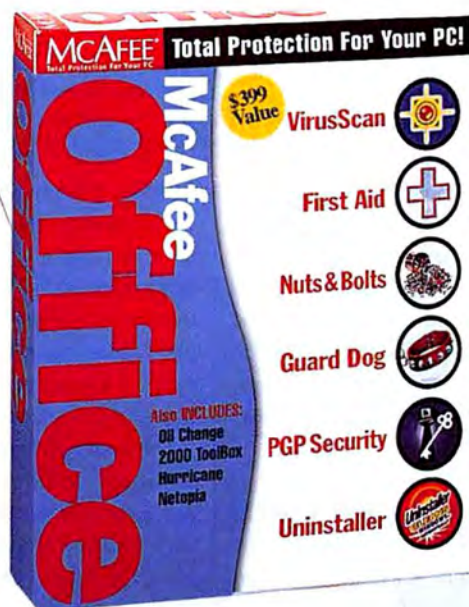




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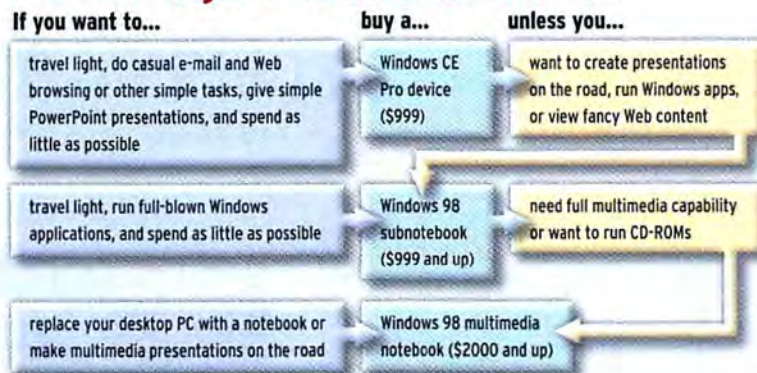
write directly to standard Office formats, a feature that performed flawlessly in our tests. (Previously, you had to first convert the document to Pocket format on a PC.) As before, however, you may lose some formatting that the Pocket editions of these apps don't support.

You can run simple PowerPoint presentations and even annotate and edit slides. But you can't create presentations in Pocket PowerPoint or run ones with multimedia enhancements, such as video. Also, Pocket Internet Explorer can't run Java applets, common on many Web sites.

## A CLOSE-UP LOOK

OF THE DEVICES we looked at, the HP Jornada 820 was the most like a notebook and even

## Pick the Right Portable for the Job



includes a touchpad pointing device. Its crisp, bright 8.2-inch display makes a great first impression, and its keyboard is the best of the bunch. Weighing in at 2.5 pounds with battery, the Jornada is among the lightest of the group.

The Sharp Mobilon TriPad PV-6000 and the Vadem Clio are the same machine sold under different labels. Their unusual design consists of a

9.4-inch touch-screen display that tilts for different viewing angles. It even lies flat on the keyboard for use as a writing tablet. Tipping the scale at 3.2 pounds, the TriPad PV-600 and Clio are larger and heavier than the Jornada.

The 2.5-pound NEC Mobile-Pro 800 will be the first CE Pro device with an 800 by 600 SVGA display and with support for more than 256

colors. The 9.4-inch 65,536-color touch screen looked brighter than the other devices' touch screens, rivaling the Jornada for brightness and clarity.

CE Pro devices represent the next wave in mobile computing. Their numbers will swell as more vendors introduce products later this year. Should you ride the wave? The

answer depends on your needs. If you want an inexpensive, light device with a decent keyboard and a full-size screen for simple tasks—like checking e-mail, Web browsing, basic presentations, or light editing of Office documents—check out a CE Pro machine. But if you want to take Windows 98 on the road, fork out the cash for a real notebook.

—Yardena Arar ►

## Big Jobs, Small Budget? Real Notebooks for Under \$1000

IF YOUR NOTEBOOK budget is small but you need to run Windows applications, you can now buy a new Windows 98 notebook for \$999.

We looked at two new laptops debuting at that price: Mag Portables' TinyNote 200TNS-01 and WinBook's XL 233. Not surprisingly, they were among the slowest Win 98

notebooks we've seen, and neither comes with a modem. But when we tested slightly more expensive versions with additional RAM, the scores improved. Our advice: Con-

sider spending \$150 to \$200 extra for upgrades that have more RAM and other enhancements.



The TinyNote is about the size of a CE Pro device and includes a decent 8-inch dual-scan screen and a keyboard that's easy to type on. It even comes with an eraserhead pointing device, uncommon on a low-priced portable. But the TinyNote weighs over 5.5 pounds, despite its small size. And with its Cyrix MediaGX-200 CPU, 16MB of RAM, and no secondary cache, performance was, well, tiny: Its PC WorldBench 98 score of 55 was the

second lowest we've seen on a notebook PC since the benchmark was introduced. For \$150 more, you can add 16MB of RAM and an internal 56-kbps modem. The extra RAM boosted the TinyNote's PC WorldBench score almost 20 percent—to a still-meager 65.

### NO WIN FOR WINBOOK

THE WINBOOK XL 233 boasts a Pentium MMX-233 processor and a 256KB secondary cache. It outperformed the TinyNote, but with only 16MB of RAM, it's no road racer. The WinBook's WorldBench score of 76 was more on a par with test results of the few PMMX-166s we've reviewed. A \$1199 model with 32MB of RAM and a larger hard disk earned a respectable 108,

comparable to scores of similarly configured PMMX-233 notebooks. Still, there are other handicaps: The WinBook XL weighs over 8.5 pounds, and its 12.1-inch dual-scan screen looked hazy in our tests.

We can't recommend either of these laptops in their sub-\$1000 configuration. If you can wait until spring, though, notebooks based on new chips such as the mobile Celeron-266 and -300 should arrive. You may have to pay \$1200 or so, but you'll be happy you waited.

•TinyNote 200TNS-01; \$999 street; Mag Portables; 800/533-7515; [www.magportables.com](http://www.magportables.com)

PC WORLD INFONET NO. 768

•XL 233; \$999 street; WinBook; 800/725-3470; [www.winbook.com](http://www.winbook.com)

PC WORLD INFONET NO. 769



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## Latest WordPerfect Suite Boasts Microsoft Office Compatibility for Less

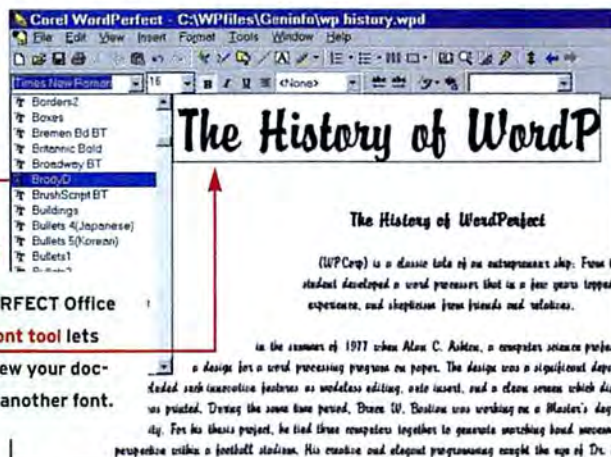
### PREVIEW

IT'S MICROSOFT Office's world—WordPerfect just lives in it. That's the humbling but realistic admission that Corel will make with the next version of its office suite. And no wonder: According to the latest market studies conducted by Dataquest, eight out of ten suite buyers now choose Microsoft Office (see "WordPerfect Hangs On").

On the basis of such grim statistics, WordPerfect Office 2000 (the new suite's name) will not try to match Microsoft Office 2000 feature for feature when the rival suites debut in the coming months (both packages are expected to ship in the spring of 1999). Instead, Corel says, it will concentrate on low-key but practical improvements that speed up common tasks and make existing features easier to use. And in a nod to market realities, the new version will help users collaborate smoothly with co-workers, clients, and friends who use Microsoft Office. Judging from

our preview of an early version of the suite at Corel's Ottawa headquarters, the refinements could keep content-

easier and more accurate. For example, let's say an Excel file you're importing contains formatting that Quattro Pro does



**WORDPERFECT Office 2000's font tool lets you preview your document in another font.**

ed WordPerfect fans happy and dissuade wavering ones from jumping ship.

### PARLEZ-VOUS MICROSOFT?

GIVEN MS OFFICE's market dominance, its file formats are becoming a computing lingua franca. That's why Corel is working hard to make importing and exporting files between WordPerfect and Word, Quattro Pro and Excel, and Presentations and PowerPoint

not support. The new version of Quattro may be able to silently preserve the formatting so it can be reinstated when the file is exported back to MS Office. Corel will also add basic support for Visual Basic for Applications, MS Office's scripting language. (The suite's existing scripting tool, PerfectScript, will remain intact.) The Corel suite's own file formats, except for Quattro Pro's, won't change. Quattro Pro needs updating to ensure that

it is compatible with large Excel workbooks.

The gotcha: MS Office 2000 will support alternative file formats that meld HTML and XML; documents saved in those formats will supposedly keep their formatting, whether they're opened in an MS

Office app or a Web browser. But until Corel adds support for these new file formats—which it will eventually—folks who buy its office suite can't use them. At least they'll have company: MS Office users who don't upgrade to Office 2000 face the same dilemma.

### SO WHAT ELSE IS NEW?

IN ADDITION to making WordPerfect Office 2000 more compatible with MS Office 2000, Corel is introducing a bunch of small improvements (see "WordPerfect Office 2000's New Features"). Some of these will appear in multiple applications. To access a real-time preview of formatting changes, for example, you just hover the mouse pointer over a selection on the font list; your document will temporarily adopt that font. An autoscroll feature, like a software version of the thumb-wheel on Microsoft's IntelliMouse, will let you zip through documents with a minimum of mousework. And as in MS Office 2000, an install-as-you-go option will allow you to start with a minimal installation of the suite and add features on the fly.

In the realm of Web capabilities, Corel is adding an existing third-party product to the suite: Trellix Corporation's Trellix, a well-regarded Web publishing tool that automates the task of turning business documents into easy-to-navigate Web sites. At press time, Corel could provide only rough details of how Trellix will be integrated; it will probably be able to read WordPerfect documents, apply formatting and navigational controls, then convert the documents into HTML files for posting on ►

### APPLICATIONS

### FEATURES

## WordPerfect Office 2000's New Features

APPLICATION	What's Inside
CorelCentral	Streamlined interface with faster performance; outline-like to-do list with subtasks; better search tools; improved PalmPilot support; alarms sound even if CorelCentral isn't running.
Paradox	New database templates for business and home applications; more step-by-step help; allows publishing of dynamic tables to Web; more file exporting options.
Presentations	More features readily accessible from toolbars, additional drawing tools, exporting to PowerPoint format, improved Web publishing abilities.
Quattro Pro	Improved cross-tab feature, with drag-and-drop data pivoting; collaborative review and editing features; data-mining tools; better Web publishing; more space-efficient file format.
WordPerfect	Real-time preview of fonts and other formatting; browsing through tables, footnotes, or other elements with a single click; integration with Trellix for Web publishing; support for XML editing.





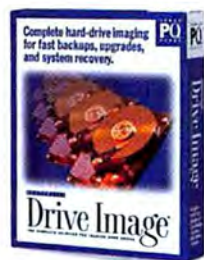
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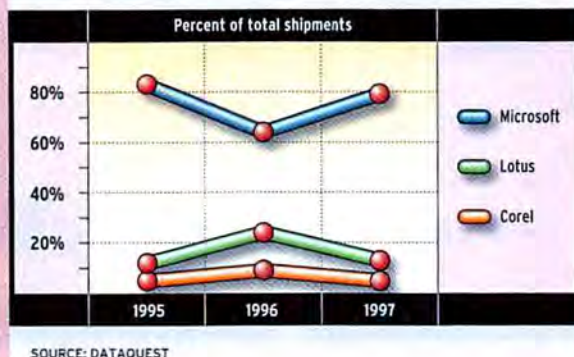
the Web or on an intranet.

But while it's hello Trellox, it's good-bye Netscape Communicator: The Netscape browser suite, integrated into WordPerfect Suite 8, won't be back in the new version. Instead, Corel will strive to make its suite work well with whatever Web browser and e-mail apps you own. Since both Communicator and Internet Explorer are free and most users have a favorite, this arrangement makes perfect sense.

Like its predecessor, WordPerfect Office 2000 will offer integrated voice recognition—something that Microsoft does not plan to add to its new suite. Corel's upgrade will use version 3.0 of Dragon Systems' technology, and it may add voice recognition to some other suite features, such as Presentations' outliner mode. The speech features will be included in the suite's Professional Edition but will cost extra if you buy the Standard version.

## WordPerfect Hangs On

COREL'S OFFICE SUITE still straggles behind Microsoft's Office and Lotus's 1-2-3 in market share.



Corel is still trying to attract budget-conscious shoppers by keeping its prices low. Both Corel and Microsoft say upgrade prices will be comparable to current pricing. WordPerfect Suite 8 starts at \$89 for a competitive upgrade to the Standard Edition; in contrast, a competitive upgrade to Microsoft Office 97 Standard sets you back \$249.

### COREL'S FATE

BUT FEATURE SETS and prices aside, one other buying consideration looms large: For the last couple years, Corel has racked up a string of unprofitable quarters; suffered a serious decline in its stock price; and stretched its resources increasingly thin, on everything from network computers to CD-ROM games. As a result,

WordPerfect users have had cause to wonder about the company's stability.

But Corel is back on track, believes Duncan Stewart, an analyst at Tera Capital, a Toronto investment company. "They've focused and cut ridiculous amounts of spending.... Their fiscal problem is over." Jeffrey Tarter, editor of industry newsletter *Sofletter*, is also guardedly upbeat. "Corel has a strong value proposition," he says. "WordPerfect Suite is a reasonable package, and reasonable people can buy it."

But some buyers may have an ulterior motive for choosing WordPerfect over Microsoft's Office. "A lot of people just don't want to use Microsoft products," says Stewart. For this vocal minority, the overarching virtue of WordPerfect may be simply that Bill Gates has nothing to do with it. And that's one feature Microsoft's new suite won't deliver.

—Harry McCracken

## IE 5: Looks the Same, Works Better



MICROSOFT'S second public beta release of IE 5 has hit the Net ([www.microsoft.com/windows/ie/default.htm](http://www.microsoft.com/windows/ie/default.htm)), and, at first glance, you'd be hard put to tell it from IE 4.x. But look a little deeper, and you'll discover a host of convenient new features. Some of these design tweaks, such as simpler off-line browsing and a new, improved AutoComplete feature, make browsing easier. Others, including revamped

search tools, more customizable toolbars, and a spam filter, make Internet Explorer more powerful than ever.

But while Microsoft calls its latest Web browser Internet Explorer 5, I'd prefer to think of it as Internet Explorer 4.5. The new version does not represent the same revolutionary leap that IE 4.0 (and its controversial integration with Windows' desktop) made over IE 3.x. IE 5's improved searching and navigation tools make it what

IE 4.x should have been. Exciting as some of the new features may be, however, many are still half-baked, as if the developers had a brilliant idea and then ran out of energy before carrying it out.

### SEARCHING FOR A REASON

BY FAR THE best new feature is the overhauled Search bar. Type your query into the search field, and IE 5 will send it to any of nine search engines. Can't find what you're looking for in the list of matches from AltaVista? Just click the Next button above the

search results to see the results from Lycos, then HotBot, and so on. The Search bar is smart enough to assign different search types to the appropriate sites: E-mail searches are sent to Internet directories, requests for maps go to mapping sites, and so on. You can also query Microsoft's Encarta encyclopedia for free.

Microsoft has also substantially revamped the AutoComplete tool, which saves you keystrokes by filling in partially typed Web addresses. When I first saw a demonstration of the new AutoComplete capabilities, I thought I was in typist heaven. Unlike IE 4.x, which suggests matches from a list of recently visited





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sites, IE 5's AutoComplete tool draws on the Favorites and History lists, and presents its findings in a drop-down list of possible matches. You needn't leave the keyboard to browse that roster—just press your down arrow and scroll through the matches. AutoComplete is also smart enough to let you skip the “www” and just start typing the domain name. You can even assign short-hand names to sites in your Favorites list—“pcw” for www.pcworld.com, for example—to avoid the hassle of opening the Favorites bar and drilling down through your folders to find the site you want.

### THE PASSWORD IS...

AUTOCOMPLETE can also kick in when you're filling in Web forms—it'll insert your name and password, for instance, at sites you visit frequently. And the tool's memory isn't limited to a single session. One day I was searching from Alta Vista; the next day, when I returned and clicked the Search field, I got a list of the previous day's queries.

With version 5, Internet Explorer's toolbars are finally customizable, letting you add the buttons you want and remove those you don't.

There are also two new buttons: A Go icon next to the Address field (for users who forget to press <Enter> after an address—others can disable it); and a Folders button, which launches a tree view of your local system in the left-hand “Explorer Bar.” Another nice toolbar tweak: If you resize the toolbar so that it

is too small to display its entire contents, you get a drop-down menu that features all the items you can't see.

Exciting as the new features are, many are half-baked, as if the developers ran out of energy before carrying out a good idea.

### NOW THE BAD NEWS

IN OTHER AREAS, good ideas are sabotaged by poor execution. For example, Microsoft has tried to make it easier to

As dialog box. But if you want to save several layers of a Web site, you need to first add that site to your Favorites list, then

select *Organize Favorites*, click the site's icon, and choose the option to make it available offline. Few users would think of going through the Favorites menu for a one-time download, but that's the only way Microsoft will let you do it.

Similarly, while Outlook Express now includes a Junk Mail filter, it's confusing to use: A poorly labeled detector slide allows you to “Catch

whose To field doesn't contain your e-mail address—a handy antispam technique.

### LINGERING ANNOYANCE

WHILE THE improved search tools are nice, they have one glaring deficiency: You can't add a search engine to Microsoft's default list of nine. When we asked Microsoft about this flaw, the company advised us to use the free IE PowerToys utility (available from PC World Online at [www.fileworld.com/magazine](http://www.fileworld.com/magazine)), which will let you add any search engine you want. Too bad Microsoft did not include this in IE itself.

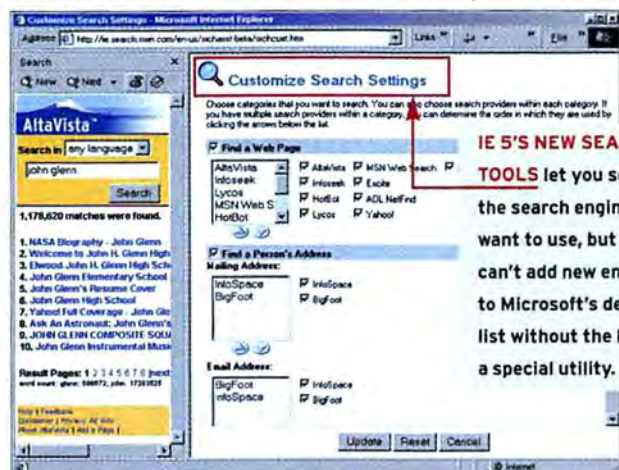
Another disappointing omission from the Search palette is Windows' own Find tool.

With all the talk of integration with the operating system, you'd expect IE to let you search your own hard drive from within the same interface. When you browse through local folders from within IE, though, you don't have

quick access to your local Favorites or History folders; the only way to get to them is by typing their locations into the Address box.

In short, Internet Explorer 5 offers terrific new tools as well as some lingering annoyances. Netscape's Navigator 4.5 is no match for IE 5, but nobody knows yet what Netscape's Communicator 5, whose beta version is due to arrive by the time you read this, is hiding up its sleeve. Netscape could be waiting to see what IE 5 looks like so it can include similar functionality in the next generation of its flagship browser. Netscape and IE users should stay tuned.

—Yael Li-Ron ►



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Web pages for offline reading. And, indeed, saving an entire Web page, complete with its images, is a relatively intuitive matter of using the File•Save

Less” or “Catch More,” but it fails to explain what those options entail. The program comes with several filtering options, but it doesn't permit you to block all the messages



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## Net Porn Law: Help for Kids, Pain for Business

### ANALYSIS

RICK GROMAN has spent almost four years creating a profitable Web site for West Stock, his 22-year-old stock photography service. But all of his efforts may come to nothing: A new federal antismut law could put his and thousands of other mainstream Web businesses out of business. At least, that's the contention.

Like many sites that include some controversial material, West Stock ([www.weststock.com](http://www.weststock.com)) is not in the pornography business. The company licenses 40,000 stock photos to graphics professionals. But because West Stock's inventory contains some photographs of scantily clad women that could be viewed as "harmful to minors," the site may need an expensive, time-consuming overhaul to restrict access to these pictures.

The law in question is the Child Online Protection Act, which was passed at the close of the last congressional session in October.

COPA, also referred to as the Communications Decency Act II, has a noble aim: to shield minors from sexually explicit content on the Web by requiring commercial sites to limit access to such material to individuals who are 18 years of age or older. Business owners who fail to comply with the new law can be fined as much as \$50,000 a day and receive a jail term of up to six months.

Groman is one of 30 plaintiffs in a challenge to the new law that's been filed by the American Civil Liberties Union and other civil rights groups.

### ONUS IS ON SITES

REQUIRING Web sites with "harmful" content to limit access to adult visitors puts an unreasonable onus on content providers, says Chris Hansen, senior staff counsel for the ACLU. It also infringes on the First Amendment rights of both Web site owners and their adult audiences.

The bill's opponents say its vague terminology, particularly in defining what's harmful, means that it could affect thousands of Web-based businesses, from bookstores to health sites to online news media.

## Congress Tackles the Net

A quick look at three new laws and a proposed piece of legislation:

■ **NO SALES TAX:** Provides tax-free shopping on the Web for the next three years.

■ **CHILD PRIVACY PROTECTION:** Web sites must obtain a parent's

approval before collecting personal information from children.

■ **ANTIPIRACY:** Protects software and other data stored on the Net.

■ **SPAM PREVENTION:** Stay tuned for ongoing discussions when Congress reconvenes this month.

Like West Stock, these businesses have two ways to avoid prosecution: They can scrutinize every item on their sites and remove "offensive" material, thereby practicing self-censorship and risking a loss of business. Or they can add expensive verification measures that identify a visitor's name and age. This option may be unfeasible, considering that few online businesses turn a profit.

engaged in commercial distribution of material that's harmful to minors, then [adding verification measures] is simply a cost of doing business."

### INEFFECTIVE TO BOOT?

CRITICS ALSO NOTE that the law may be ineffective because it doesn't affect key sources of controversial content, such as newsgroups, chat rooms, or Web sites that originate out-

side the United States. And because the Act covers only commercial Web sites, the same material that might be blocked on a for-profit site would still be freely accessible on a Web site sponsored by a nonprofit organization.

Although COPA was scheduled to take effect at the end of November, enforcement will likely be put on hold pending resolution of the legal challenge. The ACLU's Hansen says the new law has the same flaws as its predecessor, the Communications Decency Act. "The CDA was struck down largely because it would have prevented adults from having access to material that adults are entitled to," says Hansen. "The exact same thing is true of this act." Legislative aide Crane argues that COPA addresses all of the Supreme Court's objections to the original CDA and says the new law will survive the challenge.

As with the CDA, the Supreme Court will make the final call. Until then, some Web businesses will be waiting and worrying.

—Roberta Furger ■







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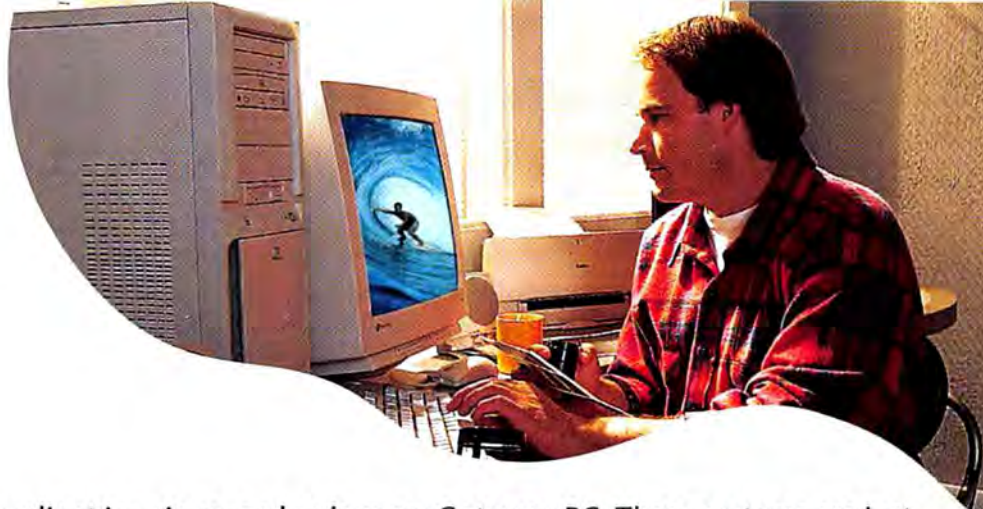
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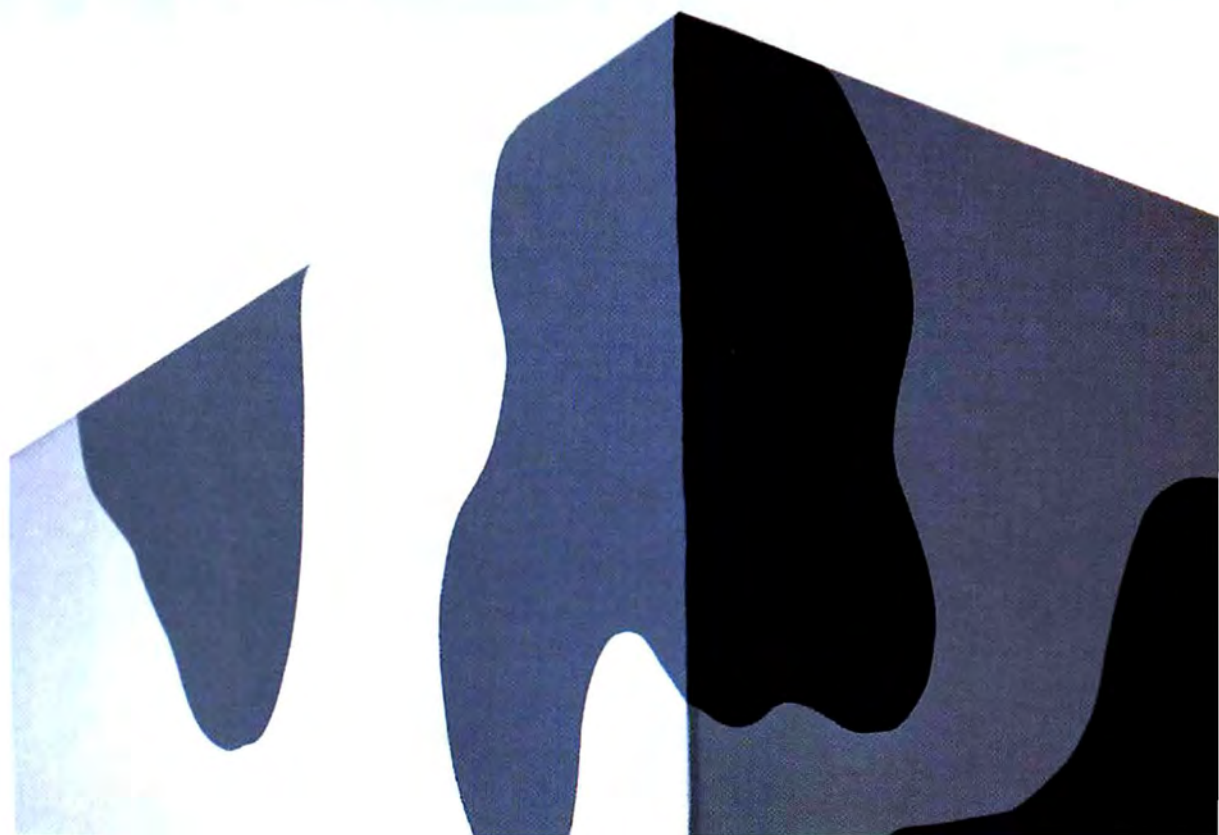
Let's talk about your



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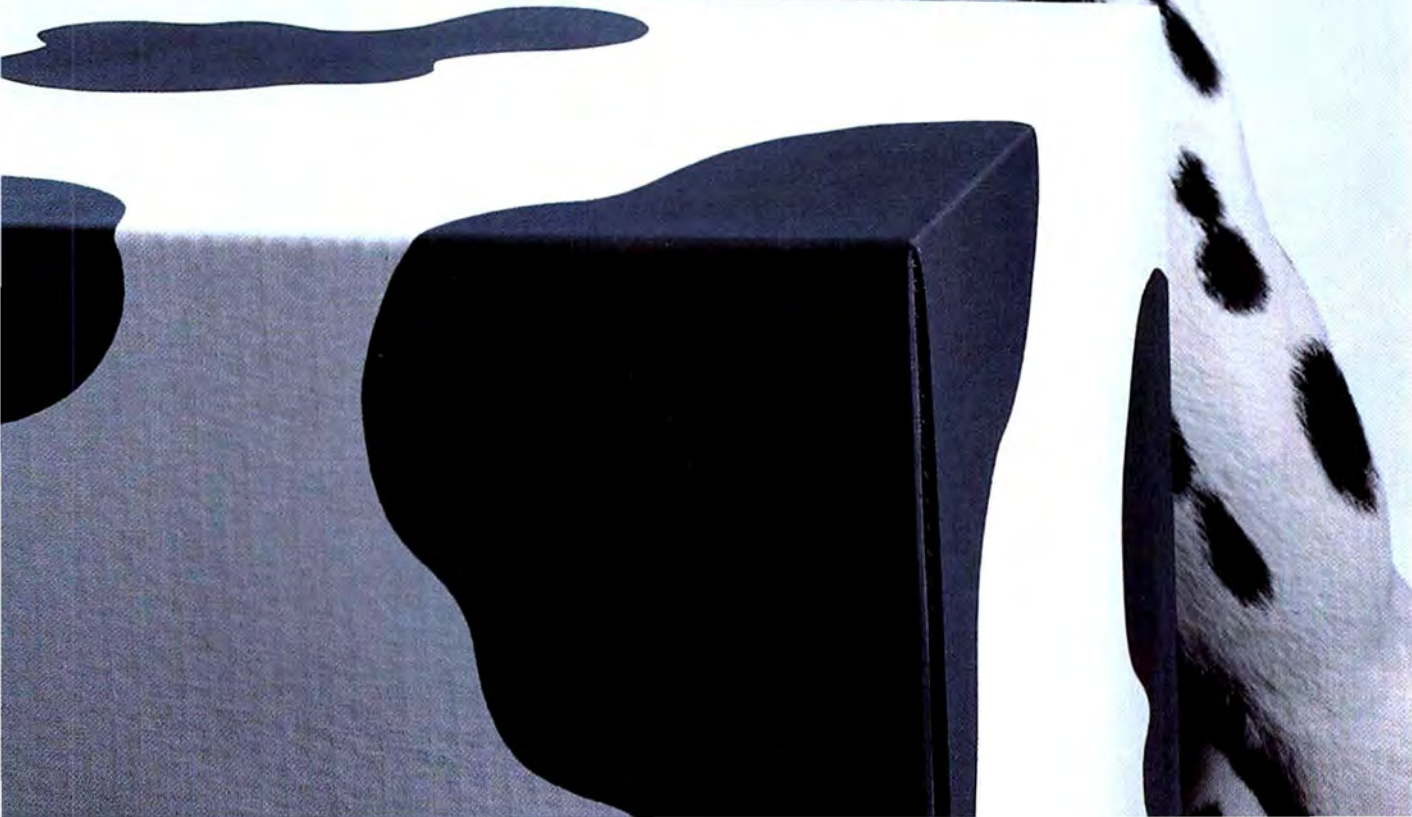
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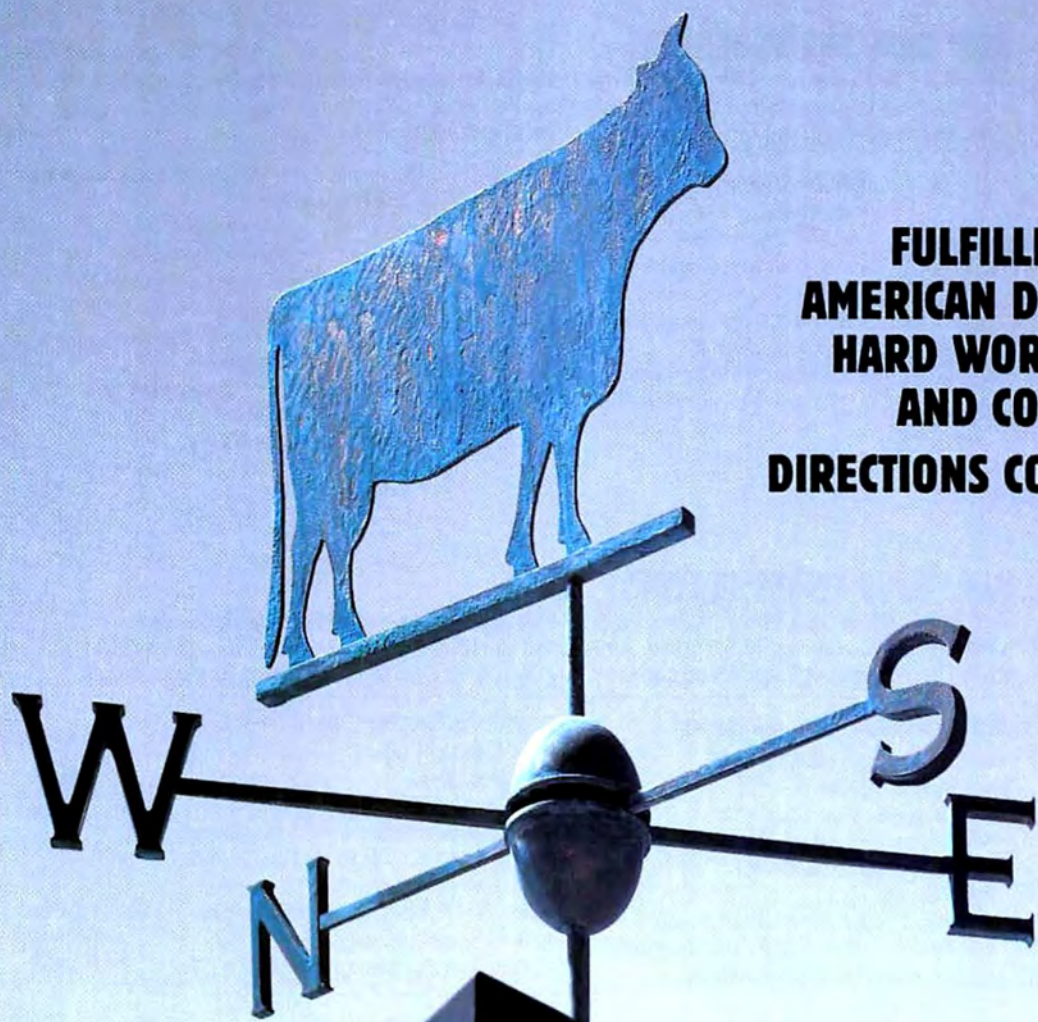
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- EV700 17" Color Monitor (15.9" viewable)
- 16MB AGP Graphics
- 10GB ATA Hard Drive
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- MS Office 97, Small Business Edition plus Bookshelf 98

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# NEW PRODUCTS

## Sharp and Xerox Pack Big Copier-Printer Quality Into Desktop Boxes



BIGGER THAN A BREAD BOX, but a lot smaller than the huge stand-alone alternatives—and these machines can laser print, too.

### COPIER-PRINTERS

I'VE ALWAYS thought it would be incredibly useful to have a copier right by my desk, but my small office doesn't have the room or the budget for both a big, bulky photocopier and a printer. Now Sharp and Xerox feed my need with products that work as copiers—even when the PC is turned off—and as laser printers, too.

I was impressed by shipping versions of Xerox's \$600 **Document WorkCentre XE80** digital copier-printer and Sharp's \$699 **AL-1010** digital copier with a \$100 printer upgrade kit installed. (The \$800 **AL-1041**, which should be shipping by the time you read this, is iden-

tical, except the printer upgrade comes preinstalled for out-of-the-box copying and printing.) To make copies with traditional multifunction devices, you must turn on the PC to run their scanners, which are usually sheet-fed; these devices do digital, glass-platen monochrome copying, like larger, stand-alone copiers.

### LOOK SHARP

UNLIKE SHEET-FED multifunction machines, which can process only one sheet at a time, the Sharp **AL-1010**'s glass platen lets you copy thick or odd-size pages, and its Scan Once Print Many capability allows it to make multiple

copies much faster than units that must rescan for each copy. Digital copying also offers the advantage of sharper output—a feature that until now could only be found on high-end corporate copiers.

The **AL-1010**—11.5 by 19.5 by 17.5 inches—looks bulkier than a simple printer because the output tray is cradled in the center of the block, so pages don't spew out onto your desktop. Controls resemble those on conventional copiers, complete with a big, green copy button and clear markers for enlarging, reducing, and adjusting brightness.

The **AL-1010** quietly produces a sharp, detailed dupli-

cate in about 5 to 10 seconds. Printing is as simple as on most laser printers, though a bit slower: Despite a rated speed of 8 pages per minute for text, the unit I tested took almost 30 seconds to print a full-size gray-scale photo and only slightly less time for a page of text. The text looked nearly perfect, but photos showed banding.

Additional gripes: The Sharp's printed and on-screen documentation is mediocre, and the unit seems overpriced. For the same \$799, you can buy a stand-alone copier and a faster printer such as Minolta's **PageWorks 8L** (see *Top 10 Printers*, page 221). On the positive side, the **AL-1010** comes with a three-year limited warranty, a roomy 250-sheet input tray, and the ability to handle documents as large as 10 by 14 inches.

### XEROX THIS

XEROX's **WorkCentre XE80** copier-printer is based on Sharp's proprietary engine. Like the **AL-1010**, it comes with a 250-sheet paper tray and a three-year warranty. Printing speeds and output quality were also nearly identical. The Xerox's documentation wasn't much better than the Sharp's, either: a single, small manual with no index.

But the Xerox costs less: Its \$600 price includes the laser printer and the digital, glass-



**Sharp AL-1010**

**PRO:** Easy-to-use desktop digital laser copier-printer.

**CON:** A tad expensive, photos show banding, needs upgrade kit to print.

**VALUE:** Useful SOHO device with printer upgrade (or get the AL-1041 with printer upgrade preinstalled).

Street price: copier \$699, printer upgrade \$100

**Sharp Electronics**

www.sharp-usa.com

800/237-4277

PC WORLD INFONET NO. 742

platen copier—\$200 less than you pay for the comparable Sharp. Xerox's software also offers options Sharp's doesn't, including image shifting, dith-

**Xerox Document WorkCentre XE80**

**PRO:** Quality and most features similar to those of the Sharp with printer upgrade, but at a lower price.

**CON:** Flimsy paper tray, separate scans required for multiple copies.

**VALUE:** If you don't need fast multiple copies, get this model and save. Street price: \$600

**Xerox**

www.xerox.com

800/832-6979

PC WORLD INFONET NO. 743

ering, and a setting to improve the way color images appear in the unit's monochrome output. The Xerox looks smaller than the Sharp until you extend

its winglike paper trays. Then it takes up just as much space.

My biggest complaints: Unlike the Sharp, the Xerox must perform a separate, time-consuming scan for each copy of a document. Printed pages land in the output tray face up, and thus out of order (you can, however, remedy this problem via the software). The output tray is flimsy and jam-prone.

If you frequently print several copies of originals, and have the money, spring for the Sharp (and get the AL-1041 if you want to print and copy). Otherwise, the Xerox will do the trick for less money.

—Karen Silver

- 70** Sharp AL-1010, Xerox Document WorkCentre XE80 digital copier-printers
- 71** Compaq Prosignia Desktop 330
- 72** IBM ThinkPad I Series 1450 notebook; Royal DaVinci PDA
- 74** Adobe ImageStyler 1.0 graphics software, Mitsubishi Diamond Pro 900u CRT monitor
- 76** Network Associates PGP for Personal Privacy 6.0; Logitech SoundMan speakers
- 77** PrintMaster Platinum 7.0, Publish It 3.03 desktop publishing software; Enfish Tracker Pro
- 80** Nico Mak WinZip 7.0
- 81** Amquest Small Office/Home Office ComSuite modem-doubling software
- 82** Epson Perfection 636, Plustek OpticPro 9636P+ scanners

## Compaq's Prosignia Line Takes On Dell

### DESKTOP

PC SHOPPERS have rarely looked to Compaq for cutting-edge technology and bargain prices in the same product. But the Compaq **Prosignia Desktop 330** may change that perception. The first in a new line of small-business desktops, notebooks, and servers, this Pentium II midtower delivers solid performance for a very competitive \$2239.

Compaq offers the system with a PII-350, PII-400, or PII-450 CPU. We tested a shipping version of the PII-450, with 128MB of RAM, a 512KB secondary cache, an AGP graphics card with 16MB of RAM, a 16.8GB hard disk, a 12X-40X CD-ROM drive, a 56-kbps modem, and a 17-inch monitor. It comes with Microsoft Office Small Business Edition and Norton AntiVirus.

Our unit's PC WorldBench 98 score of 210 was acceptable



**BUY DIRECT, PLUG IT IN:** Compaq's new Prosignia line offers aggressively priced, ready-to-run systems for small businesses.

but unexceptional—3 percent below the average for seven comparably equipped PCs. (For most business applications, differences of less than 5 percent in WorldBench results are negligible.) But the price is noteworthy: At this writing, you'd pay \$2535, or \$296 more, for a similarly configured Gateway GP6-450.

Prices of other Prosignia systems are equally aggressive. In fact, the line was designed to compete with Dell and Gateway products—and not just in price. While available in stores, the line is the first created primarily for direct sales via Compaq's Web site and toll-free number. Compaq will build to order and offers vari-



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ous support and lease options.

If this Prosignia is an indication, Dell and Gateway have reason for concern. Small businesses that previously thought Compaq overcharged for up-to-the-minute technology should take another look.

—Stan Miastkowski ►

**Prosignia Desktop 330**

**PRO:** Comprehensive cutting-edge package for small businesses.

**CON:** 17-inch monitor small for a high-end system.

**VALUE:** An aggressive initiative from a top-tier vendor.

Street price (as tested): \$2239

**Compaq**

800/345-1518

www.compaq.com

PC WORLD INFONET NO. 744



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



## Big Blue's Budget Notebook

### NOTEBOOK

MOST IBM notebooks cost a bundle. The new ThinkPad 560Z, for example, will set you back a cool \$3799. But with its ThinkPad I Series—the company's first low-cost portable line intended for consumers—Big Blue hopes to shed its reputation for mak-

#### IBM ThinkPad I 1450

**PRO:** Low price, good reliability.

**CON:** Heavy, no modular bay.

**VALUE:** A decent deal, but soon-to-arrive mobile chips will yield even better bargains.

Street price: \$2088

IBM

800/426-2968

[www.pc.ibm.com/us/thinkpad](http://www.pc.ibm.com/us/thinkpad)



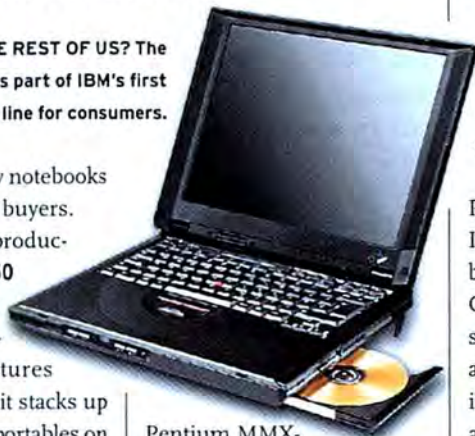
THIS PRODUCT has been evaluated using tests designed by the PC World Test Center.

**IBM NOTES FOR THE REST OF US?** The ThinkPad I 1450 is part of IBM's first low-cost portable line for consumers.

ing only high-brow notebooks for deep-pocketed buyers.

The \$2088 preproduction ThinkPad I 1450 that I looked at seems to be a winner. In price, features and performance, it stacks up well against other portables on our *Top 10 Notebook PCs* chart.

Weighing 8.6 pounds with the AC adapter attached, the ThinkPad I 1450 is a large, heavy notebook with a 13.3-inch active-matrix screen and fixed CD-ROM and floppy drives. Though designed primarily for desktop work, it supplies a good 3 hours of battery life on the road. With its



Pentium MMX-266 processor, 96MB of RAM, and 4.3GB hard drive, the I 1450 chalked up a respectable PC WorldBench 98 score of 118—fast enough to handle basic applications.

Multimedia is this laptop's strong suit: Speakers on either side of the I 1450's crisp display provide good sound—for a notebook, that is. For audio

CD fans, the notebook has handy audio control buttons on its outside case, a small indicator window for CD tracking, and the ability to play music even when the computer is powered off.

For \$500 more, the ThinkPad I 1720 offers a Pentium II-266 CPU and a modular bay to hold a second battery. Or, at the other end of the scale, for \$1499, you can bag a ThinkPad I 1410 with a 12.1-inch screen, 32MB of RAM, and a 3.2GB hard drive.

In most respects, the I 1450 looks and feels like its more expensive siblings. But while IBM quality at budget prices sounds enticing, you might want to wait a few months for new Intel mobile chips, including a low-cost mobile Celeron. They should lower notebook prices even further.

—Vince Bielski

## DaVinci: Pilot-Like PDA for Penny-Pinchers

### PDA

UNLIKE ITS brilliant namesake, Royal's DaVinci is no trailblazer. In fact, this personal digital assistant looks and behaves suspiciously like 3Com's popular PalmPilot. But at \$99—less than half the price of the cheapest Palm—DaVinci is the least expensive full-fledged PDA yet.

Like the PalmPilot, it's a pen-based device with an easy-to-use address book, calendar, memo pad, and calculator. It includes a docking station and desktop software for entering, editing, and viewing data on the PDA or your PC. You get only 256KB of memory (Palms have 1MB to 2MB), but that



**UNUSUAL ACCESSORY:** Royal's DaVinci PDA offers a folding minikeyboard as a \$20 option.

can store hundreds of entries.

However, screen glare on my shipping unit sometimes made the display tough to read, and DaVinci Script—a knockoff of the PalmPilot's

Graffiti handwriting-recognition system—isn't exactly intuitive. Most irritating, to sync a DaVinci, you have to remove a flimsy plastic door to expose the docking station connector, and replace the door afterward.

For e-mail and faxing, you'll need the \$150 DaVinci

Pro, which also comes with a docking station that has a slot for a PC Card modem, and 1MB of memory. Synchronization software for Outlook, ACT, and other PIMs is al-

ready available, as is a truly original add-on: a \$20 folding minikeyboard small enough to slip in a pocket.

If you covet a Pilot or Windows CE palmtop but can't justify the expense, consider this low-cost, high-value PDA.

—Harry McCracken

#### DaVinci

**PRO:** Full-featured, palm-size PDA at a rock-bottom price.

**CON:** Clunky PC synchronization and handwriting recognition, glare-prone screen.

**VALUE:** No PalmPilot killer, but a bargain.

Street price: \$99

Royal Consumer Business Products

908/526-8200

[www.royal.com](http://www.royal.com)

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## Add Visual Spice to Bland Web Pages

### WEB GRAPHICS

**LET'S FACE IT:** An all-text Web site is a yawner. Adobe's \$129 **ImageStyler 1.0** can give drab pages visual oomph.

Aimed at business users, this graphics enhancement tool works with Web authoring packages like Microsoft FrontPage and Claris HomePage. With a preproduction version of ImageStyler, I created slick, colorful Web graphics without too much fuss.

#### Adobe ImageStyler 1.0

**PRO:** Produces polished, vivid, easy-to-edit Web graphics.

**CON:** Download time information not easily accessible; interface may be a little complex for novices.

**VALUE:** Affordable tool for embellishing Web pages.

Street price: \$129

Adobe Systems

800/685-3663

www.adobe.com

PC WORLD INFONET NO. 715

The program includes a library of shapes and images that you can select from a palette to add to pages. You can apply textures and styles, such as embossing and metallic shine, to objects or to elements such as text. Page elements can be edited independently. If you don't like your work, ImageStyler has 14 levels of undo.

As with most graphics packages, you can line up page elements using precise x and y coordinates, as well as specify color and levels of opacity and distortion. To update your Web graphics quickly, ImageStyler lets you assign graphical "aliases" to a collection of elements; when you change the attributes of one object in the group, all the other objects in the group change as well.

You can also add canned interactive JavaScript effects that change a graphic's ap-

pearance when the pointer moves over, on, or away from it. (Of course, these effects can be seen only in browsers that support JavaScript.) While you can't directly edit HTML pages, you can export graphical elements to any heading tag. You can also copy and paste ImageStyler graphics into other Web design applications; the program supports

.gif, .jpg, .png, and Photoshop (.psd) file formats.

Those unfamiliar with Adobe products may find the palette-based interface tough to master. NetStudio, a \$149 competing application, has a simpler, Word-style interface and makes information on file size and download time easier to locate. But for nifty-looking Web graphics (and a savings of \$20), ImageStyler is well worth considering.

—Grace Aquino



**PALETTES APLENTY:** Adobe's familiar palettes abound in ImageStyler, an affordable program for gussying up Web pages.

## Mitsubishi's Better Flat-Screen CRT

### MONITORS

**FOR PEOPLE WHO** do precise work with graphic images, most flat-faced monitors pose a problem—even though the glass is flat, images on them actually look concave. Mitsubishi's new 19-inch cathode ray tube monitor, the \$799 **Diamond Pro 900u**, corrects the illusion by using a shorter, flatter DiamondTron tube (dubbed Natural Flat), applying a slight curve to the inside of that tube, then predistorting the image to compensate for the concave effect.

A shipping version of the Diamond Pro 900u did splendidly on PC World's standard battery of image quality tests. Colors looked sharply defined and vibrant, thanks in part to DiamondTron stripe-pitch technology, which generally produces brighter images than the more common dot-pitch tubes. More importantly, the edges of both graphics and text looked very straight and about as flat as a sheet of glass. You'll appreciate that accuracy when you rescale photos.

The monitor has an inte-

grated Universal Serial Bus hub with two upstream ports, so you can connect two Win 98 PCs to the monitor at once and switch back and forth if you need the extra screen space. You get three ports for connecting USB peripherals, one of them front-mounted—ideal for a mouse or keyboard.

My only complaint: While the hardware controls let you make precise adjustments, they're difficult to use. You're better off using the supplied USB software, which allows for easy tweaking via a mouse.

While a typical 19-inch monitor costs about \$100 less, the Diamond Pro's superior quality justifies the premium, especially for graphics pros.

—Mick Lockey ▶

#### Mitsubishi Diamond Pro 900u

**PRO:** Flat image edges ideal for detailed graphics work; good colors.

**CON:** On-screen controls are not intuitive; slightly pricey.

**VALUE:** Great for graphics pros.

Street price: \$799

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## PGP 6.0: Pro Crypto Suite Gets Personal

### ENCRYPTION

PRETTY GOOD PRIVACY is the grassroots standard for strong e-mail, file encryption, and digital signatures. PGP for Personal Privacy 6.0, the upgrade to our September Best Buy (see "The Defenders," [www.pcworld.com/sep98/defenders](http://www.pcworld.com/sep98/defenders)) makes PGP friendly enough for users who don't know a cipher key from a house key but are concerned about growing privacy problems. The upgrade's modules (PGPkeys, PGPTools, PGPtray,

each user to make a *keypair*—a personal digital ID consisting of a private key and a public key. You use the private key to make digital signatures or unlock messages sent by others using your public key.

You can configure version 6.0 to require virtually no user intervention beyond a passphrase (which can consist of several words, providing more security than a single password could). I checked out a shipping version.

PGPkeys has an improved



**PGPDISK AFFORDS** military-grade transparent real-time security for virtual partitions of any size.

and assorted plug-ins) offer the same 128-bit encryption as always, but the package is bulked up with power-user tools usually reserved for businesses, and with the welcome addition of PGPdisk, a unique disk encryption tool.

PGP pioneered public key cryptography, which requires

key-generation wizard and a friendly icon bar for managing keys you collect. You can now automate online searches for new pub-

lic keys. Parents can make kids' keys *sign-only*, permitting a child to generate a digital signature to prove he or she sent their own homework, but disallowing secret e-mail correspondence. Parents can also retain the ability to revoke a child's keys if necessary.

PGPTools, the desktop drag-and-drop encryption toolbar, has more secure file and folder deletion. A new Wipe Free Space command exceeds military specs in clearing sensitive file fragments from temporary files or the Recycle Bin.

To secure e-mail, plug-ins add PGP buttons to Eudora; Exchange; and Outlook 97, 98, or Express. (A plug-in for Lotus Notes is due to come out by spring.) You can sign, encrypt, and decrypt text from other applications (AOL,

Microsoft Word, Excel, and so forth) by copying it to the clipboard and using the PGPtray taskbar menu.

The addition of PGPdisk 2.0 alone makes the suite worth the upgrade for anyone with a laptop, nosy kids, or keyboarding pets. The first truly transparent high-security tool, PGPdisk creates encrypted virtual partitions of any size, in which you can store files you wish to secure. These so-called volumes behave exactly like normal drives, working in real time so that you can use the files—even huge audio-video ones—while at the same time keeping them secure.

One major complaint: Network Associates' tech support wasn't great. The techs are smart (if you can reach one), but there's no toll-free number, and the phone menus are confusing and inaccurate. Fortunately, the printed and on-screen documentation gets an A+, with clear explanations of cryptography for new users.

PGP for Personal Privacy 6.0 costs \$40 and, like its recent predecessors, uses the Diffie-Hellmann (DH) key encoding formula. If a friend still runs PGP under DOS, Win 3.x, or UNIX, you can add support for RSA keys for \$20 extra. PGP continues to be trustworthy: All source code is published, so there are no "back doors." The number of

### Little Speakers, Big Sound

IN THE REALM of PC audio quality, the bigger the box, the better the sound you get—usually. Logitech's \$50 **SoundMan** PC speakers don't completely demolish that rule, but they certainly give it a good challenge. Petite (6 by 6 by 2 inches) and light (3.1 pounds including all cables and power cord), these 6-watt speakers can save space on a crowded desktop, or save weight on a road trip when you want something better than notebook speakers for multimedia presentations. SoundMan is the budget member of a speaker line that uses licensed new technology employing neodymium magnets to deliver excellent sonic range; a built-in bass pipe adds depth in the lower registers. (The SoundMan family also includes an upgrade subwoofer, more powerful speakers, and a system with both speakers and subwoofer.) I played a selection of CDs and .wav files using a shipping unit plugged into my PC and a notebook, and found the quality crisp and clear—easily as good as that of bulkier desktop speakers costing as much or more. Logitech, 800/231-7717, [www.logitech.com](http://www.logitech.com).

PC WORLD INFONET NO. 725

—Yardena Arar

PGP public keys is close to 4 million and growing, so you'll find plenty of friends with whom you can exchange private e-mail and files.

—Dave Del Torto ▶



**ENCRYPTION MADE EASY:** PGPTools sits on your desktop, offering quick access to key encryption, management, and other modules.

### PGP for Personal Privacy 6.0

**PRO:** Smooth integration, transparent disk security, strong encryption, excellent documentation.

**CON:** Hard-to-reach tech support, no toll-free number.

**VALUE:** Friendly, low-cost, full-strength personal security toolkit.

Street price: \$40 (RSA capability \$20 extra)

Network Associates

408/988-3832

[www.pgp.com](http://www.pgp.com)

PC WORLD INFONET NO. 720



We hope you're satisfied.





# Well, if you own a

Quantex systems feature the Intel® Pentium® II processor



Today, Quantex is one of the world's largest direct marketers of computer systems, featuring the Intel® Pentium® II processor. And in the last year, Quantex has consistently placed at or near the top in surveys of customer satisfaction and tech support. As well as winning dozens of product rating awards in the most respected publications.

As more businesses and experts say good things about Quantex, you're bound to wonder, "How good can they be?" There's one way to find out.

## WOULD QUANTEX OWNERS BUY AGAIN? IN A HEARTBEAT<sup>1</sup>.

There's no greater expression of satisfaction than customers who return again and again. For Quantex owners, the intent to repurchase is practically a given. After all, when *PC World* asked—based on reliability and service—whether they'd purchase another Quantex system, the answer was a resounding "Yes."

### WOULD YOU BUY AGAIN?

Vendor	Based on Reliability	Based on Service
Micron	★★★★★	★★★★★
<b>Quantex</b>	★★★★★	★★★★
Dell	★★★★★	★★★★
Gateway	★★★★	★★★★
IBM	★★★★	★★★
Compaq	★★★	★★★
HP	★★★	★★★
AST	★★	★★
Acer	★	★

Five star is best possible rating; one star, the worst.  
"PC World Reliability and Service Survey—Home PCs" Nov '98  
\*calculations based on online participants' responses recorded between May 1998 and June 1998

That puts us ahead of some very big names.

## QUANTEX TECH SUPPORT EARNS TOP SCORES FROM THOSE WHO KNOW US BEST—OUR CUSTOMERS.

In the most recent *PC Magazine* study, PC owners rated Quantex a leader for tech support based on their own experiences. For the technical knowledge of our people and the promptness of the resolution, no one beat Quantex. And no one came within 10 points for "tech tried everything to help." Not Dell. Not Micron.

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1997 Direct Channel  
Achievement Award

**PC COMPUTING**  
1997 Most  
Valuable  
Product Award

**PC COMPUTING**  
5 Star Rating  
(11/98)

**PC COMPUTING**  
5 Star Rating  
(10/98)

**PC WORLD**  
Best Buy Award  
(10/98)

**PC WORLD**  
Best Buy Award  
(9/98)

**PC WORLD**  
#1 Best Buy  
Award (8/98)

**PC WORLD**  
#1 Best Buy  
Award (7/98)

<sup>1</sup>Results based on a PC World (Nov '98) "Home PCs Reliability and Service Survey" in which Quantex received a 5-Star rating for Buy Again Based on Reliability and 4-Star rating for Buy Again based on Service. Buy again based on reliability: Five stars: 96.4 to 95.1%; Four stars: 93.2 to 91%; Three stars: 86.4 to 86%; Two stars: 84.4 to 81.5%; One star: 77.9 to 72.5%. Buy again based on service: Five stars: 94.1 to 93.8%; Four stars: 90.4 to 86.1%; Three stars: 82 to 75.6%; Two stars: 73.6 to 70%; One star: 60.3 to 60.1%.



# Quantex PC you are.



Not Gateway. Not IBM. Not Compaq.

Hey, we may not be a household name yet. So we go the extra mile. And our customers notice it.

## QUANTEX SYSTEMS KEEP WINNING. COMPETITION AT A LOSS.

Obviously, it takes a lot more than great support to generate great customer satisfaction. And more than VERY competitive prices. It takes great computers featuring the Intel Pentium® II processor. And Quantex configures them with industry-standard "enhancements" that make Quantex systems regular winners in the "Best Buy" category.

### TECH SUPPORT EXPERIENCE

Vendor	Tech was knowledgeable	Tech tried everything to help	Prompt resolution	Got a run-around
<b>Quantex</b>	<b>57%</b>	<b>59%</b>	<b>49%</b>	<b>9%</b>
Micron	56%	47%	43%	9%
Gateway	54%	48%	45%	10%
Dell	54%	43%	49%	10%
IBM	41%	33%	36%	15%
Compaq	37%	30%	30%	17%
<b>Average*</b>	<b>40%</b>	<b>33%</b>	<b>32%</b>	<b>16%</b>

"Service and Reliability Survey," PC Magazine, July 1998

\* calculations based on all 25 PC vendors evaluated in the survey



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[www.quantex.com/pcworld](http://www.quantex.com/pcworld)

**PC WORLD**  
#1 Best Buy  
Award (6/98)

**WINDOWS  
MAGAZINE**  
WINLIST Award  
(11/98)

**WINDOWS  
MAGAZINE**  
WINLIST Award  
(10/98)

**C|NET ONLINE**  
Editors' Choice  
Award (8/98)

**C|NET ONLINE**  
Editors' Choice  
Award (6/98)

**PC PORTABLES**  
Best Buy Award  
(3/98)

**PC COMPUTING**  
4-star "Torture Test"  
Survivor (4/98)

**PC COMPUTING**  
4-star Rating  
(9/98)

\*Results based on PC Magazine (July '98) "Service and Reliability Survey" in which Quantex received the highest ratings for its customers' "Tech Support Experience" in 4 out of 5 categories including "tech was knowledgeable, tech tried everything to help, prompt resolution and got a run-around." Calculations based on 25 vendors evaluated in the survey.





# Systems with better



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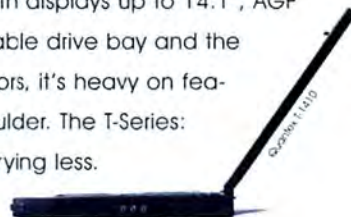
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It's time to stop thinking about notebooks as a compromise between mobility and performance. Quantex presents the T-Series Notebook, full-featured power in a lightweight mobile computing solution. It packs huge performance and flexibility into a lean 1.43", 6.4-pound system, perfect for working on a plane or during an important presentation. With displays up to 14.1", AGP graphics, a single, swappable drive bay and the fastest Pentium® II processors, it's heavy on features but light on your shoulder. The T-Series: start packing more by carrying less.

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- Intel® 740™ 3D 2X AGP Graphics with 8MB SDRAM
- New Intel Pro 10/100 PCI Fast Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
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- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- Quantex ATX Mid Tower Case
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- 8GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 17" Digital Monitor w/OSD & NEC ChromaClear CRT (16.0" viewable, 25 dp, 1600x1200 max resolution)
- Intel® 740™ 3D 2X AGP Graphics with 8MB SDRAM
- New Intel Pro 10/100 PCI Fast Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- 32X Max Variable Speed CD-ROM Drive
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
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- New Intel Pro 10/100 PCI Fast Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- 32X Max Variable Speed CD-ROM Drive
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
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- QEntry Technology (including Intel LANdesk Client Manager V.3.1)
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QP6/400 SB-4(w/ Pentium® II Processor).....\$1899

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- 24X Modular CD-ROM Drive / 3.5" Modular Floppy Drive
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- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- USB and Fast IR Ports / Integrated Personal Touchpad
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- Quantex Carrying Case
- Year 2000 Compatible
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

### Quantex I-1400 \$2199

Business lease: \$77/Mo.

- Pentium® II processor 266MHz
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- 64MB SDRAM / 512KB Secondary Cache
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- New Long-Lasting 12-Cell Smart Lithium Ion Battery
- USB and Fast IR Ports / Integrated Personal Touchpad
- MS Windows 98 / Corel Office Suite 8
- Quantex Carrying Case
- Year 2000 Compatible
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

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### Quantex T-1400 \$2399

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- 64MB SDRAM / 512KB Secondary Cache
- 6GB Ultra ATA HD
- 56K V.90 Fax/Modem\*
- 24X Modular CD-ROM Drive / 3.5" Modular Floppy Drive
- New NeoMagic NM55 128-bit AGP Video
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- Mini-Docking Station
- USB and Fast IR Ports / Integrated Personal Touchpad
- MS Windows 98 / Microsoft Office 97 SBE v2.0
- Quantex Carrying Case
- Year 2000 Compatible
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

### Quantex I-1411 \$3299

Business lease: \$110/Mo.

- Pentium® II Processor 300MHz
- 14.1" XGA Active Matrix Display
- 128MB SDRAM / 512KB Secondary Cache
- 8GB Ultra ATA HD
- 56K V.90 Fax/Modem\*
- New Removable 2X DVD-ROM Drive / 3.5" Floppy Drive
- New ATI Rage Lt Pro 3D AGP Video w/MB
- New ESS 3D WaveTable Surround Sound and Speakers
- New Two Long-Lasting 12-Cell Smart Lithium Ion Batteries
- Mini-Docking Station
- USB and Fast IR Ports / Integrated Personal Touchpad
- MS Windows 98 / Microsoft Office 97 SBE v2.0
- Quantex Carrying Case
- Year 2000 Compatible
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

I-1411 w/ Pentium II processor 266MHz.....\$3099

### Quantex T-1410 \$2699

Business lease: \$94/Mo.

- Pentium® II processor 300MHz
- New Ultra-Thin Design (12.44"x9.84"x1.43")
- 14.1" XGA Active Matrix Display
- 80MB SDRAM / 512KB Secondary Cache
- 6GB Ultra ATA HD
- 56K V.90 Fax/Modem\*
- New 2X Modular DVD-ROM Drive / 3.5" Floppy Drive
- New NeoMagic NM55 128-bit AGP Video
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- USB and Fast IR Ports / Integrated Personal Touchpad
- MS Windows 98
- Microsoft Office 97 SBE v2.0
- Quantex Carrying Case
- Year 2000 Compatible
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

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Business lease: \$101/Mo.

- Pentium® II Processor 300MHz
- New Ultra-Thin Design (12.44"x9.84"x1.43")
- 14.1" XGA Active Matrix Display
- 96MB SDRAM / 512KB Secondary Cache
- 6GB Ultra ATA HD
- 56K V.90 Fax/Modem\*
- New 2X Modular DVD-ROM Drive / 3.5" Floppy Drive
- New NeoMagic NM55 128-bit AGP Video
- Integrated 16-bit Stereo Sound and Speakers
- Two Smart Lithium Ion Batteries
- Mini-Docking Station
- USB and Fast IR Ports / Integrated Personal Touchpad
- MS Windows 98 / Microsoft Office 97 SBE v2.0
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- Year 2000 Compatible
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components



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## VALUE MULTIMEDIA

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- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
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- 64-Bit 3D AGP Graphics Accelerator with 4MB
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- 32X Max Variable Speed CD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98 / Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant

QP6/333 M-1x(with Pentium II processor).....\$1149

QP6/350 M-1x(with Pentium II processor).....\$1199

QP6/350 M-1xv with Pentium II processor, 17" Monitor, and Intel740 3D 2X AGP Graphics w/8MB.....\$1299

**SOFTWARE:** Corel Office Suite 8 • Internet the City • Compton's Interactive Encyclopedia • Body Works 6.0 • Amazon Trail II • MS Money '97 (pre-loaded only) • American Heritage Talking Dictionary • Dr. Solomon's Find Virus (pre-loaded only) • Compton's Reference Collection • MS Internet Explorer 4.0

### QP6/350 M-2x \$1399

#### Business lease: \$49/Mo.

- Pentium® II Processor 350MHz/100MHz Front Side Bus
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 17" Digital Monitor w/OSD (15.8" viewable)
- Upgrade to 17" Monitor w/NEC ChromaClear CRT for \$79
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- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
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- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant

QP6/400 M-2x(with Pentium II processor).....\$1549

QP6/450 M-2x(with Pentium II processor).....\$1749

### QP6/400 M-3x \$1649

#### Business lease: \$58/Mo.

- Pentium® II Processor 400MHz/100MHz Front Side Bus
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 10.2GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 17" Digital Monitor w/OSD (15.8" viewable)
- Upgrade to 17" Monitor w/NEC ChromaClear CRT for \$79
- Toshiba MPACT7 3D Media Accelerator w/8MB VRAM
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant

QP6/350 M-3x(with Pentium II processor).....\$1499

QP6/450 M-3x(with Pentium II processor).....\$1849

### QP6/450 M-4x \$1999

#### Business lease: \$70/Mo.

- Pentium® II Processor 450MHz/100MHz Front Side Bus
- 96MB PC100 SDRAM Memory/512KB Secondary Cache
- 10.2GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 19" Monitor w/OSD (18.1" viewable), 1600x1200, 26dp
- Intel740™ 3D 2X AGP Graphics with 8MB SDRAM
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant
- Add Altec Lansing ACS-251 Subwoofer for \$39

QP6/350 M-4x(with Pentium II processor).....\$1649

QP6/400 M-4x(with Pentium II processor).....\$1799

## POWER MULTIMEDIA

### QP6/450 SM-1x \$1449

#### Business lease: \$51/Mo.

- Pentium® II Processor 350MHz/100MHz Front Side Bus
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 13GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 17" Digital Monitor w/OSD (15.8" viewable)
- Upgrade to 17" Monitor w/NEC ChromaClear CRT for \$79
- Intel740™ 3D 2X AGP Graphics with 8MB SDRAM
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- 32X Max Variable Speed CD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-45 1 PowerCube Speakers w/subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office 97 SE v2.0
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant

QP6/400 SM-1x(with Pentium II processor).....\$1599

QP6/400 SM-1xv with Pentium II processor, 10.2GB HD, and 3rd-Generation 4.8X DVD-ROM Drive.....\$1699

### QP6/400 SM-2x \$1799

#### Business lease: \$63/Mo.

- Pentium® II Processor 400MHz/100MHz Front Side Bus
- 96MB PC100 SDRAM Memory / 512KB Secondary Cache
- 13GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 17" Digital Monitor w/OSD (15.8" viewable)
- Upgrade to 17" Monitor w/NEC ChromaClear CRT for \$79
- New 30fx 128-bit Voodoo Banshee 3D AGP Video w/16MB
- Based on award-Winning Voodoo2 3D Technology
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-45 1 PowerCube Speakers w/subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows 98 / Power Multimedia Software Bundle
- Microsoft Office 97 SE v2.0
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant

QP6/350 SM-2x(with Pentium II processor).....\$1649

QP6/450 SM-2x(with Pentium II processor).....\$1999

### QP6/400 SM-3x \$2099

#### Business lease: \$74/Mo.

- Pentium® II Processor 400MHz/100MHz Front Side Bus
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 13GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 19" Monitor w/OSD (18.1" viewable), 1600x1200, 26dp
- New 30fx 128-bit Voodoo Banshee 3D AGP Video w/16MB
- Based on award-Winning Voodoo2 3D Technology
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-45 1 PowerCube Speakers w/subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows 98 / Power Multimedia Software Bundle
- Microsoft Office 97 SE v2.0
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant
- Upgrade to #9 Revolution IV AGP Video w/32MB for \$49

QP6/350 SM-3x(with Pentium II processor).....\$1949

QP6/450 SM-3x(with Pentium II processor).....\$2299

### QP6/450 SM-4x \$2399

#### Business lease: \$84/Mo.

- Pentium® II Processor 450MHz/100MHz Front Side Bus
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- New 16.8GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 19" Monitor w/OSD (18.1" viewable), 1600x1200, 26dp
- New 30fx 128-bit Voodoo Banshee 3D AGP Video w/16MB
- Based on award-Winning Voodoo2 3D Technology
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- New Altec-Lansing ADA-305 Dolby Pro Logic Surround Sound Speakers with subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows 98 / Power Multimedia Software Bundle
- Microsoft Office 97 SE v2.0
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant
- Upgrade to #9 Revolution IV AGP Video w/32MB for \$49

QP6/400 SM-4x(with Pentium II processor).....\$2199

## SUPER MULTIMEDIA

### QP6/450 M-4x SE \$2149

#### Business lease: \$77/Mo.

- Pentium® II Processor 450MHz/100MHz Front Side Bus
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 13GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 19" Monitor w/OSD (18.1" viewable), 1600x1200, 26dp
- Intel740™ 3D 2X AGP Graphics with 8MB SDRAM
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant
- Add Altec Lansing ACS-251 Subwoofer for \$39
- Upgrade to 21" Monitor (20.0" viewable) for \$349

QP6/400 M-4x SE(with Pentium II processor).....\$1949

### QP6/450 SM-4x SE \$2799

#### Business lease: \$98/Mo.

- Pentium® II Processor 450MHz/100MHz Front Side Bus
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 16.8GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 21" Monitor w/OSD (20.0" viewable), 1600x1200
- New 30fx 128-bit Voodoo Banshee 3D AGP Video w/16MB
- Based on award-Winning Voodoo2 3D Technology
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- New Altec-Lansing ADA-305 Dolby Pro Logic Surround Sound Speakers with subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows 98 / Power Multimedia Software Bundle
- Microsoft Office 97 SE v2.0
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant
- Upgrade to 15.0" LCD Flat-Panel Display for \$149

QP6/400 SM-4x SE(with Pentium II processor).....\$2599

## M-SERIES BEST BUY

### QP6/450 Best Buy \$1999

#### Business lease: \$70/Mo.

- Pentium® II Processor 450MHz/100MHz Front Side Bus
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 10.2GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 19" Monitor w/OSD (18.1" viewable), 1600x1200, 26dp
- New 30fx 128-bit Voodoo Banshee 3D AGP Video w/16MB
- Based on award-Winning Voodoo2 3D Technology
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-45 1 PowerCube Speakers w/subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant
- Add a Internal Zip Drive for \$79

## GAMING BEST BUY

### QP6/450 GX-2 \$2399

#### Business lease: \$84/Mo.

- Pentium® II Processor 450MHz/100MHz Front Side Bus
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 13GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 19" Monitor w/OSD (18.1" viewable), 1600x1200, 26dp
- Intel740™ 3D 2X AGP Graphics with 8MB SDRAM
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem\* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- Aureal® A3D™ 3D Positional PCI Sound
- 30fx Voodoo2 based 3D Game Accelerator w/12MB
- MS SideWinder Precision Pro Joystick
- New Altec-Lansing ADA-305 Dolby Pro Logic Surround Sound Speakers & subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS Mouse
- MS Windows 98 / Value Multimedia Software Bundle
- Activation Game Titles: Battlezone, Heavy Gear Interstate 76 w/Nitro Pack
- 3-year limited warranty with 1-year On-Site Service\*\*
- Year 2000 Compliant

QP6/400 GX-2(with Pentium II processor).....\$2199



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## Desktop Publishing for the Home

### DESKTOP PUBLISHING

THE LINE between professional and personal desktop publishing programs has blurred. I looked at two of the newest low-end packages, a shipping copy of Mindscape's \$69 **PrintMaster Platinum** and a preproduction version of Macmillan's \$89 **Publish It**.

Both products allow you to create small-business documents such as invoices, fax cover sheets and letterheads. Both offer loads of home-oriented projects—greeting cards, newsletters, personal Web pages, and the like. **PrintMaster Platinum** has the edge in ease of use, number of project types, and clip art.

To compare ease of use, just look at the two programs' project wizards. **PrintMaster Platinum**'s helpful Project Gallery



**CRAFTY CREATION:** **PrintMaster Platinum**'s huge collection of clip art includes fanciful images such as the one used in this flier.

browser lets you search for project types by category and keyword. **Publish It**, on the other hand, forces you to sift through a mundane, Win-

dows Explorer-like hierarchy of projects. And for those projects, **Publish It** offers fewer choices and templates. While it easily covers the basics—

and tosses in a few extras such as a template that creates covers for CD-ROM jewel cases—it doesn't include as many options as **PrintMaster**, which has children's craft projects for masks, stickers, and bookmarks. Another **PrintMaster** bonus: An event reminder will gently prod you to produce a loved one's birthday card (you provide the information).

**PrintMaster** also comes with seven CD-ROMs of clip art (and 15,000 more images on Mindscape's graphics server) versus the three CD-ROMs included with **Publish It**.

**Publish It** is a perfectly competent tool. But since **PrintMaster Platinum** is easier to use, offers a wider variety of projects, and bundles more art, it's hard to beat—especially at \$20 less than **Publish It**.

—Christopher Breen

### PrintMaster Platinum 7.0

**PRO:** Easy to use, contains a wide variety of project templates and loads of good clip art.

**CON:** None significant.

**VALUE:** A great home or SOHO choice at a reasonable price.

Street price: \$69

**Mindscape**

617/761-3000

www.printmaster.com

PC WORLD INFONET NO. 717

### Publish It

**PRO:** You get the home desktop publishing basics.

**CON:** Not particularly intuitive; fewer templates and less clip art than the competition.

**VALUE:** Okay, but not spectacular.

Street price: \$89

**Macmillan Digital Publishing**

800/716-0044

www.notalentrequired.com

PC WORLD INFONET NO. 722

## Enfish Tracker Pro Makes Order of File Chaos

### UTILITY

IT'S EASY TO squirrel away tons of data on today's jumbo-size hard drives. The hard part is finding what you need. **Enfish Tracker Pro** largely succeeds at imposing some order on hard drive chaos.

**Tracker Pro**, which I reviewed in shipping form, categorizes information using sets of search criteria called "trackers." When you first run the program, **Tracker Pro** indexes your PC's hard drive (which can take 30 minutes to an hour) and creates a set of default trackers. I found them useful but overly reliant on directory names. Fortunately, however, you can create and refine your own trackers.

A tracker for material related to the term "1999 Budget" would create an entry for any document or e-mail you work on that contains that phrase (or any other related phrases that you define). Click on the tracker's icon in **Tracker Pro**'s browserlike main screen, and you'll be provided with links to all the relevant documents and e-mail messages.

**Tracker Pro** works with most popular word processors, spreadsheets, presentation and graphics programs, PIMs, and e-mail applications—as well as Internet Explorer 4.x and Netscape Navigator 4.x. Support for Internet Explorer 3.02, CompuServe, and Web-based e-

mail is in the works. The program will also search the Web, filter the results, and create links to the best sites.

At \$80, **Tracker Pro** is a bit pricey. But it's unique for its ability to track useful information—and the more you use it, the better it performs.

—Stan Miaszkowski ►

### Enfish Tracker Pro

**PRO:** Intuitive program keeps related files organized.

**CON:** Doesn't support all e-mail applications yet.

**VALUE:** Pricy but useful utility.

Street price: \$80

**Enfish Technology**

800/222-3634

www.enfish.com

PC WORLD INFONET NO. 718





How much does it cost to rule the world?

You want performance technology at prices you can afford. In other words, you want the world. Well, Compaq has everything you're looking for: notebooks, desktops, workstations, servers — all at prices that are compatible with your budget. And with features like the Intel® Pentium® II Processor, it can satisfy all your business needs and then some. Order by calling us directly or visiting our website. More technology and more ways to get it. It's what makes Compaq computers the best selling in the business.

#### Professional Workstations

##### AP200

Exceptional performance for the budget-conscious user who wants an entry-level, single-processor workstation.

**\$2,310\***

Leasing Price: \$78/Month<sup>1</sup>

- Intel Pentium II Processor 450 MHz
- 6.4 GB<sup>2</sup> Ultra ATA Hard Drive
- 64 MB SDRAM (expandable to 384 MB)
- Powerful 2D/3D graphics: ELSA GLoria Synergy+
- Compaq V55 15" (13.7" viewable) monitor
- Towerable chassis converts from desktop to minitower
- Optimized for Microsoft® Windows NT®
- 3-year limited warranty<sup>5</sup>

#### Compaq Servers

##### ProLiant 1600

The ultimate workgroup server combining next-generation performance and high availability features.

**\$3,043\***

Leasing Price: \$103/Month<sup>1</sup>

- Intel Pentium II Processor 400 MHz, 512 KB L2 cache
- Dual-Processing Capable
- 4.3 GB<sup>2</sup> Hard Drive
- 64 MB SDRAM (expandable to 1 GB)
- Expandable internal storage to 45.5 GB
- Integrated Dual Channel SCSI
- Optional redundant hot plug power supply available
- Prefailure warranty<sup>6</sup> available on memory, drives, and processor



\*All prices shown are Compaq DirectPlus prices and are subject to change. Prices do not include applicable state and local sales tax or shipping to recipient's destination. <sup>1</sup>Leasing available through Compaq Capital Corporation (CCC) to qualified commercial customers, subject to credit approval and execution of CCC lease documentation. Monthly lease payments are based on 36-month fair market value lease, and do not include taxes, fees, or shipping charges. Offering subject to other restrictions and CCC reserves the right to change, alter, or cancel this offering at any time without notice. <sup>2</sup>For hard drives, GB = billion bytes. <sup>3</sup>24X Max CD-ROM data transfer rates may vary from 150 KB/s to 3600 KB/s; 32X Max CD-ROM data transfer rates may vary from 150 KB/s to 4800 KB/s. <sup>4</sup>Designed only to allow faster downloads from K56flex-compliant sources. Maximum achievable download transmission rates currently do not reach 56 KB/s, and will vary with certain line conditions. <sup>5</sup>Some restrictions and exclusions apply. Call (800) OK COMPAQ for warranty details. ©1998 Compaq Computer Corporation. All rights reserved. Compaq, the Compaq Logo, Armada, Deskpro, and ProLiant are registered trademarks and DirectPlus is a registered service mark of Compaq Computer Corporation. Intel, the Intel Inside Logo, and Pentium are registered trademarks and Celeron is a trademark of Intel Corporation. Microsoft and Windows NT are registered trademarks of Microsoft Corporation. Other products mentioned herein may be trademarks or registered trademarks of their respective companies. Operating system pre-installed on all portable products. Compaq is not liable for editorial, pictorial, or typographical errors in this advertisement.





## Compaq Deskpro EP Series

### Model 6300A/4300

The business computer for those who crave the latest industry-standard technologies, at very aggressive pricing.

# \$1,199\*

Leasing price: \$41/Month<sup>1</sup>

- Intel Celeron™ Processor 300A MHz
- 4.3 GB<sup>2</sup> SMART II Hard Drive
- 32 MB SDRAM
- Compaq S700 17" (15.7" viewable) monitor
- Matrox MGA G100 AGP Graphics
- Towerable chassis converts from desktop to minitower
- 3-year limited warranty<sup>5</sup>

### Model 6350/10000/CDS

Provides the latest in performance technology in a simple, flexible design that configures to the workplace. The option is open for either a desktop or minitower system.

# \$1,789\*

Leasing price: \$61/Month<sup>1</sup>

- Intel Pentium II Processor 350 MHz
- 10 GB<sup>2</sup> SMART II Hard Drive
- 64 MB SDRAM
- Compaq S700 17" (15.7" viewable) monitor
- Matrox Millennium G200-SD AGP Graphics with 8MB VRAM
- 32X Max<sup>3</sup> CD-ROM
- Towerable chassis converts from desktop to minitower
- 3-year limited warranty<sup>5</sup>

### Model 6450/10000/CDS

Delivers true value by providing the ultimate in desktop quality and reliability. It offers a broad range of innovative, cost-effective, and flexible solutions.

# \$2,029\*

Leasing price: \$69/Month<sup>1</sup>

- Intel Pentium II Processor 450 MHz
- 10 GB<sup>2</sup> SMART II Hard Drive
- 64 MB SDRAM
- Compaq S700 17" (15.7" viewable) monitor
- Matrox Millennium G200-SD AGP Graphics with 8 MB VRAM
- 32X Max<sup>3</sup> CD-ROM
- Towerable chassis converts from desktop to minitower
- 3-year limited warranty<sup>5</sup>

## Options

### Deskpro EP Series:

- Additional 32 MB SDRAM Memory: **\$79\***
- 32X Max<sup>3</sup> CD-ROM: **\$138\***
- Upgrade to Compaq S900 19" (18" viewable) monitor: **\$200\***
- SuperDisk LS-120 Drive: **\$116\***
- Compaq C-Series 810 Handheld: **\$424\***



## Compaq Armada Notebooks

### Armada 1700

The fully integrated notebook from Compaq that combines the latest key technology with uncompromising value.

# \$2,299\*

Leasing price: \$78/Month<sup>1</sup>

- Mobile Intel Pentium II Processor 233 MHz
- 4.0 GB<sup>2</sup> SMART Hard Drive
- 32 MB SDRAM (expandable to 160 MB)
- 12.1" CTFT SVGA display
- 24X Max<sup>3</sup> CD-ROM
- K56flex modem<sup>4</sup>
- Integrated AC Adapter
- Intelligent Manageability pre-installed
- 1-year worldwide limited warranty<sup>5</sup>

### Armada 3500

The lightest notebook from Compaq, weighing only 4.4 lbs.

# \$2,799\*

Leasing price: \$95/Month<sup>1</sup>

- Mobile Intel Pentium II Processor 266 MHz
- 4.1 GB<sup>2</sup> SMART Hard Drive
- 32 MB RAM (expandable to 160 MB)
- 12.1" CTFT SVGA display
- 4.4 lbs. and 1.3" thin
- Magnesium display for durability
- Intelligent Manageability pre-installed
- 3-year worldwide limited warranty<sup>5</sup>

### Armada 7400

The 6.3 lb., 1.6" thin notebook, delivering the highest performance with the optimal combination of desktop equivalence and mobility.

# \$3,999\*

Leasing price: \$136/Month<sup>1</sup>

- Mobile Intel Pentium II Processor 300 MHz
- 6.4 GB<sup>2</sup> SMART Hard Drive
- 64 MB SDRAM (expandable to 256 MB)
- 13.3" CTFT (1024 x 768) display
- Powerful AGP graphics
- 24X Max<sup>3</sup> CD-ROM
- Magnesium casing for durability
- Intelligent Manageability pre-installed
- 3-year worldwide limited warranty<sup>5</sup>

## Options

### Armada 1700:

- Compaq Value Case: **\$49\***
- 32 MB Memory Module: **\$89\***
- Ethernet Convenience Base: **\$279\***

### Armada 3500:

- Mobile Expansion Unit with 24X Max<sup>3</sup> CD-ROM: **\$199\***
- Mobile Expansion Unit with DVD: **\$399\***
- Additional Li-Ion Battery: **\$210\***

### Armada 7400:

- ArmadaStation II Expansion Base: **\$879\***
- MultiBay DVD Drive: **\$419\***
- Additional Li-Ion Battery: **\$189\***

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Better answers.<sup>SM</sup>



## WinZip 7.0: Still a Shareware Star

### UTILITY

NICO MAK'S WinZip is well-known as a terrific compression tool. Its simple interface, support for multiple compression and e-mail file formats, and ability to run programs from within a .zip file have made it a favorite among shareware downloads.

So how do you make an already easy-to-use program easier? You let users customize

the interface. WinZip 7.0 lets you resize and rearrange its columns as you would in a spreadsheet. In the shipping version I tested, you can open files with a single click, à la Internet Explorer. And the toolbar is now configurable—you can choose from among 21 buttons. (However, Windows 95 users who don't have Internet Explorer 4.0 may have to download a free up-

grade to Windows' Common Control Library (comctl32.dll) from the Nico Mak or Microsoft Web site.)

You can now sort WinZip's file list by clicking any column header, as you can in Windows Explorer, and print the list. Support for Microsoft's .cab file compression format affords easy access to Windows installation files, so you don't have to run setup to replace a corrupted file. WinZip finally supports the .zip file format's Comment feature, which lets you add or view a description of the archive in a window accessed by clicking on a toolbar icon.

WinZip still lacks the easy transparency of Mijenix's \$40 ZipMagic, which makes your .zip files look like plain old Windows folders. But WinZip is still a powerful and versatile compression tool—and simple and inexpensive, to boot.

—Lincoln Spector



WINZIP'S BIGGER TOOLBOX is customizable and offers such options as support for a .zip file's Comment feature (second from right).

### WinZip 7.0

**PRO:** Customizable interface, new toolbar options.

**CON:** Can't treat .zip files like Windows folders, as with ZipMagic.

**VALUE:** Affordable, familiar compression utility adds useful features. Street price: \$29 (upgrade free to registered users)

Nico Mak Computing

[www.winzip.com](http://www.winzip.com)

PC WORLD INFONET NO. 719



# LOSE WEIGHT.



## Double Your Modem Pleasure

### COMMUNICATIONS

A FARMER who is using only one horse to pull a heavily loaded wagon knows exactly what to do to go faster: harness up a second steed. Similarly, Amquest's \$49 **Small Office/Home Office ComSuite**, a connectivity software package, lets you use a second modem to speed up Internet access or PC-based faxing.

Amquest's Internet Multiline Access Software System lets you meld two modems, phone lines, and ISP connections into a single connection to the Internet. In my tests with a shipping copy, an IMASS dual-modem connec-

tion was markedly faster than a conventional single-modem connection for some tasks but not for others. The software speeds up Web browsing by dividing the downloading of a page's text, picture, and other elements between the two modems. A complex Web page that took 70 seconds to retrieve via a single modem loaded in 46 seconds when a second modem was used.

My tests suggest that pages that load in 30 seconds or less over a single 56-kbps modem aren't likely to load faster with two modems and IMASS. But IMASS reduced my file download times by half or better: A

1MB file loaded in 1 minute and 49 seconds, compared to 4 minutes and 20 seconds using one modem.

The suite's useful @fax.com module lets multiple modems concurrently answer incoming fax and voice lines. The DoubleModem Device Driver can speed up remote control or videoconferencing.

Dual-modem connections may become more common as ISPs begin supporting the Multilink Point-to-Point Protocol features in Windows 98 and NT (and available as a free update for Windows 95). Until then, Amquest's package is an inexpensive way to speed up

your Internet connection, provided you already have two modems, two phone lines, and two ISP accounts.

—Bill Lawrence ►

### Small Office/Home Office ComSuite

**PRO:** Inexpensive way to speed up Internet downloads using any two Windows-compatible modems.

**CON:** Most Web pages aren't big or complex enough to benefit from double modem-enhanced retrieval.

**VALUE:** Cheaper than high-speed bandwidth connections such as ISDN, cable, or leased lines.

Street price: \$49

Amquest

877/663-3648

[www.amquestmodem.com](http://www.amquestmodem.com)

PC WORLD INFONET NO. 723

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## NEW PRODUCTS

### Upscale Scanners Pay Off

#### SCANNERS

NOW THAT you can buy a color flatbed scanner for less than \$100, why pay more? Several reasons: To get more accurate scans, higher-quality final images, greater ease of use, faster performance, and more powerful software tools. Two new flatbed scanners, Plustek's \$135 **OpticPro 9636P+**

selection of software for scanning and editing your images, as well as limited versions of TextBridge optical character recognition software by Xerox.

Not much pricier than a budget scanner, Plustek's OpticPro 9636P+ promises better color depth and scanner controls. In my tests using default color and tone settings,



THE PLUSTEK OPTICPRO 9636P+ delivers premium 36-bit color scans for only \$135—not much more than a budget flatbed.

and Epson's \$299 **Perfection 636**, both deliver extras to justify their higher cost. I reviewed a shipping version of the Plustek and a preproduction Epson unit.

Both are 36-bit scanners, capable of capturing a larger palette of colors—and thus of producing better-quality images—than sub-\$100 scanners, which are typically 30- or 24-bit. And both scan at 600 by 1200 dpi, rather than the 300 by 600 dpi common in less-expensive models. The finer resolution makes it possible to enlarge small images and still retain decent quality. Both scanners have removable lids for scanning bound volumes, with a maximum scan area of 8.5 by 11.7 inches. Each comes bundled with a suitable

the Plustek produced accurate images, though colors were often flat and undersaturated. Advanced features in the scanning software let you adjust color and apply various filters (blurring, sharpening, and others), but novices would need time to master these tools. Also, you can't perform other tasks on your PC ►

#### Plustek OpticPro 9636P+

**PRO:** Good price, easy installation, advanced color tools.

**CON:** Slower than the Epson, doesn't support multitasking.

**VALUE:** Great price for a 36-bit, 600-dpi color scanner.

Street price: \$135

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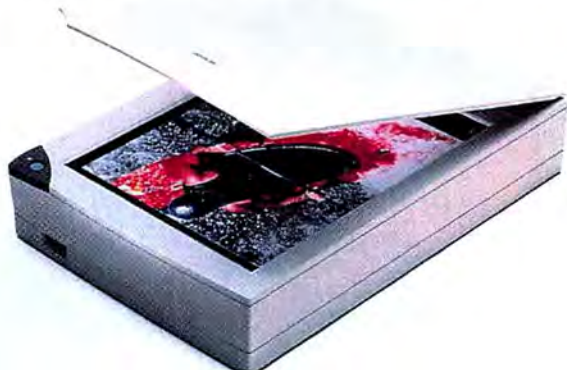
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## NEW PRODUCTS

during a scan, which could take a good minute or two because of the relatively slow parallel-port hookup. Despite its shortcomings, however, the Plustek can deliver quality scans at a bargain price.

The Epson Perfection 636 is harder to set up than the Plustek—it uses a PCI SCSI interface card, so you have to open your PC's case instead of just plugging in an adapter. But

The Epson's robust software facilitates batch scanning and provides powerful image-tweaking features such as color correction, tone adjustment, and auto adjustment. A convenient push button on the scanner's front panel automatically starts the unit and launches the bundled document management program (NewSoft's Presto PageManager) or any other compatible



**PRICEY BUT WORTH IT:** The Epson Perfection 636 costs \$299 but delivers great scans, superior speed, and useful features and options.

you'll more than recoup the extra setup time with this scanner's speedier performance. For example, the Epson took only 53 seconds to complete a 300-dpi scan of a 5-by-7-inch color photo, compared to 3 minutes and 7 seconds for the Plustek.

But you won't sacrifice image quality: In my tests, the Epson consistently produced sharper, more vibrant scans than the Plustek. The Epson can also deliver higher resolution—up to 600 by 2400 dpi. However, you can achieve the high-resolution setting only in an area of the scan bed that's intended primarily for use with a \$99 adapter for 35mm slides, film, and transparencies up to 4 inches wide. Epson also offers a \$199 automatic document feeder.

application you assign to the start button.

While the Plustek OpticPro 9636P+ can produce better images than the typical budget flatbed, the Epson Perfection 636's superior speed, image quality, scanning features, and add-on options make it well worth the extra investment for serious business use.

—Richard Jantz ■

### Epson Perfection 636

**PRO:** Provides fast, excellent color scans, advanced color tools, add-on options.

**CON:** Expensive, requires SCSI card installation.

**VALUE:** Superior scanner well worth the premium for business users.

Street price: \$299

Epson America

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## Award-Winning Complete Internet-Ready\* 450MHz Systems Starting at Just \$1,699



Model Name	Millennia C333	Millennia 350	Millennia 450	Millennia 450 MAX	Millennia 450 MAX
Processor	Intel® Celeron® processor 333MHz	Intel Pentium® II processor 350MHz	Intel Pentium® II processor 450MHz	Intel Pentium® II processor 450MHz	Intel Pentium® II processor 450MHz
Cache	128KB Internal L2 cache	512KB Internal L2 cache	512KB Internal L2 cache	512KB Internal L2 cache	512KB Internal L2 cache
RAM	32MB SDRAM	64MB 100MHz SDRAM	64MB 100MHz SDRAM	128MB 100MHz SDRAM	128MB 100MHz SDRAM
Hard Drive	4.3GB Ultra ATA hard drive*	8.4GB Ultra ATA hard drive*	8.4GB Ultra ATA hard drive*	13.6GB Ultra ATA hard drive*	14.4GB 7200 RPM Ultra ATA hard drive*
Monitor	15" Micron 500Vx monitor (13.8" display)	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)	19" Micron 900Lx monitor (18" display)	19" Micron 900Lx monitor (18" display)
DVD/CD-ROM	32X max speed CD-ROM drive	32X max speed CD-ROM drive	32X max speed CD-ROM drive	6X DVD 32X ROM drive	6X DVD 32X ROM drive
Modem	3Com U.S. Robotics 56K WinModem**	3Com U.S. Robotics 56K WinModem**	3Com U.S. Robotics 56K WinModem**	3Com U.S. Robotics 56K WinModem**	3Com U.S. Robotics 56K WinModem**
Graphics	nVidia Riva 128, 8MB SGRAM 3D AGP graphics	nVidia Riva 128, 8MB SGRAM 3D AGP graphics	nVidia Riva 128, 8MB SGRAM 3D AGP graphics	3dMax Diamond Viper 550 ToT 2X AGP graphics	3dMax Diamond Viper 550 ToT 2X AGP graphics
Sound System	PCI 64-voice Wavetable sound	PCI 64-voice Wavetable sound	PCI 64-voice Wavetable sound	PCI 128-voice Wavetable sound	PCI 128-voice Wavetable sound
Warranty	5-year/3-year Micron Power® limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty
Scholarship	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online
Software Included	Microsoft Windows 98 Microsoft Office 97 Small Business Edition Microsoft Outlook Microsoft Internet Explorer Norton AntiVirus	Microsoft Windows 98 Microsoft Office 97 Small Business Edition Microsoft Outlook Microsoft Internet Explorer Norton AntiVirus	Microsoft Windows 98 Microsoft Office 97 Small Business Edition Microsoft Outlook Microsoft Internet Explorer Norton AntiVirus	Microsoft Windows 98 Microsoft Office 97 Small Business Edition Microsoft Outlook Microsoft Internet Explorer Norton AntiVirus	Microsoft Windows 98 Microsoft Office 97 Small Business Edition Microsoft Outlook Microsoft Internet Explorer Norton AntiVirus
Also Includes:	New MicroTower™ case Advent AV009 stereo speakers 104-key enhanced keyboard Microsoft IntelliMouse® 3.5" floppy drive	New MicroTower case Advent AV009 stereo speakers 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive	New MicroTower case Advent AV009 stereo speakers 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive	Micron MiniTower case Advent AV009 stereo speakers 100MB Iomega Zip Drive 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive	Micron MiniTower case Monsoon MM1000 flat panel speakers w/subwoofer 100MB Iomega Zip Drive 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive

Price	<b>\$1,199</b> \$42/mo. TechRefresh Bus. Lease, 36 mos.**	<b>\$1,499</b> \$53/mo. TechRefresh Bus. Lease, 36 mos.**	<b>\$1,699</b> \$59/mo. TechRefresh Bus. Lease, 36 mos.** <i>New Low Price!</i>	<b>\$2,499</b> \$87/mo. TechRefresh Bus. Lease, 36 mos.**	<b>\$2,799</b> \$98/mo. TechRefresh Bus. Lease, 36 mos.** <i>New Low Price!</i>
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—William Goins, III

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TREK² 233



TREK² 233



TREK² 266



New!  
TREK² 300

Now Featuring  
Brilliant 14.1" Display!  
DVD-ROM drive!



Model Name	TREK² 233	TREK² 233	TREK² 266	TREK² 300
Processor	Intel® Pentium® II processor 233MHz	Intel Pentium II processor 233MHz	Intel Pentium II processor 266MHz	Intel Pentium II processor 300MHz
Cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache
RAM	32MB EDO DRAM	64MB SDRAM	64MB SDRAM	64MB SDRAM
Hard Drive	3.2GB hard drive (removable)*	3.2GB hard drive (removable)*	3.2GB hard drive (removable)*	3.2GB hard drive (removable)*
Monitor	12.1" SVGA TFT display	13.3" XGA TFT display	14.1" XGA TFT display	14.1" XGA TFT display
Extra Storage	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)
DVD/CD-ROM	24X CD-ROM drive (dedicated bay)	24X CD-ROM drive (dedicated bay)	24X CD-ROM drive (dedicated bay)	DVD-ROM drive (dedicated bay)
Graphics	4MB AGP graphics accelerator	4MB AGP graphics accelerator	4MB AGP graphics accelerator	4MB AGP graphics accelerator
Sound System	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone
Warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty
Scholarship	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online
Software Included	Microsoft® Windows® 98 System Wizard Mobile Client™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™ Norton AntiVirus
Also Includes:	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible Wavetable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible Wavetable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible Wavetable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible Wavetable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports
Price	\$1,799 \$63/mo. TechRefresh Bus. Lease, 36 mos.**	\$2,299 \$80/mo. TechRefresh Bus. Lease, 36 mos.**	\$2,599 \$91/mo. TechRefresh Bus. Lease, 36 mos.**	\$2,899 \$101/mo. TechRefresh Bus. Lease, 36 mos.**

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you're starting to scratch the surface. Let's face it, when you're crawling around under someone's desk in a jungle of twisted cables because they want to see the dancing baby and you're the only one in the office that understands that "hot-swappable hard-drives" aren't something dirty, the last thing you need is a server that's anything but flawless.



Fred

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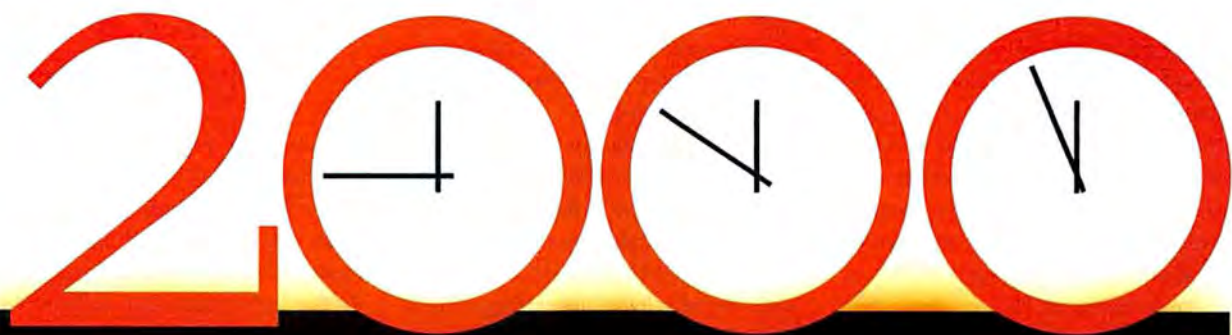
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The year '2000' is rendered in a large, bold, orange-red font. The three zeros are designed as clock faces, each with a black circle and a crosshair. The first zero has a vertical line on the left and a horizontal line on the right. The second zero has a vertical line on the right and a diagonal line from the top-left to the bottom-right. The third zero has a vertical line on the right and a diagonal line from the top-right to the bottom-left.

# THE YEAR OF LIVING DANGEROUSLY

BY LINCOLN SPECTOR

Time is  
running out  
for solving  
your PC's  
year 2000  
problems.

**Better  
start now.**

**Tick, tick, tick.** That's the sound of your PC, counting down to the end of the century. And if you don't deal with your system's year 2000 issues, it could be the sound of a time bomb.

By now, everyone has heard the tales of digital apocalypse. From the mainframes that handle airline reservations to the logic chips that keep the local power plant online, millions of computer systems will be unable to roll over from 1999 to 2000. Nobody knows exactly what will happen when the clock strikes midnight, but estimated costs for fixing the problem range from \$600 billion to \$4.6 trillion. (In other words, it's a great time to be a Y2K consultant.)

If you think your PC is immune to the so-called millennium bug, think again. Like mainframes and embedded systems, most personal computers will encounter some kind of year 2000 glitch. The ►

ILLUSTRATIONS BY ERIC DINYER



problem stems from the way computers have traditionally stored dates since the late 1950s. To save precious memory and storage space, programmers conventionally used only two digits to store the year—for example, 1/15/99 instead of 1/15/1999. That tradition lives on in the real-time clocks inside millions of PCs. When the calendar flips over to 1/1/00, many of those systems will see '00' and turn the clock back to 1900, not forward to 2000.

The problems for PC users range from annoying but trivial to potentially devastating. Here are just some of the things that can go wrong on January 1, 2000:

➤ You want to track interest payments on a Treasury bill that matures in 30 years. You enter 1/15/30 into your spreadsheet; the program interprets this date as 1930.

➤ Your PC produces the wrong system date when you power on. So your e-mail goes out with the wrong date stamp, and your scheduler doesn't notify you of appointments. Because your company files are organized by save date, you lose track of the latest revisions to your documents.

➤ Your custom accounting package sends out statements demanding 99

years of interest on bills mailed last week.

Even if you squash all the millennium bugs in your system, you risk reinfesting your PC when you import noncompliant data files. And if your network isn't Y2K ready, all bets are off.

Fortunately, you can solve most Y2K problems yourself—and for a lot less than \$4.6 trillion. We've broken the Y2K problem down into four key areas: hardware (your PC's real-time clock and BIOS); commercial software (operating systems and off-the-shelf applications like Excel); custom applications (code written especially for your business or industry); and exchanging data (items such as networked spreadsheets and databases accessible by groups of users). We tested 19 freeware and commercial packages that claim to diagnose and/or cure your Y2K ills—and found several that really work (see "Software to the Rescue"). We also took a handful of PCs back to the future, advancing their system dates to January 1, 2000, to see exactly what would happen. In the following pages, we'll tell you how to identify, isolate, and defuse your Y2K problems—before they blow up in your face.

## HARDWARE

# The Clock Stops Here

YOU MAY NOT KNOW it yet, but odds are good that your PC has some kind of millennium bug. According to Greenwich Mean Time, a United Kingdom-based vendor of Y2K utilities, 93 percent of PC BIOSes built before 1996 will not switch over properly from 1999 to 2000. That figure declines to around 11 percent for computers built last year. Still, it's wise for all PC users to check their hardware for Y2K problems—it's fairly easy to do, and in most cases, the solution is painless.

The problem starts with the way your desktop PC tells time—a complex process worthy of a Rube Goldberg cartoon. Every PC's motherboard includes a battery-powered real-time clock (or RTC). Even when the PC is turned off, the RTC continually updates the time and date. But the RTC uses only two-digit years; PCs store the first two digits of a year in a storage space called the *century byte*.

## HAVE YOU BEEN BITTEN BY THE MILLENNIUM BUG?

### QUESTION

### WHAT CAN GO WRONG

### WHAT YOU CAN DO

Was your PC built before 1997?

Most older BIOSes can't make the switch from 1999 to 2000.

Use Tantra Software UK's ClokTest to check if your BIOS is Y2K compliant. If not, get a BIOS upgrade. If none is available, use a terminate-and-stay-resident program to intercept BIOS calls, or invest in a new PC.

Was your PC built after 1997?

Some newer BIOSes need help rolling over from 1999 to 2000.

Use ClokTest or another BIOS compliance tester. If your BIOS is non-compliant, manually reset the system date. If your PC can't retain the new system date, upgrade the BIOS.

Do you use Windows 3.x?

Win 3.x has minor Y2K glitches, but most 16-bit apps are not being updated for Y2K compliance.

Upgrade to Windows 98 or NT 4.0; upgrade to Y2K-ready 32-bit apps.

Do you use Windows 95 or 98?

Minor issues with holdover apps from Win 3.x; Win 95 and 98 use short-date format as their default.

Change Windows date settings from short-date format (m/d/yy) to long-date format (m/d/yyyy). Update File Manager.

Do you use spreadsheet, database, or accounting software?

Program may insert the wrong century for two-digit years in cells, fields, and formulas.

Scan every file for two-digit years in each cell, field, and formula; change to four digits. Use Check 2000 PC Deluxe (from Greenwich Mean Time UTA) or another Y2K utility to automate file scanning.

Does your business rely on customized software?

Program may reject four-digit years or may not function with dates beyond 1999.

Test each program using four-digit years and 21st-century dates. If it fails, recompile or replace the program. Ask the software vendor and/or programmer about a Y2K fix.

Do you share data with clients or across a network?

External files may contain Y2K glitches; noncompliant network server can alter PC system dates.

Check incoming data carefully on a quarantined PC. Test the server; upgrade to Y2K compliance or use time-service software.



When you turn on your machine, the BIOS gets the time and the last two digits of the year from the RTC, and the first two digits from the century byte. The BIOS feeds this information to the operating system, which passes the time and date along to most of your applications.

But the RTC doesn't update the century byte. So at midnight on December 31, the RTC will change the year from 99 to 00, but the century byte will be stuck at 19. When you turn your PC on, the BIOS will retrieve the year as 1900.

A Y2K-ready BIOS will recognize this error and deftly update the century byte, substituting '20' for '19'. But a noncompliant BIOS will dutifully pass the year 1900 to your OS. And if you're using DOS, Windows 3.x, or Windows 95, the operating system will change 1900 to 1980—the first year that it's capable of handling. Windows 98 and NT 4.0 are designed to catch the error and automatically change 19 to 20, but the safeguard doesn't always work as planned.

### CLOCK THERAPY

WHEN YOU power up your PC on January 1, 2000, and it welcomes you to 1980, you'll know you have a Y2K hardware problem. But why wait to find out? Test your PC now, and rest easy when the millennium rolls around.

One way to check for compliance is to visit the year 2000 page on your hardware vendor's Web site. For instance, at [www.dell.com/year2000](http://www.dell.com/year2000), you can enter the make and model of your Dell PC and find out whether it's compliant.

Another option is to check your hardware, using a Y2K utility. We tested 19 utilities and found Tantra Software UK's ClokTest to be the simplest, most effective way to check whether your PC's BIOS can update the century byte. Just copy ClokTest to a bootable floppy and boot your PC with the disk in drive A:. ClokTest will run and give you the results. Download it for free from PC World Online's FileWorld ([www.fileworld.com/magazine](http://www.fileworld.com/magazine)).

Once you know your system has the Y2K bug, you have to cure it. The fix may be as simple as manually changing ▶

# BACK TO THE FUTURE

## WE TOOK EIGHT PCs ON A TRIP TO THE YEAR 2000 • HERE'S WHAT HAPPENED.

**WE COULDN'T WAIT.** We wanted to know yesterday what would happen to our PCs tomorrow. So, taking matters into our own hands, we set the clocks of eight unsuspecting PCs ahead to January 1, 2000. The computers ranged in age from fledgling (one

ness applications. These ranged from typing a new date into a Word Pro document to creating a month's worth of calendar entries in Starfish Sidekick 95 and resetting the software's date to the year 2000. Even in the PCs whose BIOSes dutifully retained the correct dates, strange things happened to some of our software.

Case in point: File Manager under Windows 3.11 reported that a file created after 1/1/2000 had its genesis on the mysterious date 1/1/0. (Microsoft has developed a patch to correct the File Manager problem; download it at [support.microsoft.com/support/kb/articles/q172/7/07.asp](http://support.microsoft.com/support/kb/articles/q172/7/07.asp).)

### Fin de Siècle

ANOTHER ANOMALY occurred on a relatively new Kingdom Pinnacle AMD K6-300 running Windows 98. When we entered the year 2045 into a cell of an Excel

7.0 worksheet and then copied the cell into a different Excel worksheet, the date reverted to 1945. This also happened several times when we copied the cell contents to another cell within the same spreadsheet. We did not observe this problem on any other machine.

In contrast, some applications wouldn't be cowed even when the BIOS failed to deliver the correct date. Two personal information managers, Starfish's Sidekick 95 and Microsoft's Outlook 97, use calendars that knew the correct date even when the BIOS reverted to 01-0x-1980. You won't miss any meetings in the New Year with these babies on your computer.

Conclusion: Our world didn't come to a crashing halt on January 1, 2000. The Y2K glitches we encountered were merely annoying, not fatal. Next New Year's Day promises to bring a bigger hangover than usual, but nothing a couple of painkillers and some careful planning can't handle. —Susan Silvis



month) to ancient (eight years). To keep our test as random as possible, we installed Windows 3.11 on two of the PCs, Windows 95 on another two, and Windows 98 on the remaining four. We also installed a number of popular business applications on each. Then we took the great leap forward, and—*drum roll, please*—here's what happened:

### BIOS Fear

**WE BEGAN** our test by booting each system to the MS-DOS prompt and typing in the new date. So far, so good: All eight PCs worked fine. But things changed when we rebooted. With the four PCs built before 1996—a Compaq Deskpro/325i, a Compaq Deskpro/4DX2-50, a Dell Dimension 486DX2-50, and a Gateway 4V66—the date reverted to either 1/01/80 or 1/04/80—a sure sign that these machines' BIOSes were not Y2K compliant.

For our next tests, we performed a series of date-related operations in various busi-



the system date on the first day of the new year. Boot your PC in DOS mode, type the command **date** followed by a space and the correct day and year (date 1/1/2000).

But older machines may revert to the wrong date the next time you turn them on. In our tests, no PC built before 1996 was able to retain the year 2000 (see "Back to the Future"). In such cases, the best solution is a BIOS upgrade. You can usually download BIOS upgrades from your PC vendor's or BIOS vendor's Web site. If your BIOS isn't flash upgradable, you may need to install a new BIOS chip. Or you may choose to replace your aging PC with a completely new machine.

Other fixes exist, though some are

worse than the disease. You can install a terminate-and-stay-resident program that loads every time you boot, then corrects any inaccurate dates before the BIOS passes them on to the operating system. The TSR solution makes sense only if you look after a fleet of machines—it's easier than testing them all and updating the BIOSes on many of them.

Another option is to use add-in cards that intercept calls to the BIOS and do the same job as TSRs. Like memory-resident programs, these increase the danger of conflicts—in this case with other hardware devices. And of course, you're paying money to fix a problem you might well be able to resolve for free.

## COMMERCIAL SOFTWARE Blind Dates and Bad Data

WHILE YEAR 2000 hardware glitches get all the press, a bigger problem for most users may be commercial applications like those in Microsoft Office, Corel WordPerfect Suite, or Lotus SmartSuite. As with PCs, the older the software, the less likely it is to be up to speed on Y2K issues. And even if your applications are relatively new, you may still encounter problems because of the way you or your colleagues have entered data into them.

## SURVIVING ARMAGEDDON QUESTIONS AND ANSWERS FOR THE YEAR 2000

THE YEAR 2000 is just a year away, and the problems it may cause extend beyond any single company, industry, or government. The real wild cards are so-called embedded systems—chips and circuitry that support such tasks as the operation of factory equipment, medical devices, and nuclear power plants. Y2K analysts estimate that there are 3 to 5 billion embedded systems—one for nearly every person on Earth.

When the clock strikes midnight on December 31, some of these systems will begin passing bad data to other systems. No one knows what the cumulative result will be. January 1, 2000, could be just another Saturday morning, or it could be the start of service disruptions affecting everything from your corner gas station to air traffic control. Here are answers to questions you may be asking:

### Will planes fall from the sky?

NO, BUT THEY MAY not get off the ground on time. "We have airline shutdowns all the time because of computer problems," says Peter

De Jager, owner of Year2000.com and an expert on Y2K issues. De Jager notes that baggage handling, flight scheduling, aircraft load balancing, and airport security all rely on date-dependent systems. If any of these fail, planes cannot fly on time. Think of Y2K as the mother of all storms, producing unpredictable delays as planes idle on the tarmac and airports run at reduced efficiency.

### Will the lights stay on?

FOR THE VAST MAJORITY of us, yes. Utility companies such as Commonwealth Edison in Chicago report being well along in their efforts, but everyone admits there is much more to do. "The chances are 100 percent that we will be sitting in the dark in pockets of the U.S.," says Tony Keyes, president of Y2K Enterprises, a consulting firm in Washington, D.C. "We'll probably be able to get those areas back online within 24 hours." But many analysts expect brownouts and rolling blackouts for days or weeks after the New Year arrives. Fortunately, New Year's Day is

on a Saturday, when power consumption tends to be low, which should make it easier for utilities to cover for plants that shut down in the wake of the date rollover. And federal law mandates that nuclear plants must shut down if their support systems—including local 911 service—are not operational.

### Will the phones work?

YES. SMALLER providers may experience problems, though De Jager says phone companies have worked hard to ensure that dial tones will be heard on New Year's Day. In particular, phones with date features may fall silent; and corporate PBX systems—which rely heavily on date and time stamps for voice-mail storage and other features—are another trouble spot. Also, try not to make any calls that span the millennial date change, says Chip Blaney, senior information systems engineer at Mitre, a not-for-profit organization that handles system integration for the U.S. government ([www.mitre.org/research/Y2K](http://www.mitre.org/research/Y2K)). You could get billed for a 99-year call!

### What about Internet access?

INTERNET ACCESS depends on lots of elements—your PC, electrical service, and phones must all be working. Beyond that, your Internet service provider must ensure that its hardware and software are Y2K ready—something you should ask your provider about. But even if your ISP is ready, the Internet may not be. A router may be Y2K compliant but could freeze up when a noncompliant device hands



Of course, a lot depends on your operating system. If you're still using Windows 3.x, you're relying on old 16-bit applications. Unfortunately, few software vendors are updating 16-bit apps for year 2000 compliance. The Y2K bug could force you to make that operating system upgrade you've avoided for four years.

For Windows 95 and 98 users, the millennium bug is a less worrisome issue, though Windows 95 has one notable Y2K glitch: an old, Windows 3.1-style File Manager that can't properly display dates after December 31, 1999. If you still use File Manager, get fixes at [support.microsoft.com/](http://support.microsoft.com/)

support/downloads. The version of File Manager that comes with Windows 98 doesn't need an upgrade.

### PIVOTAL DECISIONS

EXCEPT FOR A HANDFUL of minor glitches, current versions of all major office suites and financial packages are year 2000 compliant. The real question is how careful you and your colleagues have been when entering data. If you've reli-

giously entered four-digit years (1998, 1999) into your spreadsheets, databases, and accounting software, you probably have nothing to worry about. If you haven't, now is the time to fix those entries.

When you enter a two-digit year into Excel 97, for example, the program makes an assumption about whether the date intended is in the 1900s or the 2000s. Excel assumes that years from 00 to 29 are 2000 to 2029, while years from 30 to 99 are 1930 to 1999. If you type 1/15/29 into a cell, Excel will record this as January 15, 2029; enter 1/15/30, and you're back in 1930. The cut-off point between being ►

over a two-digit date it doesn't recognize. Enough of those errors can slow Net traffic to a crawl, or halt it altogether.

### What if I get sick?

"THE INFORMATION coming from the health care industry is so peculiar, I don't know what to make of it," says De Jager. "Take a recent survey of hospitals—including one that reported a 45 percent failure rate among some 1200 date-dependent systems—versus the Veterans Administration, which tested 1600 similar systems and found only one that was malfunctioning." Like power companies, hospitals must deal with embedded systems that can be extraordinarily difficult to access or reprogram. Devices that dispense medicines incrementally may stop functioning. Failure of automated systems may also disrupt services that handle staff tracking, patients' charts, and pharmaceuticals.

### Should I pull my money out of the bank?

THE FINANCIAL SYSTEM is in the best shape of any industry, says Robert Martin, associate section leader in information technologies directorate at Mitre. Still, he says, you should play some fiscal defense: "I'd get your personal records, statement of earnings, bank statements, and have them around. Get a credit report, in case bad credit reports start showing up." Michael P. Harden, CEO of Century Technology Services, a Y2K consultancy, sug-

gests withdrawing a one- or two-week supply of cash, just in case. The Federal Reserve plans to print an extra \$50 billion in bills to meet the expected demand for year 2000 withdrawals.

### How can I tell if a company has kept its Y2K promise?

TO BORROW a Cold War phrase: Trust but verify. If a bank or utility tells you its code will be complete by June, call the company in June. If progress has been minimal, reassess your options. The Securities and Exchange Commission now requires that legally binding Y2K updates be included in the annual reports and quarterly 10K statements of public companies. You can access these statements at the SEC's Web site ([www.sec.gov/edgarhp.htm](http://www.sec.gov/edgarhp.htm)), or you can obtain them by contacting the companies' investor relations departments.

### I'm a small-business owner—what should I do?

ANY TIME A BUSINESS faces potential disruptions, whether from a natural calamity or from a Y2K glitch, it needs to be prepared. But most small businesses have yet to recognize the Y2K threat, says Harden. Business owners

should make sure that their company's computers, equipment, and suppliers are Y2K ready. If your business relies on a certain supplier, meet with that vendor and assess its Y2K progress; make contingency arrangements with backup vendors just in case.

Also, schedule around the New Year: Build inventories to stave off delivery slowdowns, and plan to burn time working on Y2K issues.

### Will civilization collapse?

NO, SAYS De Jager: "Since events like the blackout of 1968 and the ice storm of 1998, we've found that local disturbances don't bring down the power grid. Montreal was down for three weeks. In Auckland [New Zealand], the entire downtown area was down for six weeks." Both these power outages disrupted services in ways similar to worst-case Y2K scenarios, yet in both cases the local communities and economies recovered quickly. Mitre's Martin is also optimistic: "Those of us who are working on the problem have more confidence. Even if the power grid went out, bringing it back up is fairly well understood."

### When will we know if the Y2K bug is fixed?

UNFORTUNATELY, we won't know until we get there. Though we'll see a growing number of disruptions throughout the year, it's impossible to tell precisely how things will play out when the clock strikes 12. —Michael Desmond





back-dated to the 1900s or fast-forwarded to the 2000s—30 in our example—is called the *pivot year*.

All programs that handle dates have their own pivot years (see "Know Your Pivot Years"). One major exception is Access 95, which attaches a '19' to all two-digit years—though a fix is available at [www.microsoft.com/technet](http://www.microsoft.com/technet). Pivot years vary from one program to the next, and even between different versions of the same package. For instance, Excel 97's pivot year is 30, but Excel 7.0's is 20. Enter 1/15/29 into Excel 7.0, and it will record the year as 1929.

#### FOUR DIGITS ARE BETTER THAN TWO

	A	B	C	D	E	F
1	20th Century Faux					
2						
3						
4		1900+		2000+		
5	01/01/1928				01/01/2028	
6	01/01/1929				01/01/2029	
7	01/01/1930				01/01/2030	
8	01/01/1931				01/01/2031	
9	01/01/1932				01/01/2032	
10	01/01/1933				01/01/2033	
11						
12						

THE DATE ENTRIES in these two Excel columns may look identical, but when you expand them to four-digit years, you find they're a century apart. Whenever you use two-digit years, you're begging for year 2000 problems.

The problem arises when your software accidentally assigns a date to the wrong century. Suppose you have a Lotus 1-2-3 97 spreadsheet that tracks employee retirement benefits. Lotus 97's pivot year is 50. If you enter a birth date of 1/15/34 for one of your employees, the program will say she was born in 2034.

Obviously, if you use formulas based on inaccurate dates—say, to calculate projected market growth or the interest on long-term loans—you'll get incorrect data. And you may not find out until it's too late.

#### WATCH THOSE APPS

FORTUNATELY, PIVOT DATES are usually set far enough into the future that most of your data won't be adversely affected. But the only way to be sure is to inventory all your relevant data files, starting with spreadsheet, database, and accounting files. You'll also want to examine your schedulers and any other software that depends on date calculations.

The first thing you need to do is change Windows' default short-date format to display four-digit years. That will help you catch errors in your data files. To change this setting, click the *Start* button and select *Settings*•*Control Panel*. Double-click *Regional Settings* and click the *Date* tab. Change 'Short date style' to *m/d/yyyy*; then click *OK* and close *Control Panel*.

The next step is to pore over your key spreadsheet, accounting, and database files, looking for date information and formulas with date calculations. If you don't have time to examine all of your files, start with those that are vital to your business.

Fortunately, several commercial packages can help you search for potential problems. The best we've found is Greenwich Mean Time UTA's Check 2000 PC Deluxe (see "Software to the Rescue"). This package will also check your BIOS for Y2K problems.

But realize that no program will solve all your Y2K woes. The only cure is to carefully check all the files you use to run your business—and keep checking them as you add new data.

## CUSTOM APPLICATIONS Danger in Numbers

THE DANGERS posed by shrink-wrapped, commercial software are nothing compared to the threats from custom-built applications. Even your favorite Excel macros may harbor Y2K snags. If you've ever purchased a software package that was written for your particular type of business, or if you've ever hired someone to write one for you, you have the most to lose from a year 2000 glitch.

For one thing, these apps typically involve accounting, inventory, and other functions where a miscalculated date can destroy your data and possibly ruin your business. If your accounting module can't handle an invoice dated 01/15/00—or if it records the transaction as 99 years ▶

## KNOW YOUR PIVOT YEARS

**QUICK, WHAT CENTURY IS IT?** If you enter a date like 1/15/20 into a spreadsheet, the program automatically assigns a century based on its own internal pivot year. All dates that fall below the pivot year land in the 2000s; the rest are consigned to the 1900s. Knowing what pivot year your software uses is important for smoking out year 2000 conflicts. Here are the pivot years used by the major spreadsheets, databases, personal information managers, and personal finance packages.

APPLICATION	PIVOT YEAR <sup>1</sup>
<b>Corel (<a href="http://www.corel.com/2000.htm">www.corel.com/2000.htm</a>)</b>	
CorelCentral 8	51
Paradox 7.0	51
Paradox 8	51
Quattro Pro 7.0	51
Quattro Pro 8	51
<b>Intuit (<a href="http://www.intuit.com/support/year2000.html">www.intuit.com/support/year2000.html</a>)</b>	
Quicken 98/99	28
<b>Lotus (<a href="http://www.wyr2k.raleigh.ibm.com">www.wyr2k.raleigh.ibm.com</a>)</b>	
1-2-3 97	50
1-2-3 Millennium	current + 20 <sup>2</sup>
Approach 97	30
Approach Millennium	current + 20 <sup>2</sup>
Organizer 97	current + 50 <sup>2</sup>
Organizer Millennium	current + 20 <sup>2</sup>
<b>Microsoft (<a href="http://www.microsoft.com/year2000">www.microsoft.com/year2000</a>)</b>	
Access 95	none <sup>3</sup>
Access 97	30
Access 2000 <sup>4</sup>	30
Excel 7.0	20
Excel 97	30
Excel 2000 <sup>4</sup>	30
Money 97	48
Money 98/99	varies <sup>5</sup>
Outlook 97	current + 70 <sup>2</sup>
Outlook 98	current + 70 <sup>2</sup>
Outlook 2000 <sup>4</sup>	30
Schedule Plus	80

<sup>1</sup> The lowest two-digit number assumed to be in the 1900s.

<sup>2</sup> The system date plus xx years. For instance: In 1999, "current + 20" means the pivot year is 19.

<sup>3</sup> Access 95 has no pivot year. A patch, available from Microsoft's Web site, provides a pivot year of 30.

<sup>4</sup> Upcoming release.

<sup>5</sup> If the two-digit year + 1900 is more than 33 years in the past, Money uses year + 2000.



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# SOFTWARE TO THE RESCUE

IF YOU HAD TO manually check every application and data file for Y2K problems, that's all you'd be doing until 2000. Fortunately, a good utility can automate the job.

Commercial year 2000 programs check both hardware and software for Y2K glitches. Simply load the program, tell it to inspect your system, and break for lunch. You'll come back to find a report detailing known problems with your software. The best utilities also inspect your data (spreadsheets, databases, and time-dependent documents) finding suspect dates and two-digit numbers that might represent years.

While most Y2K inspection programs are intended for large IS departments, I found four programs priced for single users. I tested each of them using data files created in Access, Excel, Paradox, and a custom-built application, as well as plain text files.

## Lean and Mean

THE BEST OF THE LOT was Greenwich Mean Time UTA's \$60 **Check 2000 PC Deluxe**. It has an easy, wizard-based interface and offers clear descriptions of the problems it finds. It was the only program that noticed Windows' two-digit short-date format. It also pointed out questionable two-digit numbers in an Excel worksheet—again, something no other package did. It comes with a perfectly good hardware tester that checks the BIOS upgrade without forcing you to reboot.

Compare that to Intelliquis's \$19 **Fix2000**, which calls itself "the complete year 2000 solution" but doesn't bother to check your data. **Fix2000** "fixes" your programs by scanning for .exe files that are on its list of bad programs. For instance, the program considers Windows 95's `command.com` (the DOS prompt program) to be noncompliant, because if you enter the DOS command 'date 01-01-00', `command.com` responds with an error message. (However, `command.com` accepts the command 'date 01-01-2000'.) After **Fix2000** fixed my `command.com`, typing 'date 01-01-00' froze my system. Luckily, the program allowed me to undo its fix.

Network Associates' **2000 ToolBox** offers a friendly, wizard-based interface, but the \$30 program missed all my database problems.

It didn't raise an eyebrow at two-digit data entries in Access or at a dBASE file with suspect years. The utility found something wrong with my hardware but wouldn't tell me what it was (**Fix2000** did that, too); it just noted that the hardware wasn't compliant and said I could remedy the problem by installing its terminate-and-stay-resident program.

I also tested Symantec's **Norton 2000 Corporate Edition**, since the retail version was unavailable at press time. It missed problems that **Check 2000 PC Deluxe** caught—like spreadsheet cells containing two-digit



years not formatted as dates—and offered explanations that needed a translator: "Schema contains field definition with internal format date type." A \$50 single-user version with a revamped interface should be available by the time you read this. —Lincoln Spector

• **2000 ToolBox**; \$30 list; Network Associates; 800/332-9966; [www.nai.com](http://www.nai.com)

PC WORLD INFONET NO. 602

• **Check 2000 PC Deluxe**; \$60 list; Greenwich Mean Time UTA; 800/216-5545; [www.gmt-uta.com](http://www.gmt-uta.com)

PC WORLD INFONET NO. 603

• **Fix2000**; \$19 street; Intelliquis; 801/553-1127; [www.intelliquis.com](http://www.intelliquis.com)

PC WORLD INFONET NO. 604

• **Norton 2000 Corporate Edition**; \$75 list per node, individual-user version \$50 list; Symantec; 800/441-7234; [www.symantec.com](http://www.symantec.com)

PC WORLD INFONET NO. 605

overdue—you've got a serious problem.

Even worse, you may not be able to find the people who wrote the program—and if you don't own the source code, you won't be able to hire someone else to fix it.

What should you do? First, identify any custom apps your business may use, and contact the vendors (or authors, if the software was written in-house). Quiz them about the software's Y2K compliance, and get detailed answers in writing.

But don't rely on the vendor's word. You or someone in your organization should reinstall each program on an isolated computer and run tests using dummy data. Does the program even run when

the system date is 1/1/2000 or later? Can it store four-digit years? What happens when you enter a date with a two-digit year? Can you set a convenient pivot year? Do queries and formulas work across the centuries?

Macros are easier to deal with, especially if you wrote them yourself. If you have automated your work in Visual Basic for Applications or some other macro language, identify any crucial macros that handle dates.

Check and update their code carefully, and then test them using two- and four-digit years in both centuries.

## CODE DEPENDENTS

OK, YOU'VE TESTED the software and found a few millennium bugs. Now what? If you can't locate the vendor who sold you the program, or if the employee who wrote it now works for the competition, your options are limited. If you own the source code, you can hire a programmer who is competent in the relevant code language to identify problems with the code and repair them.

Otherwise, you'll need to replace your old software with something that's ready for year 2000 and beyond. If you can find a competing product to replace your custom app, contact that product's makers and ask about its Y2K compliance. Get ►



assurances in writing, if you can. Make sure you can transfer your data from the old software to your new package.

If the application was created just for your company, look for a local consultant who can build you a similar (but bug-free) program. Get references from other companies in your area to locate a competent consultant, or check out Y2K information sites on the Web (see "Online Help for Y2K Snares"). Show the newly hired consultant your existing program as an example of what you need.

## EXCHANGING DATA The Bug Bites Back

YOU'VE BOUGHT new software, chased short-form dates out of your files, and updated your BIOS. You've got the Y2K bug beat six ways to Sunday, right? Wrong.

Data from outside sources can still throw you for a loop. Data that you import from another program into your spreadsheet may contain dates in a two-digit format. If it does, your software will assign a century based on its own pivot year—but will it be the right century? If you're sharing data with programs that aren't Y2K savvy, you're in for a rash of problems.

The solution: Screen all data files for date problems before you use them. Better yet, run them through a software compliance checker (like Check 2000 PC Deluxe). If you share data with suppliers or clients, discuss your year 2000 data policy with them before you exchange files.

### SERVER SNAFUS

YOUR NETWORK may also trip you up. Windows NT 4.0 (Network version), for example, peeks directly at your server's RTC to get date information. But as noted earlier, most RTCs are not Y2K aware—system makers rely on a smart BIOS to pass the proper date and time along. NT will detect and fix some problems—for instance, it will interpret any two-digit date below 20 as 20xx—but other snags can cause Windows NT to reset to Microsoft's baseline 1980 date.

And if your server thinks it's 1980, so will everything else on the local area net-

work. Network PCs get their time data from the server. What's more, a confused server can mangle backup routines, confused e-mail time stamps, and hose your scheduling and calendar software.

The solution? Consider replacing your server hardware with truly Y2K-ready hardware, or at the very least use time-service software, which points systems to a reliable time source at boot-up. Greyware's Domain Time Software lets your NT server pull time data from another server on the network or from publicly available time services on the Internet. Coetanian Systems' Time Synchronization Server 100 grabs time information from Global Positioning System satellites.

• **Domain Time Software;** \$42 list; Greyware; 972/867-2794; [www.greyware.com/software/domaintime](http://www.greyware.com/software/domaintime)

PC WORLD INFONET NO. 606

• **Time Synchronization Server 100;** \$1995 list; Coetanian Systems; 650/917-0130; [www.coetanian.com](http://www.coetanian.com)

PC WORLD INFONET NO. 607

### I'M Y2K, YOU'RE Y2K

NO ONE CAN anticipate all the damage the millennium bug may cause. Many of the problems won't be caught until they happen. And while the bulk of the year 2000 glitches will occur outside your PC, it's still important to do as much Y2K system housekeeping as you can now, to minimize headaches later.

Besides, if the digital doomsayers are right, you'll have plenty of things other than your PC to worry about when the clock rolls over to January 1, 2000.



Find files discussed in this article on PC World Online's FileWorld ([www.fileworld.com/magazine](http://www.fileworld.com/magazine)).

Contributing Editor Lincoln Spector writes PC World's Answer Line and a syndicated humor column, Giggglebytes. Contributing Editor Michael Desmond writes PC World's Windows NT column. Susan Silvius is a San Francisco Bay Area-based freelance writer. Katherine Ozment is a senior associate editor for PC World. ■

## ONLINE HELP FOR Y2K SNARES

**NOT SURE IF YOUR PC** houses a millennium bug? Or just want to know what *could* go wrong when the ball drops on December 31, 1999? Visit the following sites for useful information on all things Y2K.

**Y2K News Magazine** [www.y2knews.com](http://www.y2knews.com). The online version of the eponymous print magazine, Y2K News offers a wellspring of information for the general consumer. Its articles, links to vendor compliance reports, expert commentary, and chat rooms are easy to access and easy to read.

**The Year 2000 Information Center** [www.year2000.com](http://www.year2000.com). Aimed primarily at the suit-and-wing-tip crowd, this clearinghouse packs its punch with news archives, links to consultants who fix millennium bugs, and articles on how businesses can avoid liability if all hell really does break loose.

**Vendor 2000** [www.vendor2000.com](http://www.vendor2000.com). Beam yourself here to view an updated list of compliant and noncompliant wares, or if your company is ready to cough up some cash for large-scale prevention measures.

**Microsoft Year 2000 Resource Center** [www.microsoft.com/technet/topics/year2k](http://www.microsoft.com/technet/topics/year2k). Will your software stand the test of time? Bill's content lists the bulk of Microsoft's product line—with details on which programs are compliant and which aren't—and advises users on how to evaluate their companies' ability to avert a millennial meltdown.

**Yahoo News Year 2000 Problem headlines.** [yahoo.com/full\\_coverage/tech/year\\_2000\\_problem](http://yahoo.com/full_coverage/tech/year_2000_problem). Yahoo's Y2K arm keeps it sweet and simple with news, links to other sites, and suggested books, articles, and conferences—all rounded out with the usual fare of forums and message boards.

**The Cassandra Project** [www.millennia-bcs.com](http://www.millennia-bcs.com). Got powdered milk? This grassroots organization (named for the mythical prophet doomed to be disbelieved) wants to prepare communities for the worst. Stop here to learn about public safety risks and how to avoid them. You'll also find links to a wilderness survival school and, no kidding, a lesson in how to trap muskrat. —Katherine Ozment



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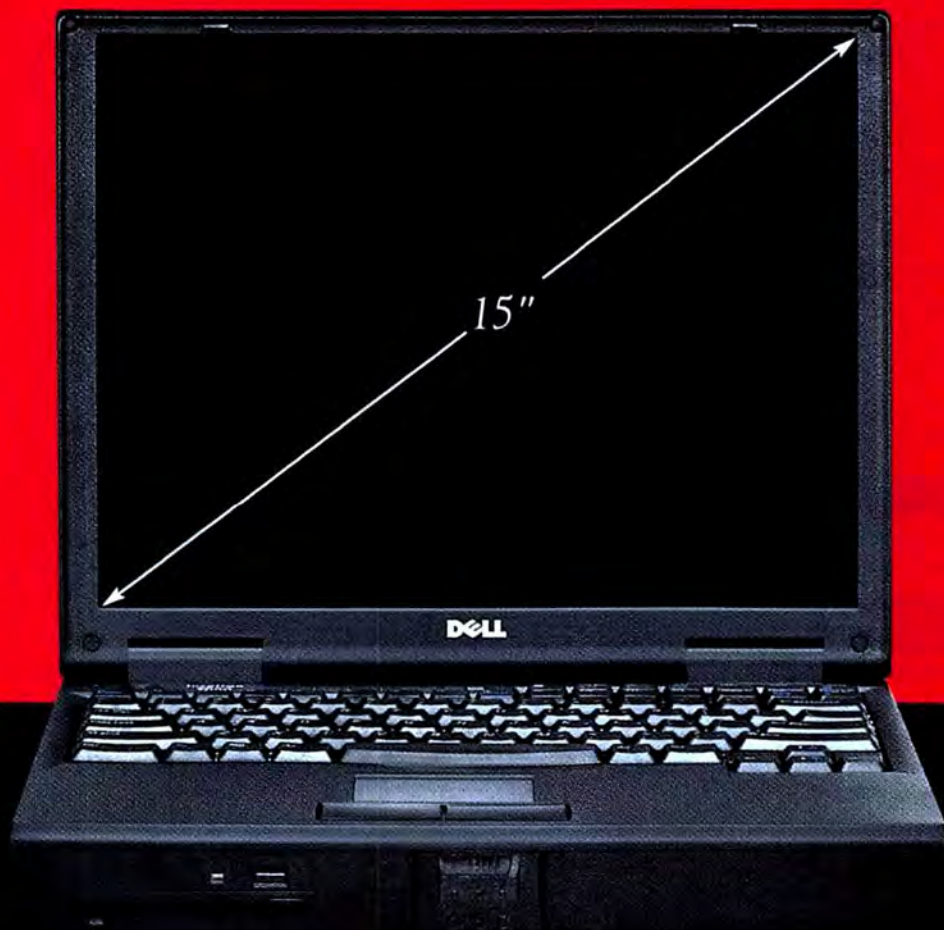
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- Microsoft® Office 97 Small Business Edition v2.0
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- 3-Year Limited Warranty†
- ★ Internal 56K Capable V.90 Fax Modem, add \$99.

**\$2899**

Business Lease\*: \$110/Mo., 36 Mos.  
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## DELL INSPIRON 7000 D300GT PENTIUM II PROCESSOR AT 300MHz FEATURING MMX TECHNOLOGY

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- 32MB SDRAM (384MB Max\*)
- 4GB Ultra ATA Hard Drive
- Removable Combo 24X Max\*\* Variable CD-ROM and 3.5" Floppy Drive
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- Intelligent Lithium Ion Battery
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- Microsoft Windows 98/Touchpad
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### All-in-One Multimedia Performance

- 14.1" XGA Active Matrix Display
- 32MB SDRAM (384MB Max\*)
- 4GB Ultra ATA Hard Drive
- Removable Combo 24X Max\*\* Variable CD-ROM and 3.5" Floppy Drive
- 2X AGP 4MB ATI Rage Pro 3D Video
- 3D Surround Sound and Hardware Wavetable
- Intelligent Lithium Ion Battery
- Deluxe Nylon Case
- Microsoft Office 97 Small Business Edition v2.0
- Microsoft Windows 98/Touchpad
- 3-Year Limited Warranty†
- ★ Upgrade to 96MB SDRAM, add \$199.

**\$2399**

Business Lease\*: \$91/Mo., 36 Mos.  
Order Code #891209

## NEW DELL INSPIRON 3500 D266GT PENTIUM II PROCESSOR AT 266MHz FEATURING MMX TECHNOLOGY

### Light Weight, Light Price

- 14.1" XGA Active Matrix Display
- 32MB SDRAM (256MB Max)
- 3.2GB Ultra ATA Hard Drive
- Modular 24X Max\*\* Variable CD-ROM
- Modular 3.5" Floppy Drive
- NeoMagic MediaMagic 256AV AGP Video
- 3D Surround Sound and Software Wavetable
- Intelligent Lithium Ion Battery
- Deluxe Nylon Case
- Microsoft Office 97 Small Business Edition v2.0
- Microsoft Windows 98/Touchpad
- 3-Year Limited Warranty†

**\$2299**

Business Lease\*: \$87/Mo., 36 Mos.  
Order Code #891205

## NEW DELL INSPIRON 3500 D233XT PENTIUM II PROCESSOR AT 233MHz FEATURING MMX TECHNOLOGY

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- 13.3" XGA Active Matrix Display
- 32MB SDRAM (256MB Max)
- 3.2GB Ultra ATA Hard Drive
- Modular 24X Max\*\* Variable CD-ROM
- Modular 3.5" Floppy Drive
- NeoMagic MediaMagic 256AV AGP Video
- 3D Surround Sound and Software Wavetable
- Intelligent Lithium Ion Battery
- Microsoft Office 97 Small Business Edition v2.0
- Microsoft Windows 98/Touchpad
- 3-Year Limited Warranty†
- ★ Upgrade to 64MB SDRAM, add \$99.

**\$1999**

Business Lease\*: \$76/Mo., 36 Mos.  
Order Code #891207

## DELL LATITUDE CPi D300XT PENTIUM II PROCESSOR AT 300MHz FEATURING MMX TECHNOLOGY

### Network Optimized

- 13.3" XGA Active Matrix Display
- 64MB EDO RAM
- 4GB Ultra ATA Hard Drive
- Modular 24X Max\*\* Variable CD-ROM
- Modular 3.5" Floppy Drive
- NeoMagic 128-bit Graphics Accelerator
- 3D Surround Sound and Software Wavetable
- Intelligent Lithium Ion Battery with ExpressCharge™ Technology
- MS® Windows NT® Workstation 4.0
- Touchpad
- 3-Year Limited Warranty†
- 1-Year On-site\* Service

**\$2999**

Business Lease\*: \$114/Mo., 36 Mos.  
Order Code #891212

## DELL LATITUDE CP D233ST PENTIUM PROCESSOR WITH MMX TECHNOLOGY AT 233MHz

### Network Optimized

- 12.1" SVGA Active Matrix Display
- 32MB EDO RAM
- 4GB Ultra ATA Hard Drive
- Modular 20X Max\*\* Variable CD-ROM
- Modular 3.5" Floppy Drive
- NeoMagic 128-bit Graphics Accelerator
- 3D Surround Sound and Software Wavetable
- Intelligent Lithium Ion Battery with ExpressCharge Technology
- MS Windows NT Workstation 4.0
- Touchpad
- 3-Year Limited Warranty†
- 1-Year On-site\* Service

**\$2199**

Business Lease\*: \$83/Mo., 36 Mos.  
Order Code #891204

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A black Dell server tower is shown against a solid green background. The server has a front panel with a large rectangular vented area in the center, a smaller vented area above it, and a control panel on the left side with several buttons and a small display. The Dell logo is visible on the front panel.

Your business depends upon your people. And your people depend on your server. Which is why our mantra at Dell is server reliability, server reliability, server reliability. Every step of the way we build our servers to deliver the most reliable performance possible. We design them to be as low-maintenance as possible. And as easy to upgrade as possible. So you can keep on getting the most out of your people as your business grows. Of course, we back every server with our award-winning service and support, so your IT people can make the most of their time, too. Call us or go to [www.dell.com](http://www.dell.com) today.





# PEOPLE.

## DELL POWEREDGE 2300 SERVER PENTIUM II PROCESSOR AT 350MHz (DUAL PROCESSOR/RAID CAPABLE)

- 64MB 100MHz ECC SDRAM
- 512KB Integrated L2 ECC Cache
- 4GB Ultra-2/LVD SCSI Hard Drive (Hot-Swap Optional)
- 32X Max<sup>®</sup> Variable SCSI CD-ROM Drive
- HP<sup>®</sup> OpenView<sup>™</sup> NNM Special Edition
- Intel<sup>®</sup> Pro/100B PCI Ethernet Adapter
- Integrated Ultra-2/LVD and Ultra/Narrow SCSI Controllers
- 6 Expansion Slots: 4 PCI, 2 PCI/ISA
- 4-1.6" or 6-1" Hard Drive Bays
- 3 External 5.25" Drive Bays plus Dedicated 3.5" Floppy Drive Bay
- 3-Year NBD On-site<sup>®</sup> Service
- 7x24 Server Hardware Technical Support
- ★ Upgrade to a Pentium II Processor at 400MHz, add \$300.
- ★ Upgrade to a 9GB Ultra-2/LVD SCSI Hard Drive, add \$250.

### \$2449

Business Lease<sup>®</sup>: \$93/Mo., 36 Mos.  
Order Code #251204

## DELL POWEREDGE 2300 SERVER PENTIUM II PROCESSOR AT 400MHz (DUAL PROCESSOR/RAID CAPABLE)

- 128MB 100MHz ECC SDRAM
- 512KB Integrated L2 ECC Cache
- 9GB Ultra-2/LVD SCSI Hard Drive (Hot-Swap Optional)
- 32X Max<sup>®</sup> Variable SCSI CD-ROM Drive
- Microsoft<sup>®</sup> Windows NT<sup>®</sup> Server 4.0 (10 Client Access Licenses)
- HP OpenView NNM Special Edition
- Intel Pro/100B PCI Ethernet Adapter
- Integrated Ultra-2/LVD and Ultra/Narrow SCSI Controllers
- 6 Expansion Slots: 4 PCI, 2 PCI/ISA
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- 3-Year NBD On-site<sup>®</sup> Service
- 7x24 Server Hardware Technical Support
- ★ Upgrade to a Pentium II Processor at 450MHz, add \$300.

### \$3999

Business Lease<sup>®</sup>: \$151/Mo., 36 Mos.  
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## DELL POWEREDGE 2300 SERVER PENTIUM II PROCESSOR AT 450MHz (RAID 5 CONFIGURATION)

- 128MB 100MHz ECC SDRAM
- 512KB Integrated L2 ECC Cache
- Three 9GB Ultra-2/LVD SCSI Hot-Swap Hard Drives
- Ultra-2/LVD PowerEdge Expandable RAID Controller 2/SC
- 32X Max<sup>®</sup> Variable SCSI CD-ROM Drive
- HP OpenView NNM Special Edition
- Intel Pro/100B PCI Ethernet Adapter
- Integrated Ultra-2/LVD and Ultra/Narrow SCSI Controllers
- 6 Expansion Slots: 4 PCI, 2 PCI/ISA
- 6-1" Hard Drive Bays
- 3 External 5.25" Drive Bays plus Dedicated 3.5" Floppy Drive Bay
- 3-Year NBD On-site<sup>®</sup> Service
- 7x24 Server Hardware Technical Support
- ★ Upgrade to 256MB 100MHz ECC SDRAM, add \$389.

### \$5499

Business Lease<sup>®</sup>: \$202/Mo., 36 Mos.  
Order Code #251202

## DELL POWEREDGE 4300 SERVER PENTIUM II PROCESSOR AT 450MHz (DUAL PROCESSOR/RAID CAPABLE)

- 128MB 100MHz ECC SDRAM
- 512KB Integrated L2 ECC Cache
- 18GB Ultra-2/LVD SCSI Hard Drive (Hot-Swap Optional)
- 32X Max<sup>®</sup> Variable SCSI CD-ROM Drive
- HP OpenView NNM Special Edition
- Intel Pro/100+ PCI Ethernet Adapter
- Integrated Ultra-2/LVD and Ultra/Narrow SCSI Controllers
- Redundant Hot-Pluggable Power Supplies, Cooling Fans and Processor Fans
- 6 Expansion Slots: 4 PCI, 2 PCI/ISA
- 10 Drive Bays: 6 Drive Bays, 4 Removable Media Bays
- 3-Year NBD On-site<sup>®</sup> Service
- 1-Year DirectLine<sup>™</sup> Network Operating System Support
- 7x24 Server Hardware Technical Support

### \$5999

Business Lease<sup>®</sup>: \$220/Mo., 36 Mos.  
Order Code #251209

## DELL POWEREDGE 4300 SERVER DUAL PENTIUM II PROCESSORS AT 350MHz (DUAL PROCESSOR/RAID 5 CONFIGURATION)

- 128MB 100MHz ECC SDRAM
- 512KB Integrated L2 ECC Cache
- Three 9GB Ultra-2/LVD SCSI Hot-Swap Hard Drives
- Ultra-2/LVD PowerEdge Expandable RAID Controller 2/SC
- 32X Max<sup>®</sup> Variable SCSI CD-ROM Drive
- HP OpenView NNM Special Edition
- Intel Pro/100+ PCI Ethernet Adapter
- Integrated Ultra-2/LVD and Ultra/Narrow SCSI Controllers
- Redundant Hot-Pluggable Power Supplies, Cooling Fans and Processor Fans
- 6 Expansion Slots: 4 PCI, 2 PCI/ISA
- 10 Drive Bays: 6 Drive Bays, 4 Removable Media Bays
- 3-Year NBD On-site<sup>®</sup> Service
- 7x24 Server Hardware Technical Support

### \$7449

Business Lease<sup>®</sup>: \$270/Mo., 36 Mos.  
Order Code #251208

## DELL POWEREDGE 6300 SERVER PENTIUM II XEON<sup>™</sup> PROCESSOR AT 400MHz (QUAD PROCESSOR CAPABLE)

- 128MB ECC EDO Memory
- 512KB Integrated L2 Cache per Processor
- Three 9GB Ultra-2/LVD SCSI Hot-Swap Hard Drives
- Dual Channel PowerEdge Expandable RAID Controller
- Triple Peer PCI Bus
- 32X Max<sup>®</sup> Variable SCSI CD-ROM Drive
- HP OpenView NNM Special Edition
- Intel Pro/100+ PCI Ethernet Adapter
- Integrated Dual Ultra-2/LVD and Ultra/Narrow SCSI Controllers
- Redundant Hot-Pluggable Power Supplies, Cooling Fans and Processor Fans
- 7 Expansion Slots: (4) 64-bit, (3) 32-bit PCI
- 10 Drive Bays: 6 Drive Bays, 4 Removable Media Bays
- 3-Year NBD On-site<sup>®</sup> Service
- 7x24 Server Hardware Technical Support

### \$9999

Business Lease<sup>®</sup>: \$362/Mo., 36 Mos.  
Order Code #251211



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- 3Com<sup>®</sup> USRobotics 33.6K Fax
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- 1-Year DirectLine Network Operating System Support

Available on the Dell PowerEdge 2300 only. Price valid with system purchase.

### DELL SERVER AWARD INFO

- Network World "World Class Award" for flexibility, serviceability and manageability – Dell PowerEdge 2300.
- Computer Shopper "Top 100" – Dell PowerEdge 2300.

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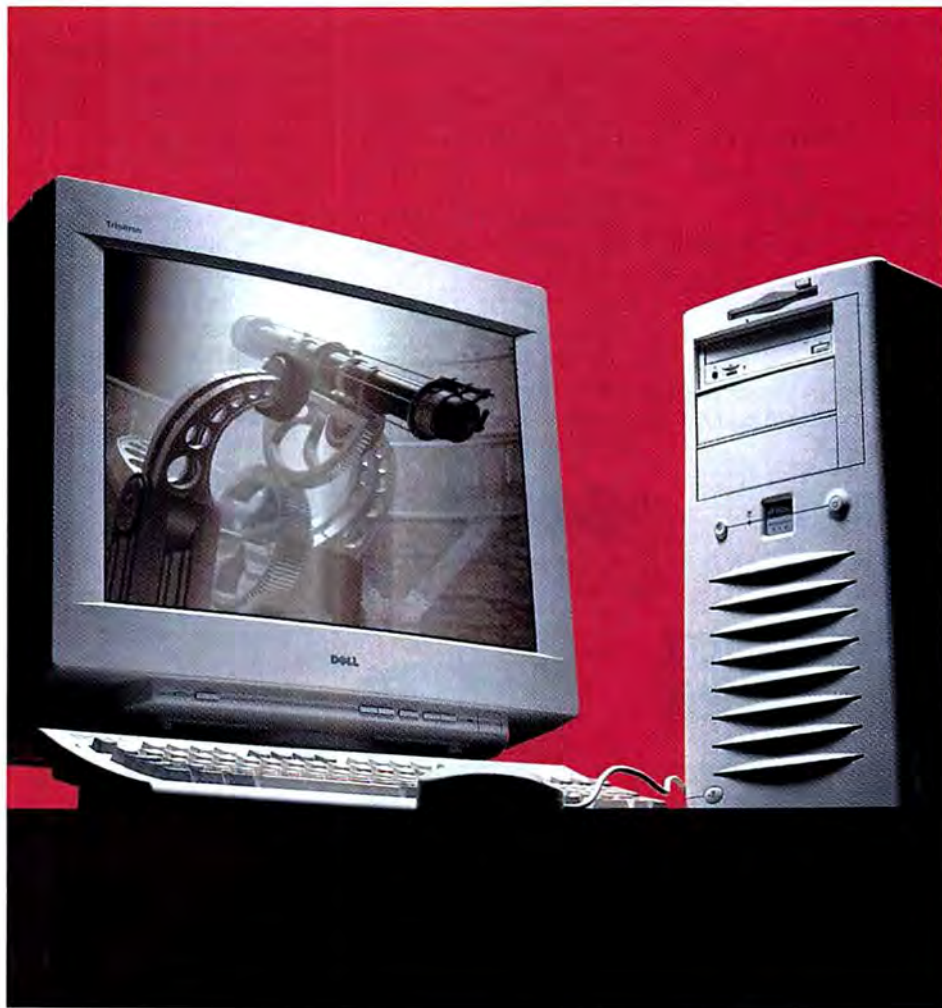
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- **MS® Windows NT® 4.0 and 1-Year NT Telephone Support**
- 3-Year NBD On-site<sup>a</sup> Service
- 7x24 Dedicated Workstation Hardware Telephone and Online Technical Support

### \$5299

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- 32X Max\* Variable CD-ROM Drive
- Sound Blaster Pro Compatible Sound
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- 3Com Fast EtherLink XL 10/100 PCI Network Interface
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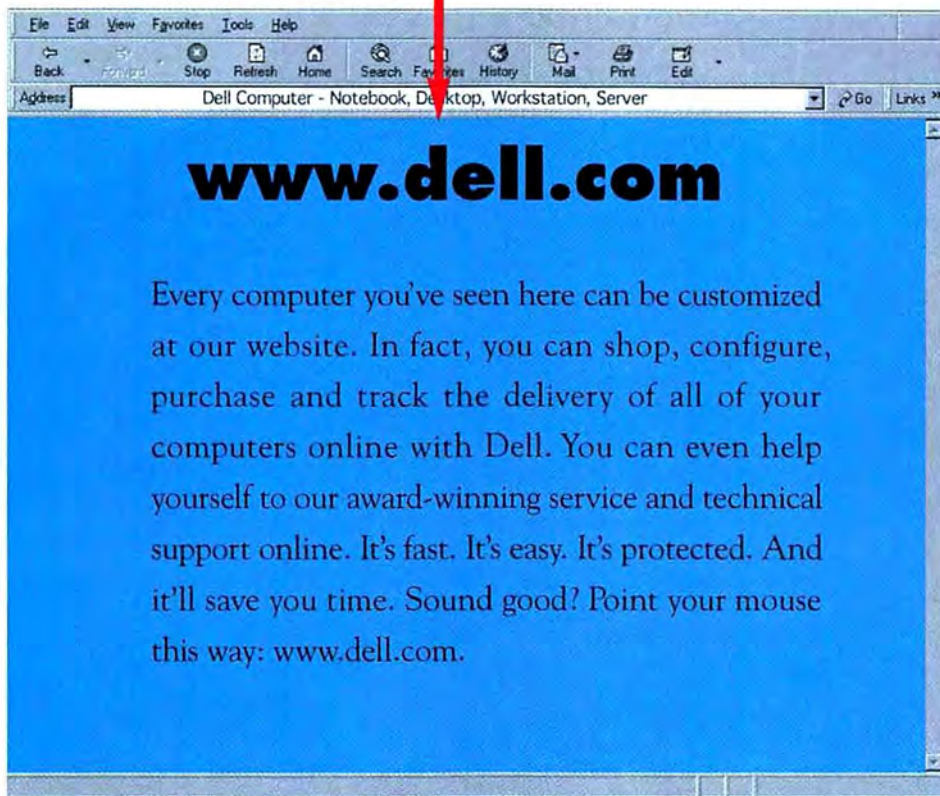
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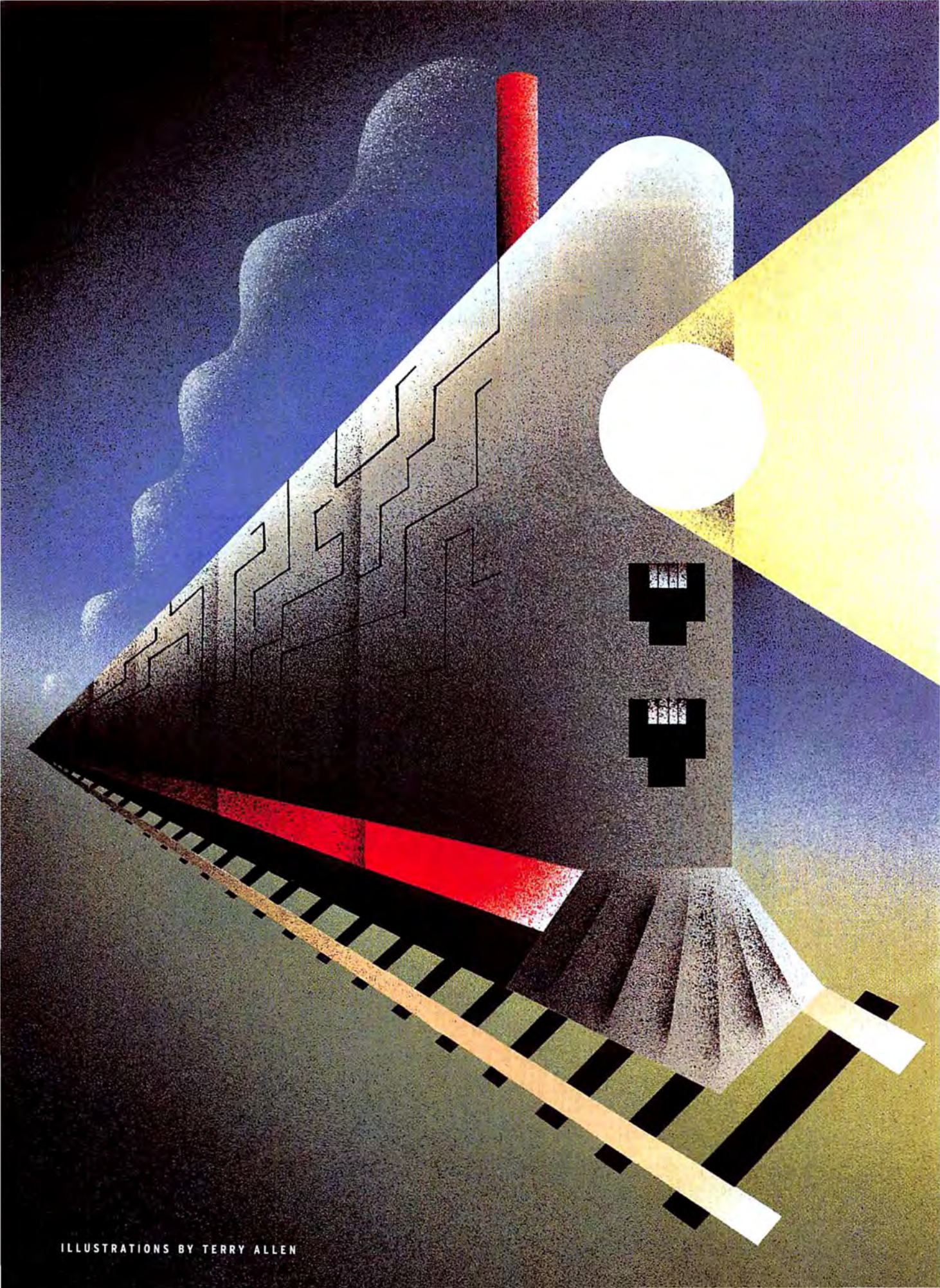
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# V.90 MODEMS: The End *of* the Line

These 56-kbps speed demons are the last analog modems you'll ever buy. And they won't get much cheaper, either.

BY DAVID ENGLISH

THE WAR of the modem standards is over. After a year of wild performance claims and vicious market-share fighting, both 56-kbps camps—x2 and K56flex—agreed to the new V.90 standard. Who won? In the long run, modem buyers. You'll no longer have to worry about picking the wrong side: V.90 is now, in most cases, your only choice.

The victory is somewhat bittersweet. V.90 has all the same problems that plagued the formerly warring protocols. For starters, don't expect to actually connect at 56 kilobits per second. Our test results for this roundup showed only a 50 percent speedup over V.34. Your results could be even lower as line noise, network traffic, and the wiring in your house play havoc with transfer rates. As in pre-V.90 times, you'll get transfer speeds approaching ►



56 kbps only when receiving data. When you send files from your PC, the pipeline constricts back to 33.6 kbps or less. Also, not all Internet service providers have been quick to upgrade fully to the V.90

modem will be the last analog modem you buy. "The theoretical limit is 64 kbps," explains Lisa Pelgrim, an analyst with Dataquest in San Jose, California. "It makes little sense to go from 56 [kbps] to

But V.90 isn't for everyone. If your workplace or home is more than 3.5 miles from a telephone switching office, you might effectively be limited to 33.6 kbps. If your phone line suffers from excessive line noise (not necessarily audible) and your V.34 modem rarely connects at speeds faster than 21.6 kbps, you may encounter trouble connecting at V.90 speeds. An overcrowded phone line may present another obstacle; four or more devices on the same line can prevent 56-kbps connections. Already have an x2 or K56flex connection? You probably don't need to do a thing. That's because you're not likely to get any performance boost from V.90 over K56flex or x2.

Whichever V.90 modem you select, prices are at an all-time low. For the first time, the average price of our review modems is under \$100; a year ago the average price of our top five internal modems was

## For the first time, the average price of our review modems is under \$100.

standard; a portion of their access points will remain x2- or K56flex-based for some time to come (see "You've Got V.90—But Does Your ISP?").

Who should buy a V.90 modem? Anyone who still has a 33.6-kbps or slower modem, connects regularly to an Internet service provider or online service like AOL that offers 56-kbps connect rates, and has phone wiring that allows connections above 33.6 kbps. In all likelihood, a V.90

64 when a manufacturer can put its R&D dollars somewhere else." Faster digital-based protocols have their own limitations. ISDN is expensive to install and operate, while DSL and cable modems require equipment upgrades by the telephone or cable company. If you're looking for a low-cost solution that's widely available now, V.90 is the best way to go, especially since modem prices are dropping like never before.

### V.90 56-KBPS INTERNAL MODEMS

	MODEM	Street price (10/15/98)	Card type/controller	Scorecard				
				Performance	Features	Documentation/installation	Software bundle	Support quality/policies
1	 IBM 56K Modem Internet Kit 800/772-2227 <a href="http://www.ibm.com/pc/us/accessories">www.ibm.com/pc/us/accessories</a>	\$99	ISA/○	above average	above average	fair/good	outstanding	outstanding/outstanding
2	 Zoom Fax/Modem 56K-PCI Dualmode 800/631-3116 <a href="http://www.zoomtel.com">www.zoomtel.com</a>	\$64	PCI/○	below average	average	good/good	good	good/good
3	Diamond Multimedia SupraExpress 56i 56i 800/468-5846 <a href="http://www.diamondmm.com">www.diamondmm.com</a>	\$100	ISA/●	average	average	good/good	good	good/good
4	Wisecom Accelerator Pro 56K Voice Fax Modem 888/947-3266 <a href="http://www.wisecominc.com">www.wisecominc.com</a>	\$99	ISA/●	above average	average	good/good	good	good/fair
5	Apache Micro Peripherals NetExpress 56K Fax Modem 800/330-1328 <a href="http://www.apache-micro.com">www.apache-micro.com</a>	\$88	ISA/●	below average	above average	good/good	good	good/fair
6	3Com U.S. Robotics 56K Faxmodem 800/342-5877 <a href="http://www.3com.com">www.3com.com</a>	\$129	ISA/●	average	average	good/outstanding	good	outstanding/fair
7	3Com Courier V.Everything 56K Analog Corporate Modem 800/638-3266 <a href="http://www.3com.com">www.3com.com</a>	\$240	ISA/●	average	average	good/good	good	outstanding/outstanding
8	E-Tech CyberBullet PCI56RVP 888/609-8885 <a href="http://www.e-tech.com">www.e-tech.com</a>	\$59	PCI/○	below average	average	poor/poor	good	fair/good
9	Boca WinStorm 56K Internal Speakerphone Modem 561/241-8088 <a href="http://www.bocaresearch.com">www.bocaresearch.com</a>	\$69	PCI/○	below average	average	good/good	good	good/good
10	MaxTech NetPacer Pro PCI Modem Series 800/936-7629 <a href="http://www.maxcorp.com">www.maxcorp.com</a>	\$45	PCI/○	above average	below average	poor/poor	good	fair/fair
11	Archtek SmartLink 56K Voice Fax Modem 888/912-9800 <a href="http://www.archtek.com">www.archtek.com</a>	\$69	ISA/●	below average	average	good/poor	good	fair/fair
12	MultiTech MultiModemZPX 800/328-9717 <a href="http://www.multitech.com">www.multitech.com</a>	\$161	ISA/●	average	average	good/good	good	outstanding/good
13	Smart Modular Technologies 56K Data/Fax/Voice Modem 800/956-7627 <a href="http://www.smartm.com">www.smartm.com</a>	\$79	PCI/○	above average	average	fair/good	poor	good/poor
14	Shark Multimedia Leopard-56K Speakerphone, Fax/Modem 800/800-3321 <a href="http://www.sharkmm.com">www.sharkmm.com</a>	\$70	ISA/●	average	above average	poor/poor	good	good/poor
15	Hayes Accura 56K V.90 Fax Modem 800/377-4377 <a href="http://www.hayes.com">www.hayes.com</a>	\$89	ISA/●	below average	below average	poor/good	good	good/fair



Best Buy

● Yes ○ No

For more information about all products in this table, select PC World InfoNet no. 910 or visit [www.pcworld.com/infonet](http://www.pcworld.com/infonet).



\$155. This roundup also has the cheapest modem we've reviewed so far—Maxtech's respectable \$45 NetPacer Pro.

## SPEED MATTERS

**T**HE MODEM speeds listed on the box (usually 33.6 or 56 kbps) aren't always what you get. In reality, four factors can affect speed. The first is your modem's firmware and drivers. Modem companies sometimes change the controller code—the modem's own operating system—after they receive the code from the manufacturer. Also, drivers—software instructions that the PC uses in order to communicate with the modem—are upgraded frequently. Typically, the newer the controller code and the drivers, the better the performance.

# Best Buys



**The IBM 56K Modem Internet Kit** earns the nod as top value in V.90 modems. It has excellent performance overall and comes with plenty of extras, including round-the-clock toll-free telephone support and an unbeatable software bundle. At \$99, it's a bargain.

Second, the modems that have a controller chip of their own are likely to be faster performers, because they don't burden the system's processor.

A third factor is your modem's chip set. The V.90 standard was supposed to elimi-

**The \$64 Zoom Fax/Modem 56K-PCI**—our second-place Best Buy—ranks high primarily on account of its excellent selection of features, including voice mail, speakerphone, simultaneous data and voice, and distinctive ring. In addition, its documentation includes an excellent trouble-

shooting section.

The Zoom modem's performance, however, was rated below average, making it better suited for situations where speed might be less crucial.



nate differences between x2 and K56flex, but some inequality remains. If your V.90 modem's chip set originally had the x2 protocol (like the chip set from USR/ ▶

## FEATURES COMPARISON

Fax/data software	Additional 56-kbps protocol supported	Features					Support			PC World InfoNet number <sup>1</sup>
		Chip set	Voice-data phone line sharing	Voice mail/full-duplex speakerphone	Caller ID	Distinctive ring	Parts and labor warranty (years)	Weekday support (hours)	Toll-free/weekend support	
QuickLink MessageCenter III	x2	USR	●	●/●	●	●	5	24	●/●	727
Communicate Lite	K56flex	Rockwell	○	●/○	○	●	7	15	○/●	728
FaxTalk Communicator	K56flex	Rockwell	○	●/●	●	●	5	14	○/●	729
SuperVoice 2.2	K56flex	Rockwell	●	●/●	●	●	5	8	●/○	730
MegaConnect Lite	K56flex	Rockwell	●	●/●	●	●	5	8	●/○	731
USR RapidComm	x2	USR/TI	○	○/○	●	●	lifetime	10	○/○	732
USR RapidComm	x2	USR/TI	○	○/○	●	●	lifetime	24	●/●	733
Cheyenne BitWare for Windows	K56flex	Rockwell	●	●/●	○	○	7	10	●/○	734
QuickLink MessageCenter III	K56flex	Rockwell	●	●/●	●	●	lifetime	12	○/●	735
SuperVoice 2.2	K56flex	Lucent	○	●/●	○	○	5	12	○/○	736
QuickLink MessageCenter III	x2	TI	○	●/●	○	○	5 <sup>2</sup>	8	●/○	737
Trio DataFax/Voice	K56flex	Lucent	○	●/●	●	●	10	9	●/○	738
Cheyenne BitWare Fax/Data/Voice	K56flex	Lucent	●	●/●	●	●	5	9	○/○	739
DialTone	K56flex <sup>3</sup>	Rockwell	●	●/●	●	●	3	10	○/○	740
Phone Tools	K56flex	Lucent	○	○/○	○	○	5	10	○/○	741

<sup>1</sup> One-year warranty on parts.

<sup>2</sup> Does not support dual mode.



TI), it generally works faster when connected to an ISP's modem that also descended from x2. Ditto for modems that started life as K56flex models; these are usually based on Rockwell chip sets. In our tests, matching x2 with x2, or K56flex with K56flex, boosted throughput by as much as 23 percent. This result is not surprising, given that V.90 is a blend of x2 and K56flex protocols. Modem vendors did not build a whole new technology for the new standard, they simply upgraded what they had. We list each modem's chip set and all supported 56-kbps protocols (in addition to V.90) in the features chart.

The fourth factor—connect rate—directly affects performance. A modem that connects to an ISP 90 percent of the time, for example, can outperform a faster modem that connects on 80 percent of its attempts, due to the time it saves on waiting and redialing.

Don't overlook the reputation of the company you're buying from. A wave of company closures and consolidations in

## *V.90 is cheaper than DSL or cable, and it's already available nationwide.*

the past few years suggests that even the top names aren't immune from the modem market's intense competition. Modem pioneer Hayes, for example, recently filed for Chapter 11 bankruptcy protection again, after reemerging from such status in 1996. According to company spokesperson Marcy Palmer, the Chapter 11 status would have no impact on the company's sales, service, and support of its modems, or on future product development. But analyst John Navas of the Navas Group feels otherwise. "It looks pretty grim," he says. "If I were a Hayes modem user, I wouldn't be terribly optimistic."

The 15 modems we tested range in price from \$45 all the way up to \$240 and vary substantially in features, performance, and vendor-provided support. Though no single modem fits all needs, we chose the

\$99 IBM 56K Modem Internet Kit as the best overall value. The Internet Kit doesn't excel in every category,

but it's above average in most and comes with around-the-clock support, a great asset for small and home offices. The second-best value, Zoom's Fax/Modem 56K-PCI Dualmode, isn't as fast as the IBM, but it costs only \$64, has extensive features, and is backed by long support hours. The \$240 3Com Courier V. Everything is the most expensive modem on the chart. Its security features, however, make it the best choice for corporate use. The Courier is the only modem here that comes with dial-back security, which automatically dials a caller back, a deterrent to would-be hackers.

### FAST FORWARD

**W**HAT'S AHEAD for modem technology? Several companies offer modem-bonding products that combine two analog modems and two phone lines in order to increase connection speed. One of the best such products we've seen is Diamond Multimedia's SupraSonic II, which integrates two V.90 modems onto a single board and offers noticeably faster

Internet speeds than traditional V.90 modems.

For you to enjoy the full benefit, your ISP has to support the analog Multilink Point to Point protocol. Thus far, Netcom is the only national ISP to provide such support, but it is joined by 150 regional ISPs in 2300 U.S. cities. ▶

Difficulties and inconsistencies aside, the ISPs are adopting V.90 at an im-

pressive rate. In July, America Online, the world's largest ISP, announced that AOLnet, the world's largest dial-up network, had reached full V.90 deployment. AOL notes that its system will still support K56flex and x2 users.

## You've Got V.90—BUT DOES YOUR ISP?

**NOT MUCH POINT** in giving a party if nobody's going to show up. That's essentially what could happen if you purchase a V.90 modem but your Internet service provider doesn't support the standard. We spoke with representatives of most large ISPs: Most of them report that they plan to implement V.90 fully by the first quarter of 1999. In certain areas of the country, however, deployment of V.90 could be more gradual.

### V.90 COVERAGE SPOTTY

SO YOU MAY connect at V.90 when the traffic is light, and at x2 or K56flex—or even V.34—when the traffic is heavier.

In theory, you should try to match the chip set inside your modem with the chip set used by your ISP's modem. Unfortunately, the process is not that

straightforward. For starters, you may find that you have a hard time obtaining the necessary information from your ISP. And even if you locate the right technicians, they might not be able to give you a concrete answer. An ISP might use a third-party network until the number of users in a city reaches critical mass, and then switch over to its own system, which could mean a change in server modems.

Similarly, a provider could use one type of server-based modem in one area of the country, and another elsewhere. Finally, even if you ascertain that your ISP uses

a specific server modem, there's nothing to prevent the ISP from changing just after you purchase the matching modem. For that reason, you may want to consider a modem that performs well both on x2 and on K56flex protocols.





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Dell	★★★★	★★★
IBM	★★★★	★★
<b>Fair</b>		
Gateway 2000	★★★	★★★★
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Digital Subscriber Line and cable modems, which provide connections that are 10 to 100 times faster than those possible with 56-kbps modems, are available in certain areas of the country but won't be out nationwide for a year or more. These new technologies offer many advantages over standard dial-up analog modems.

When your PC is connected to the Internet via a cable or DSL modem, you can talk on your telephone at the same time, since cable modems run through the same wiring as cable television, and DSL can split the same connection between data and voice. Both technologies have many unresolved issues, including regu-

lation and adoption of standard platforms, not to mention investment of billions of dollars on equipment. Cable modem service is already available in many areas. DSL service, provided through telephone companies, was available only on a trial basis as we went to press. Prices for both cable and DSL vary, but rates of \$40 to \$60 per month seem to be the norm.

Right now, analog modems—with their combination of universally available phone service and low pricing—offer the best access options for most folks. In settling on a specific V.90 modem from among the 15 we tested, take into account documentation and installation, performance, features, upgradability, support, and price.

## UP AND RUNNING

SINCE ALL the modems that we tested support Plug and Play, installation should be a matter of simply inserting the modem card, booting the system, and loading the drivers. In almost all cases, that's just the way it worked. The 3Com Courier V. Everything was the exception: Windows installed the Courier driver that shipped with the operating system, and we had to replace it with the drivers on the Courier's disk to get the modem to work properly. Our advice: Always use the drivers that came with the modem. If you're not offered the choice at installation, delete the Windows-generated drivers and install the vendor's versions manually. ▶

## TEST REPORT

# IBM, 3Com Courier Fastest at V.90

But fallback (V.34) speed and connect rate also affect your modem's performance.

MODEM	Effective V.90 download rate (kbps) <sup>1</sup>	Effective V.34 download rate (kbps)	56-kbps downloads (minutes:sec per MB)	V.34-kbps downloads (minutes:sec per MB)	Overall connect rate (percent) <sup>2</sup>	V.90 connect rate (percent) <sup>3</sup>
1 IBM 56K Modem Internet Kit*	49.2	29.4	3:33	5:57	92	92
2 Zoom Fax/Modem 56K-PCI Dualmode*	40.9	30.8	4:16	5:40	84	84
3 Diamond Multimedia SupraExpress 56i	47.5	30.7	3:41	5:41	87	87
4 Wisecom Accelerator Pro 56K Voice Fax Modem	46.0	31.0	3:48	5:39	95	93
5 Apache Micro Peripherals NetExpress 56K Fax Modem	46.3	30.7	3:46	5:42	98	97
6 3Com U.S. Robotics 56K Faxmodem	47.3	29.9	3:42	5:51	99	97
7 3Com Courier V. Everything 56K Analog Corporate Modem	48.6	28.5	3:36	6:08	99	93
8 E-Tech CyberBullet PCI56RVP	40.0	30.0	4:22	5:50	85	85
9 Boca WinStorm 56K Internal Speakerphone Modem	39.3	30.6	4:27	5:43	99	98
10 MaxTech NetPacer Pro PCI Modem Series	41.9	27.8	4:10	6:17	90	83
11 Archtek SmartLink 56K Voice Fax Modem	46.1	30.1	3:48	5:48	92	89
12 MultiTech MultiModemZPX	40.4	26.8	4:19	6:32	90	87
13 Smart Modular Technologies 56K Data/Fax/Voice Modem	42.5	28.8	4:07	6:05	88	80
14 Shark Multimedia Leopard-56K Speakerphone, Fax/Modem	47.7	30.8	3:40	5:41	93	93
15 Hayes Accura 56K V.90 Fax Modem	36.8	28.2	4:45	6:12	84	84
*Best Buy			Faster	Faster		



**HOW WE TEST** We test V.90 (56-kbps) and V.34 (33.6-kbps) performance over a Telecomm Analysis Systems simulated phone network. We connect each modem to two common Internet service provider modems, Ascend's Max 6000 and 3Com's Total Control. Using each ISP modem, we perform two tests. In the Network Model Coverage test, we send a .zip file over several different line conditions. For the File Type test, we send a mix of four files—graphics, text, program, and compressed files—over one line condition. We average the results for the two ISP modems to calculate NMC and FT scores, which make up, respectively, 60 and 40 percent of the total performance score. Data based on tests designed and conducted by the PC World Test Center. All rights reserved. In ranking the systems, we assigned values with the following weightings: Performance 35 percent, features 28 percent, price 14 percent, service and support 12 percent, ease of use 11 percent. <sup>1</sup>Effective transfer rate is the raw transfer rate times the compressibility factor of the file being sent. For example, a modem connected at 26.4 kbps sending a file compressed to half its original size (a typical compressibility factor for text files) is sending the file at an effective transfer rate of 52.8 kbps. <sup>2</sup>Percentage of successful connections out of all attempts (includes all V.90 and V.34 connect rates). <sup>3</sup>Percentage of successful connections out of all attempts (V.90-only connect rates).





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Although installing the new modems was relatively painless, we sometimes needed help from the manuals. Quality and quantity of documentation varied. While 3Com's Courier V.Everything 56K and Diamond Multimedia's SupraExpress 56i come with step-by-step illustrations that proved helpful during setup, other manuals fixate on esoteric information most owners will never use. Half of the Archtek's (otherwise solid) manual, for example, is devoted to string commands, yet it says nothing about connecting at V.90 or why you might not get top 56-kbps speed. Hayes opts for electronic documentation, supplemented by hard copies of a four-page quick-start guide and a one-page description of a bundled program.

Zoom's Fax/Modem 56K-PCI has the best documentation, with troubleshooting advice and tips on using the card with older communications programs.

#### IN SEARCH OF SPEED

**B**UYING FROM the best-known companies doesn't always get you the fastest modem. The best overall (V.90 and V.34) performer in this batch comes from Wisecom, followed by Smart Modular Technologies, MaxTech, and IBM. Casual users, however, will be happy with the performance of all but the slowest of the bunch, Hayes's Accura.

## The modems with controllers had higher connect rates in our testing.

Looking strictly at V.90 performance, IBM's Internet Kit is the top modem. The IBM Internet Kit downloaded a 1MB test file a full minute and 12 seconds faster than the Hayes Accura.

In our tests, the controllerless modems (that is, all the PCI-based modems and the IBM modem) had noticeably lower connect rates than the modems that came with their own controller chips (all the ISA-based modems except for the IBM). We see at least two possible causes for this. Controllerless modems depend on the PC's processor to handle many more functions, including managing connections, which are timing sensitive. If the CPU is distracted for even a moment—because, say, you're loading Excel at the time—the connection can fail. Also, PCI modems are very new and have less-refined controller code, so they sometimes experience lower connect rates. It's true that PCI cards tend to be faster for some tasks, especially for sending and receiving highly compressible material like graphics and text files. But with these newer controllerless modems, you stand

a slightly increased risk of experiencing connection failures. Make sure you get a money-back guarantee on your modem.

Modems tended to perform best when connecting with an ISP modem based on the same make of chip set. For example, modems based on Rockwell's chip set did slightly better than the others with the Rockwell-based Ascend ISP modem. But most casual users would not notice the performance boost that we saw in connections between matched chip sets, and you can't guarantee the type of ISP modem that you're calling, anyway (see "You've Got V.90—But Does Your ISP?"). Also, the firmware version can affect overall performance. Because vendors update firmware often, modem performance will change over time.

#### A RANGE OF FEATURES

**W**E FOUND that features varied widely, from voice and data phone-line sharing, Caller ID, and distinctive ring to speakerphones and voice mail. While all the modems support the sending and receiving of faxes, several support more-advanced fax capabilities. Shark's Leopard-56K modem is the most fax-friendly of the group. The bundled DialTone software can create both public and password-protected fax-on-demand mailboxes, from which callers can have documents sent automatically to their fax machines.

The best-integrated communications package we found bundled with any of these modems is QuickLink Message-Center III (included with the Archtek, Boca Research, and IBM products), which deftly combines data and fax communi-

cations with phone book and voice mail functions. MessageCenter III's eight-button toolbar and informative status bar make navigating among component programs a snap.

At the other end of the spectrum, Cheyenne's clunky BitWare for Windows Voice/Fax/Data (which came with the E-Tech modem) caused ▶

## Buying TIP ISA vs. PCI

**IF YOU'RE** buying an internal modem, you'll have to decide whether to go with an ISA- or a PCI-based model. Performance shouldn't be the paramount issue here. Though PCI modems generally performed a bit faster in testing than ISA-based models, their connect rates were lower. More important is the type of free adapter slots your PC has.



As a general rule, newer PCs have three or four PCI slots and one or two ISA slots; older systems tend to have the opposite imbalance. If your computer is stuffed with lots of expansion cards, a PCI modem will give you

greater flexibility, because it will help you to avoid IRQ conflicts. Also, Intel is urging PC manufacturers to phase out the ISA bus, so you may want to choose a PCI-bus modem if you expect to transfer your modem to a new computer a couple of years down the road.



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our system to reboot spontaneously several times. BitWare's pop-up toolbar, with its oversize icons, also got in the way of our other applications. The worst software package, SuperVoice 2.2 (included with the MaxTech and Wisecom modems), is only marginally better than Windows 95's terminal program. It offers few features and has an ugly, awkward interface.

The package included with IBM's 56K Modem Internet Kit is exceptional. In addition to QuickLink MessageCenter III, the bundle includes IBM AntiVirus, an Internet content-filtering program called NetNanny Lite, IBM Home Page Creator, and IBM Internet Connection Phone, which enables you to place a long-distance phone call to a similarly equipped PC for nothing more than the price of an Internet connection.

## Upgrade Trials and TRIBULATIONS

**YOU HAVE** an x2 or K56flex modem, and you're ready to upgrade it to V.90. What do you do? Most x2 and K56flex modem vendors offer customers a free "Flash-ROM" upgrade. Check your modem manufacturer's Web site or call the manufacturer's technical support number to find out for sure. In most cases, you can download a file from the Web site that will make your modem functionally equivalent to a brand-new V.90 modem.

### UPGRADING IS EASY...

NEARLY A YEAR AGO, long before the V.90 standard was released, we purchased three 56-kbps modems, with the intention of upgrading them to V.90 in the future—the Boca 56K Multi-

media Modem, the Hayes Accura 56K Internal Fax Modem, and the Zoom Fax/Modem 56K-PCI. We found the upgrade process to be nearly as straightforward as the modem companies claimed.

At Boca's Web site, we had some trouble deciding which upgrade file to download; the label on the product box didn't match anything on the Web site. So we simply took an educated guess and, luckily, hit pay dirt.

Upgrading the Hayes modem was an easy operation. The site lists the many different modems that are upgradable, so all you have to do is select your model and download the upgrade file.

The audio quality with IBM Internet Connection Phone is only fair, and you have to prearrange the call so both parties are set up at the same time.

A few other modems bundle notable software extras. The package included with 3Com's Courier V.Everything 56K exploits the \$240 modem's corporate slant. Stampede's Remote Office Gold for Windows, for example, taps into the Courier's remote-control, dial-on-demand,



Upgrading the Zoom modem went smoothly from start to finish. The entire process took about 15 minutes.

### ...BUT USE A NET

**BEFORE YOU RUSH** out to upgrade your K56flex or x2 modem, check your documentation to be sure that your modem supports both its original 56-kbps standard and V.90 simultaneously. (In this roundup, only the Shark modem lacks dual-mode support.) If you encounter problems, you'll want to be able to "back-flash" the Flash ROM and switch back to the modem's original 56k standard, be it x2 or K56flex.

and security features. The Hayes Accura, meanwhile, comes with NetSonic, a browser cache accelerator designed to save you time online by preloading Web links into your browser's cache. We weren't overly impressed by the performance boost NetSonic provided, though.

3Com's Courier V.Everything 56K lacks both voice mail and speakerphone. 3Com believes the corporate users it's targeting with this modem would prefer features like Dial Security, which uses a password and dial-back procedure to prevent unauthorized access to the corporate network, and Remote Configuration, which allows a network administrator to configure and test the modem settings.

MaxTech's \$45 NetPacer Pro PCI includes voice mail and speakerphone but little else. It's a basic modem at a low price. Another low-priced modem, Boca Research's WinStorm 56K, does better. It includes a nearly full set of features—including voice mail, speakerphone, Caller ID, and distinctive ring—for just \$69. When Caller ID is combined with distinctive ring, you can distinguish from the tone of the ring whether the incoming call is from, say, your boss or a family member. Keep in mind that Caller ID and distinctive ring require support from your local phone company, which usually costs extra.

Only seven of the modems in this roundup support voice and data phone-line sharing—no great loss unless you happen to be a gamer who enjoys taunting opponents over the phone while engaged in online war.

A computer-based answering machine may seem like a great idea, but are you willing to leave your PC on all the time just to answer the phone? If your computer doesn't have a built-in microphone and you want to use the device's speakerphone, you'll have to carefully position an external mike or wear a microphone-equipped headset. Also, voice features often require one or more additional Interrupt Requests, which are in short supply ►






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Expanding Possibilities

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on today's loaded systems. You may be better off spending \$100 on a separate answering machine and speakerphone. After all, when was the last time you heard of someone having to reboot an answering machine?

### KEEPING UP TO DATE

**M**OST NEW MODEMS, including all 15 reviewed here, are upgradable via software. You'll be able to use future versions of V.90, which could include bug fixes and even some new features. You'd never know this was an option, though, with the modems from Apache, Archtek, Boca, E-Tech, IBM, MaxTech, and Shark: There's no hint of ROM upgrades either on the box or in the documentation. You have to wonder how motivated these companies will be to offer future fixes and fea-

tures. In fact, only four of them include instructions on how to perform an upgrade or where to look on the vendor's Web site. Of those, MultiTech and 3Com do the best job. MultiTech devotes six pages in its manual to the subject, and 3Com includes a software-based update wizard that automatically pulls the latest firmware file from 3Com's Web site and installs the upgrade.

All the modems except the Shark function in dual mode, which enables you to connect at 56 kbps to an ISP that does not yet support V.90.

### HELP IS ON THE WAY

**L**ET'S FACE IT, things don't always go as smoothly with your modem as the manual implies. That's when you appreciate long support hours and short wait

times before getting through to a technician. Unfortunately, that isn't always what you end up with. Nine of the modems in this roundup are backed by less than 10 hours of phone support on weekdays. Furthermore, fewer than half of the companies provide toll-free support.

At the other extreme, 3Com's Courier V. Everything carries a lifetime warranty, round-the-clock toll-free phone support, and help on weekends. IBM provides seven-day, 24-hour toll-free phone support to go along with a five-year warranty on its 56K Modem Internet Kit, but we often had to wait 15 to 20 minutes on hold for help. The lunch hour proved to be the worst time to call support; we waited 55 minutes to talk to a Smart Modular Technologies rep, who provided only adequate answers to our questions. The quickest

# New STANDARD, New Tests

**FOR YEARS** we've been testing modems by connecting them to a simulated phone network from Telecomm Analysis Systems and measuring file transfer rates and connect rates. Thanks to upgrades TAS made to its equipment, we've improved our testing in two big ways.

First, we now perform all 33.6-kbps and 56-kbps tests through the TAS test bed. (Previously, the

test bed lacked 56-kbps support, so we called a pair of local ISPs to measure download rates.) We made approximately 100 calls per modem to minimize skew in our results introduced by varying Web traffic and line quality. Now all testing is contained within the TAS test bed, free from the effects of constantly fluctuating Internet traffic.

### CHIP SET COUNTS

**SECOND**, we now test all review modems against Ascend's Max 6000 and 3Com's Total Control—the server modems most ISPs use. Why two server modems? The Max uses a chip set from Rockwell, the company that promoted the K56flex protocol, and the Total Control uses a set from U.S. Robotics, the firm that championed x2. We connected all 15 review modems to both servers to compare results, and found that the chip set used did matter (see "In Search of Speed").

As before, the TAS network replicates the wide variability in phone-line quality found across

response came from 3Com when we called about its U.S. Robotics 56K Faxmodem. The technician picked up immediately and gave us detailed instructions on how to test both the modem and the phone line. The company also provides a "no-hold" technical-support 900 number (\$2 per call) for customers who would rather pay than wait.

If you're purchasing a modem for home use, or if you plan to work on the weekends, consider one of the five modems that offer weekend telephone support. Not surprisingly, we found that the wait times were usually longer on the weekends and evenings.

*David English is a freelance writer based in Greensboro, North Carolina. All testing was conducted by Elliott Kirschling of the PC World Test Center.* ■

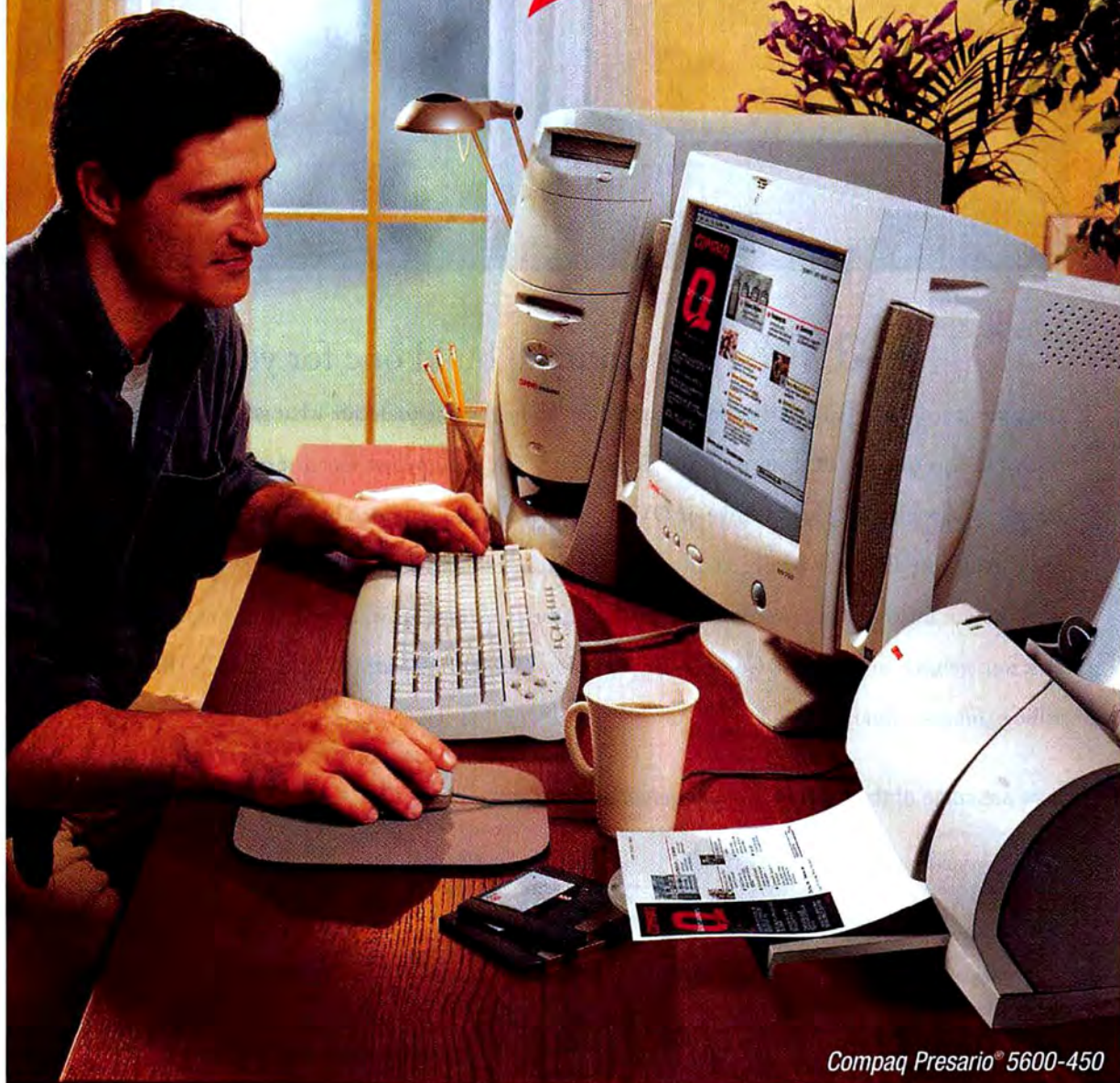
the country. It also tests how fast V.90 modems compress and send different types of common files with differing levels of compressibility. This new test bed gives us more accurate results that are based on a variety of real-world line conditions.

**REAL WORLD:** Our new tests simulate the wide range of phone-line quality that users encounter.





How do I make my personal computer  
really personal?



Compaq Presario® 5600-450



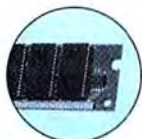
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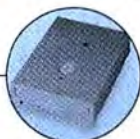
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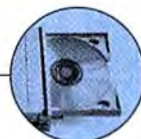
#### Hard Drive Size

Whether you're writing the great American novel or just surfing the Net, we've got the hard drive size that's right for you.



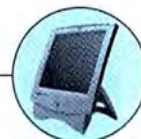
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All prices shown are Compaq Direct selling price after applicable rebate. Prices shown do not include applicable sales tax and shipping. Products and prices valid in U.S. only. Actual retail price may vary. Specifications and prices are subject to change or cancellation without notice. Not all Compaq Presario models available in all retail stores. \*50 free hours of Internet access is offered when Compaq Easy Internet Access is chosen from Compaq Internet Setup. The 50 free hours must be used over a 30-day period from initial setup. A valid credit card is required to initiate service, although no charges will be incurred until the 50-hour trial has expired. \*\*\$100 mail-in rebate from Compaq upon activation of this free trial of Compaq Easy Internet Access. Rebate offer valid only in the USA and expires 4/30/99. See rebate coupon included with product for additional terms and conditions. For hard drives, GB = billion bytes. 1TU v.90 modems are designed only to allow faster downloads from K56flex or v.90 compliant digital sources. Maximum achievable download transmission rates are currently unknown, may not reach 56 kilobits per second (Kbps), and will vary with line conditions. \*24X Max CD-ROM data transfer rates may vary from 1500 to 3600Kbps. \*32X Max CD-ROM data transfer rates may vary from 1800 to 4800Kbps.

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(Shown with Presario MV700 Monitor)

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- Diamond Viper 550 w/16 MB SDRAM
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- 56K ITU v.90 Modem<sup>3</sup>
- 2X AGP Graphics w/8 MB SGRAM
- 10 Mbps Ethernet port, Cable Modem Ready
- New! Iomega Zip Built-In™ Drive
- Microsoft Featured Home Collection
- Microsoft Windows98
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- 10 Mbps Ethernet port, Cable Modem Ready
- New! Iomega Zip Built-In™ Drive
- Microsoft Featured Home Collection
- Microsoft Windows98
- Compaq V720 17" Monitor (15.9" VIA)
- JBL Pro Speakers

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- 5X DVD-ROM Drive<sup>2</sup>
- 256 MB SyncDRAM expandable to 384 MB
- 56K ITU v.90 Modem<sup>3</sup>
- Digital Creativity Imaging Center w/1394
- Diamond Viper 550 w/16 MB SDRAM
- 10 Mbps Ethernet port, Cable Modem Ready
- JBL Pro Premium Speakers w/Subwoofer
- New! Iomega Zip Built-In™ Drive
- Microsoft Office 97 SBE v.2.0
- Microsoft Windows98
- Compaq V910 19" Monitor (18.0" VIA)

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- 56K ITU v.90 Modem<sup>3</sup>
- 2X AGP Graphics w/8 MB SGRAM
- 10 Mbps Ethernet port, Cable Modem Ready
- New! Iomega Zip Built-In™ Drive
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- 256-bit Accelerated Graphics w/2.5 MB VRAM
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- 56K ITU v.90 Modem<sup>3</sup>
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\*The 5X DVD-ROM Drive transfer rate is up to 6,750 KB/s compared to 1,352 KB/s for 1X DVD-ROM Drives. \*\*2nd-Generation DVD-ROM Drives run at a higher maximum transfer rate of up to 2.76 MB/s compared to 1st Generation DVD-ROM Drives which run at a maximum transfer rate of up to 1.348 MB/s. \*One year parts and labor. Labor for desktop systems is carry-in service with on-site service during the first 90 days of ownership. Labor for notebook systems is pick-up service. †U-ADSL updates may be downloaded from Compaq's Website when available. The 1.5 Mbps U-ADSL/56K v.90 modem protocol is designed to allow faster downloads from U-ADSL, K56flex, or v.90 compliant digital sources. Availability of U-ADSL services will vary by region and Internet Service Provider (ISP), and may differ from v.90 ISP services. Maximum achievable download transmission rates with U-ADSL and K56flex/v.90 are currently unknown, may not reach 1.5 Mbps or 56 Kbps respectively, and will vary based on service provider, line conditions, and distance. Compaq is not liable for pictorial or typographical errors in this advertisement. Compaq, the Compaq Logo, and Presario are registered trademarks of Intel Corporation. Product and company names mentioned herein may be trademarks and/or registered trademarks of other companies. Call Compaq Monday-Friday 7:00am-11:00pm (CST), Saturday and Sunday 7:00am-7:00pm (CST). ©1998 Compaq Computer Corporation. All rights reserved.

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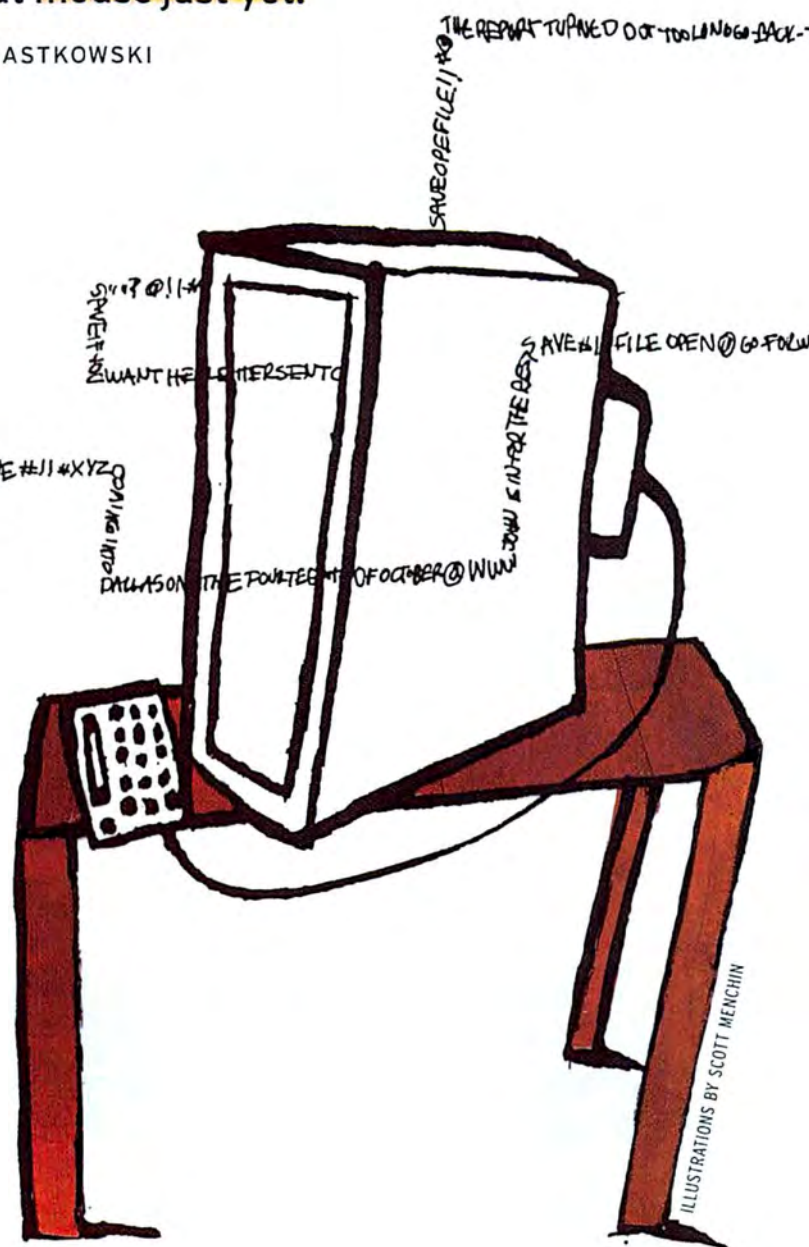
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## Voice-recognition software sounds

like a good idea. But don't ditch that mouse just yet.

BY STAN MIASTKOWSKI



ILLUSTRATIONS BY SCOTT MENCHIN

# Can We Talk?



**THIRTY YEARS AGO,** when you needed to reach out and touch someone, you dialed a rotary phone attached to the wall. Or you sent a letter, which you composed by pounding keys on a typewriter, and then waited a week for it to cross the country.

Cell phones, e-mail, and overnight services have changed the way we communicate. Typewriters have gone the way of fondue sets and eight-track tape players. But we're still tapping on keyboards, albeit ones attached to sleek, powerful computers. Isn't it time you let your voice, and not your fingers, do the talking?

A new generation of speech recognition software could make this possible. The latest programs let you dictate to your PC continuously, without pausing between words. They let you launch apps and issue commands while filing your nails. And talk truly is cheap: The packages we review range from \$39 to \$160. Small wonder, then, that Corel and Lotus include versions of popular speech packages in their latest business application suites. (See our review of Corel's voice-enabled WordPerfect Suite 8 at [www.pcworld.com/jan99/talk](http://www.pcworld.com/jan99/talk).)

Speech recognition software is a godsend for people who are physically unable to operate a PC. But has it advanced far enough for mainstream computer users to trade in their mice for microphones? *PC World* asked me to try the four leading products—Dragon NaturallySpeaking

Preferred, IBM ViaVoice 98 Executive Edition, Lernout & Hauspie Voice Xpress Professional, and Philips FreeSpeech 98—and then speak for myself.

My verdict: Speech recognition offers a handy way to dictate short memos or e-mail notes, and Dragon's NaturallySpeaking rates as the best of

the lot. But the technology is awkward for editing or formatting what you've dictated. And in our mouse-centric world, spreadsheet savants and graphics gurus will find these programs almost useless.

### GREAT DICTATORS?

THE COMPANIES that market speech recognition packages like to paint pictures of you relaxing in front of your PC

with your feet up, never touching the mouse or the keyboard. I found the reality to be considerably different.

I installed each package on a Pentium II-333 with 64MB of RAM, along with a fast Ultra-SCSI hard drive and a Sound Blaster AWE64 Gold sound card. I dictated text into the programs' basic speech-recognition screens (essentially customized versions of Windows WordPad) as well as into a word processor, a spreadsheet, and an e-mail app. My test documents included a complex business letter—replete with boldface and centered text, unusual words, a URL, and a table—simple e-mail messages, and my favorite Robert Frost poems.

Overall, Dragon NaturallySpeaking Preferred proved to be the most accurate and the easiest to use, though I never felt

## The latest speech recognition

comfortable working with it inside spreadsheets or trying to navigate on screen. But all the programs had good points and gotchas. Here's how they compare in the key areas.

**Basic Training:** All the vendors claim you can simply install their software, read a few basic sentences, and start doing your Brando imitation. That may be so, but you'll get much better results

## Freedom of Voice

Dragon fared best in our speech recognition tests, but no program was entirely free of glitches.

PRODUCT	Street price (10/20/98)	Overall rating	Minimum system requirements	Active vocabulary (words)	Training	Dictation accuracy	Editing	Formatting
 <b>Dragon Systems NaturallySpeaking Preferred</b> 800/437-2466 <a href="http://www.dragonsys.com">www.dragonsys.com</a>	\$160	very good	Pentium-133, 32MB RAM, 60MB hard disk space, 16-bit sound card	62,000	excellent	very good	satisfactory	very good
<b>IBM ViaVoice 98 Executive Edition</b> 800/825-5263 <a href="http://www.ibm.com/viavoice">www.ibm.com/viavoice</a>	\$149	good	Pentium-166, 32MB RAM, 125MB hard disk space, 16-bit sound card	64,000	good	good	good	good
<b>Lernout &amp; Hauspie Voice Xpress Professional</b> 800/380-1234 <a href="http://www.lhs.com">www.lhs.com</a>	\$150	good	Pentium MMX-166, 48MB RAM, 130MB hard disk space, 16-bit sound card	30,000	good	satisfactory	satisfactory	satisfactory
<b>Philips FreeSpeech 98</b> 800/851-8885 <a href="http://www.freespeech98.com">www.freespeech98.com</a>	\$39 <sup>1</sup>	satisfactory	Pentium MMX-166, 32MB RAM, 64MB hard disk space, 16-bit sound card	64,000	good	satisfactory	poor	satisfactory



Best Buy

<sup>1</sup> Word scores based on dictation test results. For this test, I dictated letters, business articles, and e-mail message content. The core test document was a business letter that included a small table, some uncommon names, and a URL.

<sup>2</sup> For more information about all products in this article, select PC World InfoNet no. 909 or visit [www.pcworld.com/infonet](http://www.pcworld.com/infonet).



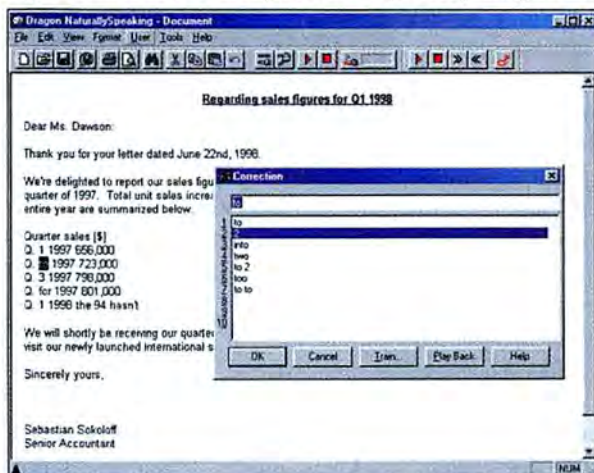
if you spend 10 to 50 minutes training the packages to adapt to the idiosyncrasies of your voice. This tedious one-time process involves reading from a series of text passages. Overall, Dragon's training sessions were the least onerous.

But training is only the beginning. I also had to teach each package to recognize words that aren't in its built-in vocabularies (these range from 30,000 to 64,000 words). My name, *Miastkowski*, was one such word, but I use hundreds of others regularly in writing about computer technology. All of the packages I examined needed additional vocabulary training, but Dragon's NaturallySpeaking was the best at guessing how to spell new or unusual words. In general, the more you train and use the programs, the more accurate they become.

ages performed at a fairly consistent level, regardless of who was talking.

**Dictation:** All four packages are designed primarily to let you dictate raw streams of text into a document. At this task, Dragon excels. It was the only one among the packages to achieve its claimed accuracy rate of around 95 percent. But bear in mind, 95 percent correct means that 1 out of 20 words is wrong. I spent some time fixing errors. The IBM ViaVoice 98, Philips Free-

print that page—and navigate around your desktop. These voice-based options worked with all four products, but not always. I found myself repeating certain



**SAY WHAT?** No speech software is perfect, but all the packages let you clean up their mistakes. When Dragon flubs a word, you select it, say "correct that," and choose from a list of alternate terms.

## programs let you dictate to your PC and launch applications or issue commands while filing your nails.

**Multiple users:** All the products except Philips FreeSpeech 98 let you set up multiple voice profiles, so different people can use the same PC. A team of *PC World* editors (with accents ranging from German to Irish to New Yorker) tested the products and found that the pack-

Speech 98, and L&H Voice Xpress Pro all topped out at under 90 percent accuracy.

**Editing/formatting:** Writing with your voice is one thing; revising your work orally is something else entirely. Only IBM's ViaVoice offers tolerably useful voice commands for editing, while IBM and Dragon give you decent formatting options. Still, you're wiser to use your keyboard and mouse for these tasks.

**Application support:** All four packages let you dictate directly into any text-based application, including Microsoft Word, Excel, and such popular e-mail packages as Outlook Express and Netscape Messenger. The only catch: If you have an older, slower system, you may experience a bit of a lag while working inside apps as the software processes what you just said.

**Command and Control:** Besides dictating text, you can tell your apps what to do—open this file,

commands (like "click File, click Save" in Word) before my PC would listen to me—particularly when using Philips FreeSpeech 98. IBM ViaVoice 98 did the best job of desktop navigation.

**Sound Gear:** All the packages are designed to work with specific sound cards—including popular brands like Sound Blaster. Before you buy, check the company's Web site for a list of certified cards. And all but the Philips come with a basic headset microphone. My vote for most comfortable headset goes to the one bundled with Dragon NaturallySpeaking. But for best results, consider buying a higher-quality noise-canceling mike. I tried out eight different headsets before settling on the \$55 Andrea ANC 500. (For more details about headsets, visit [www.pcworld.com/jan99/talk/](http://www.pcworld.com/jan99/talk/).)

### NOT EXACTLY NATURAL

WHICHEVER package you use, the biggest speed bump you'll encounter relates to the huge difference between typing documents and dictating them. For ►

Application control	Desktop navigation	Comments	PC World InfoNet number <sup>1</sup>
satisfactory	satisfactory	Word for word, the best dictation package around.	706
good	good	Tops at navigating on screen, but dictation isn't as accurate as Dragon.	—
satisfactory	satisfactory	Recognition is spotty, occasional confusion with navigation and formatting commands.	707
satisfactory	poor	Cheapest package is no bargain.	708

<sup>1</sup> Headset and microphone not included.



example, you'll find that you have to include both punctuation and formatting directions in your speech—a distraction that frequently derailed my train of thought. After using speech recognition packages for several weeks on end, I knew I'd had enough when I looked at my dog and said, "Pepper, comma, sit, exclamation point!"

Other problems ranged from wildly inaccurate rendering of common words to random characters generated by my breathing. You also must care for your voice (see "Protect Your Vocal Cords"). But unless you have carpal tunnel syndrome or some other disabling injury, typing is faster and more accurate.

**I knew** I'd had enough of speech recognition packages when I looked at my dog and said, "Pepper, comma, sit, exclamation point!" —STAN MIASTKOWSKI

In the longer term, controlling your computer by voice may be inevitable. Rob Enderle, director of desktop and mobile technology at Giga Information Group, predicts that speech recognition will soon be ubiquitous. "In five years," he says, "you'll look back and wonder why you ever used a keyboard to type."

## Dragon Naturally-Speaking Preferred

**PRO:** Best overall accuracy, easy to use

**CON:** Dictating numbers is awkward, middling on-screen navigation



The only program to come close to its flashy marketing claims, the \$160 Dragon Naturally-Speaking Preferred handled text entry well, and it let me switch easily between dictating, correcting, and formatting text.

Dragon's software did by far the best job of recognizing the text of the test

business letter, with surprisingly precise matches for tricky proper names such as "O'Keeffe," "Bernardo," and "Peterborough." Overall, the Dragon package very nearly succeeded in achieving its claimed 95 percent accuracy rate.

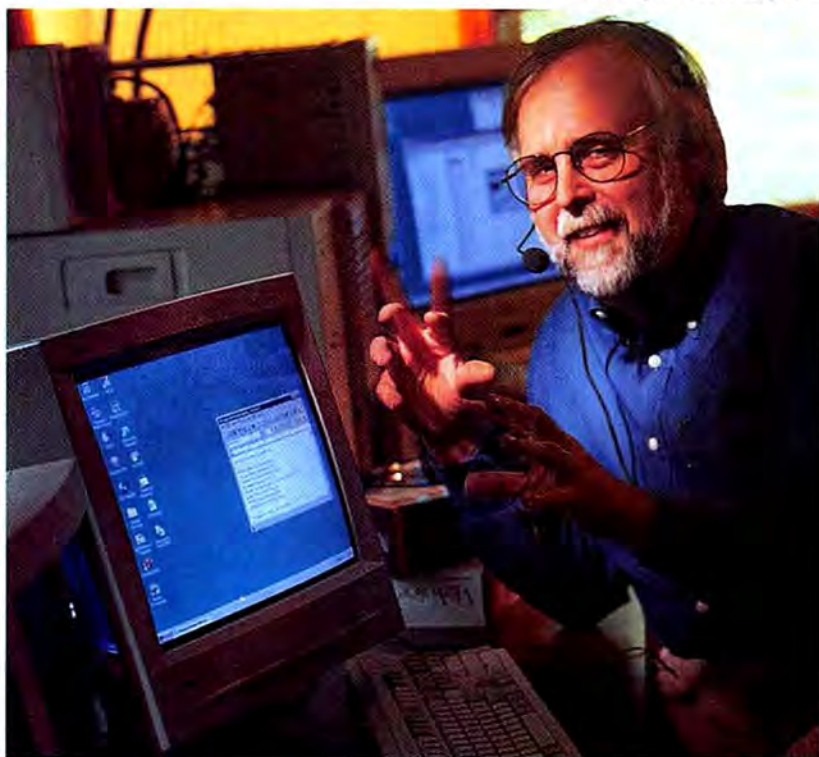
When Dragon does make a mistake, you can go into editing mode by simply saying "delete that" or "scratch that," and then repeating the correct word or phrase. Formatting text is a breeze, too: You simply select text and say phrases like "set font Arial 24," "center that," or "bold that." But like the other three packages, Dragon has a complicated set of navigation and correction commands. Turning to the keyboard and mouse to

edit my work was far faster and easier.

Dragon gives you two ways to work with it: You can dictate into the program's text window and paste your document into another app; or you can use Dragon's bundled utilities to dictate directly into your word processor, e-mail program, spreadsheet, or other application. Which is easier? It depends on your personal tastes and on the application you're using. I never had trouble cutting and pasting dictated text into the body of an e-mail, for instance. But with spreadsheets, I found it more efficient to dictate numbers directly into cells.

The NaturalWord add-on, which lets you dictate directly into Microsoft Word 97 (but not any earlier version of Word), functions very much like the main Dragon voice screen. NaturalWord also gives you decent control over menu commands in Word, but I had to try several

times before it obeyed my commands, and even then it was faster to jump back to the mouse and keyboard. If your PC has a slower CPU, Dragon warns, the speech recognition process may pause



TOP: MICHAEL FALCONER BOTTOM: RICHARD HOWARD



while Naturally Speaking and Word process your dictation, but my Pentium II-333 never had that problem.

The NaturalText feature lets you dictate into almost any Windows 95/98 application. When you install the utility, text and microphone icons appear in Windows' system tray. To use NaturalText, just click the microphone icon and talk.

I tested NaturalText in Internet Ex-

plorer Mail 3.02 and in Excel 97 and found it particularly useful for creating the quick, informal messages typical of e-mail. Creating an Excel spreadsheet was more difficult, largely due to the way Dragon handles numbers. To get Dragon to produce 723,000, for instance, I had to say "seven-two-three-comma-zero-zero-zero." Not exactly natural.

If you want to use Dragon to navigate

your desktop, the program divides your screen into numbered sectors; when you specify the number of the grid where you need the cursor to appear, the program brings up progressively smaller grids so you can fine-tune the cursor position.

In contrast, NaturallySpeaking makes menu control easy. The keyword *click* (as in "click Start" or "click File") is the verbal equivalent of a mouse click. It works, too.

Although Dragon falls a bit short of some competitors at navigation, correction, and formatting, it's the best at what matters most—getting the words right the first time you say them. By the time you read this, a new version of NaturallySpeaking should be available; Dragon says it will improve desktop navigation as well as number dictation.

## Hear Here?

WITH SPEECH RECOGNITION, what you say isn't always what you get. Even the best programs had problems with names (like "Sebastian Sokoloff") and Web addresses. Here's how each package handled part of our test business letter (mistakes are highlighted in yellow).

### What we said:

You will shortly be receiving our quarterly financial report and *Money Talk*, our new monthly newsletter. Please visit our newly launched international section on our Web site at <http://www.okeefeint.com>.

Sincerely yours,  
Sebastian Sokoloff

**Sebastian Sokoloff**

### What we got:

#### Dragon NaturallySpeaking Preferred

He will shortly be receiving our quarterly financial reports and money talk, our new monthly newsletter. Please visit our newly launched international section on our WebSite at <http://WWW.O.K.E.E.F.E.INT.com>.

Sincerely yours,  
Sebastian stucco off

**Sebastian stucco off**

#### IBM ViaVoice 98

U.S. surely be receiving our quarterly financial report and the money talk, our new monthly newsletter. Please visit our newly launched international section on our web site at <http://WWW.OKEFEIanti dot>.

Sincerely yours combine's  
Sebastian cycle off

**Sebastian cycle off**

#### L&H Voice Xpress Professional

You will surely be receiving our quarterly financial reports and money talk our new monthly newsletter. Please visit our newly launched international section on our web site at <http://WWW.Oki INT dot con>.

Sincerely yours,  
Sebastian sock along

**Sebastian sock along**

#### Philips FreeSpeech 98

You will surely be receiving our quarterly financial reports and I tell my the top and I tell our new monthly newsletter. Please visit our new leave launch to international section on our Web site had to 8280://WWW. Old came the the half the eye and to see.see old alma.

Sincerely yours,  
Said bastion such cloth

**Said bastion such cloth**

## IBM ViaVoice 98 Executive Edition

**PRO:** Good simple word recognition, improved navigation and design

**CON:** Poor recognition of proper names and acronyms, slow inside some apps

If you want to navigate your desktop by mouth instead of by mouse, the \$149 ViaVoice 98 Executive Edition is a good choice, because it offers the smoothest control over the Windows desktop. But while this year's model vastly improves on earlier editions of the product, it can't match Dragon for overall accuracy.

ViaVoice did well with the plain-text sections of the test letter but stumbled over some proper names and acronyms. For example, "Bernardo" was rendered as 'Bernad O', "Westwood" as 'West would it', and "Peterborough" as 'Peter burrow'. This sank its initial accuracy rate significantly. In my experience, the more context I provided for each word, the likelier ViaVoice was to recognize it.

Like Dragon, IBM streamlines the task of switching between dictation, correction, spelling, and command modes. Say what you want to do, and the package is usually smart enough to interpret it correctly. Occasionally, I had minor problems making ViaVoice 98 understand a navigation command (such as "move up four lines"). My success rate went up ►



when I issued each command in a clipped monotone—I got the eerie feeling that ViaVoice 98 was training me, instead of the other way around.

You can use ViaVoice directly inside such applications as Word, Excel, and Internet Explorer Mail. Dictation within Word is almost instantaneous, but for other apps you have to wait briefly while your PC mulls things over in the background. Still, ViaVoice 98 has a better head for figures than Dragon: To tell ViaVoice to put \$23,432 in an Excel cell, all

I had to do was say “twenty-three thousand, four hundred thirty-two dollars.”

ViaVoice 98 also gave me the best control over Windows’ desktop. Say “open Excel” to launch your spreadsheet, or the name of a drop-down menu to open it. You can also choose buttons (like “OK” or “Cancel”) by voice. If ViaVoice does



not recognize your command, you can train it to decipher your pronunciation, but I seldom had to resort to this tactic.

So if you want (or need) to minimize your day-to-day keyboard operations, the

ViaVoice 98 package is a good choice. But its problems with initial accuracy are still severe enough to be troubling. ►

## Talk QWERTY to Me

For two weeks, *PC World*'s Harry McCracken voice-controlled his PC. Here is his story.

**AHEM.** Testing. Is my microphone on? Good.

After years of practice, I've become an accomplished two-finger typist, with no signs yet of carpal tunnel syndrome. But at the behest of my editor, I put my keyboard aside and for two weeks used Dragon Systems' NaturallySpeaking to traverse spreadsheets, compose e-mail, and browse the Web. I'm even using it slowly but semi-surely to dictate this article in Word.

Amazingly, I've managed to get my work done, and I've enjoyed doing it. I discovered that voice works well for e-mail and is surprisingly decent for word processing. And I've learned some lessons worth pondering if you're thinking about picking up the microphone yourself.

### Consider your surroundings.

Though I have my own office, my use of speech input has been a bit disruptive to my coworkers (luckily, they're more amused than irritated by my jabbering). So I shut my door before launching into a dictation session—especially when I'm writing anything not meant for universal consumption.

**Give it time.** I used the product straight out of the box, with minimal training, and ran into an accuracy rate of well under 50 percent. I'd have been better off typing with my toes. My results improved substantially after I underwent more extensive training and added a number of words that are in my everyday vocabulary but not the program's. I also learned to position the microphone with infinite precision each time I donned my headset, and to watch my pronunciation with a diligence that would have done credit to Eliza Doolittle. (I'm still working on the high-level skill of simul-

taneously answering the phone with one hand while whipping off the headset with the other.)

**When in doubt, type.** I thought I'd be able to go completely hands-free. Not a chance. Instead, I quickly settled into a pattern of using 90 percent speech input, 10 percent keyboard strokes. Certain actions—such as entering corrections when recognition goes awry—are much faster from the keyboard than from the headset.

**Be selective.** Voice recognition works fairly well for informal writing like e-mail. For formal documents requiring extensive revision, the best approach is

to dictate a rough draft and polish it at the keyboard—as I did for this article. The hardest part is to remember speech-command equivalents for mousing maneuvers, such as “move back five words.”

**Don't expect miracles.** Windows is at heart a keyboard-centric operating system. Voice recognition accuracy has a way to go. Correcting errors is a pain. And the NaturallySpeaking headset pinches my ears. Someday—maybe even in our lifetime—these gotchas will go away. But for now, don't use speech input unless you're willing to accept its flaws. Then again, who ever said the QWERTY keyboard was a joy to learn and use?

—Harry McCracken

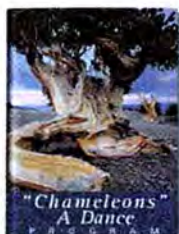




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## L&H Voice Xpress Professional

**PRO:** Easy and fast correction of misrecognized words, excellent numerical recognition

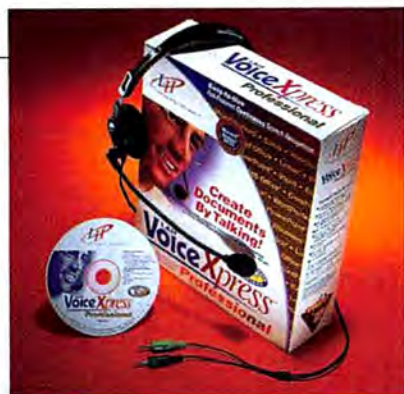
**CON:** Finicky about command pronunciation, recognition is spotty

At first glance, Lernout & Hauspie's Voice Xpress Professional looks a lot like Dragon's NaturallySpeaking Preferred. But though the \$150 Voice Xpress Pro has advantages—it recognizes numbers well and integrates tightly into Office 97 apps—it can't match Dragon's overall ac-

curacy or ability to recognize commands.

Voice Xpress Pro's training process is the longest of all the packages. It took me 50 minutes to read 230 screens of text—lists of commands, spelling exercises, and excerpts from a book about Antarctica (including such tongue twisters as "vulpine Russian glaciologist").

While Voice Xpress Pro recognized most business text, it proved hard of hearing at times. "Westwood Park" became 'west with a park', "June 22nd" became 'June 20 seconds', "quarter" became 'water', and "Stan Miastkowski"



came out (mystifyingly) as 'to stand and guest cascade'. It also had real problems with articles and short words (like "a," "the," and "that"). Voice Xpress Pro's ►

## Report From the Voice Labs

Think your PC doesn't understand you? Just wait. Someday, you may sit down and have a nice heart-to-heart with your computer—maybe even while speaking into your lapel.

**WE ASKED** experts at leading voice research labs about the future of speech recognition. Here's what they had to say.

**Talk anywhere.** Voice technology may soon move out of quiet offices and into the noisy world. "The next generation of continuous-speech technology needs to adapt to imperfect conditions," says Volker Steinbliss, chief technology officer at Phillips Speech Processing in Aachen, Germany. Future

technology, he says, will adapt to inexperienced users, distinguish between intended dictation and superfluous "ahs" and "ums," and filter out breathing sounds. Accuracy will improve, wherever you do your talking.

**Virtual secretary.** Dragon expects progress toward speech-centric applications where utterances produce ac-

tion, not just dictation. In two years you'll be able to tell your PC, "Send an e-mail to Nancy and schedule a meeting with her on Thursday. Oh—and can you fetch me a latté?" The system will identify Nancy, schedule an appointment with her, and report she's been added to your calendar (no guarantee about the coffee yet).

**Syntax reform.** IBM is focusing on making ViaVoice easier to work with.

"Right now, your computer won't always let you talk the way you want to," says David Nahamoo, senior manager in IBM Research's language tech-

nologies department. "We want to change that, so users have greater freedom of speech." Accuracy will make significant strides, too, but will never be perfect, according to Ozzie Osbourne, general manager at IBM Speech Systems. Why not? "As human beings we don't speak 100 percent accurately in the first place," says Osbourne. "We ignore syntax and slur our words. It's not really accuracy we're after, but 100 percent understanding."

**Wear it out.** Software publishers are tight-lipped about future products, but they agree that consumers will eventually see speech recognition embedded in every app under the sun, as well as in Web-based services, telephony devices, VCRs, microwaves, cars, and even clothes. Chris Schmandt, principal research scientist at MIT's Media Lab, is working on using speech recognition to activate a "wearable computer." The idea is that your PC will be accessible all the time, and you'll communicate with it purely by voice. "It will be at least a decade before consumers see this attire hit the streets," says Schmandt.

Great. I've got ten years to pick out a whole new wardrobe.

—Aoife McEvoy





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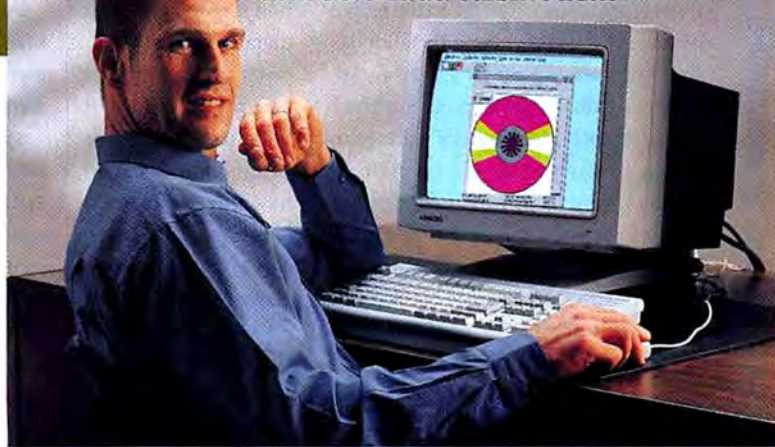
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occasional recognition problems may be attributable in part to its small (30,000-word) basic vocabulary, about half the size of those in other packages.

Voice Xpress Pro also had trouble recognizing some navigation and desktop-control commands, like "go to the end of the document." I increased dictation accuracy by speaking slowly and enunciating words with unnatural precision. But I had better luck inducing the package to recognize navigation and formatting commands by running words together ("downtwoparagraphs," for example), pausing before and after each command.

On a positive note, Voice Xpress Pro has one of the cleanest ways of correcting its mistakes. Say "correct that," and up pops a list of suggested words. If the right word is there, you say "take" and the number of the correct word, and it's inserted in your document. The product also integrates seamlessly into Microsoft Office 97; unlike with the other packages, there was no delay when working within Office apps. And Voice Xpress Pro shines at numerical entry, letting me create entries in an Excel spreadsheet by saying numbers in an entirely natural manner. But Dragon is considerably better at basic recognition, and as far as navigation and control capabilities go, Voice Xpress can't lay a finger on IBM's Via Voice.

## Philips FreeSpeech 98

**PRO:** Free trial, inexpensive

**CON:** Mediocre dictation accuracy, failed to recognize some commands, no headset

Of the four programs we looked at, Philips FreeSpeech 98 is the most aptly named: You can test-drive it for free just by downloading its 30MB installation file from the Web ([www.freespeech98.com](http://www.freespeech98.com)). Using it beyond the seven-day trial period costs \$39; but once you've tried it, you probably won't want to buy it.



Despite its very low price, FreeSpeech 98 comes with a full-set of features. Besides providing a typical WordPad-like dictation screen, it lets you dictate into any Windows application that accepts text, and it permits you to use voice commands to navigate the menus, windows, and dialog boxes of your desktop. Unlike the other three packages, FreeSpeech forces you to switch manually between the dictation, command, spelling, and sleep modes. And although you are supposed to be able to change the mode by voice, this method worked so infrequently that I used the mouse to accomplish the job.

FreeSpeech 98's initial accuracy was not impressive. This package was great at understanding basic business text, but anything unusual threw it for a loop. "O'Keeffe" became 'both keys', while "Bernardo" turned up as 'burn our goal'. And like Dragon NaturallySpeaking, FreeSpeech couldn't interpret numbers correctly unless I spoke them one digit at a time.

FreeSpeech 98's navigation and formatting commands are quite similar (often identical, in fact) to those used in the other packages. But FreeSpeech often obstinately ignored my orders, twiddling its virtual thumbs while I futilely directed it to select text or move the cursor. The ex-

## Protect Your Vocal Cords

**HANDS-FREE** computing may sound safe and comfortable, but if you don't proceed with due caution, talking to your PC can be hazardous to your vocal health.

Dennis Ettare, director of research and training at the Repetitive Strain Institute in San Jose, California, reports that 60 percent of his patients who use voice recognition software regularly experience some level of physical discomfort.

Speech pathologists urge users to proceed with extreme caution if they plan to dictate using this software on a daily basis. Erica Danjelic, a San Francisco-based specialist in speech disorders, offers some tips on how to avoid damaging your vocal cords when talking to your computer.

**Check your posture.** Ensure that your head is not extended out over your body, a position that creates tension in the neck and throat.

you're running out of breath. Inhale and exhale in an easy, relaxed pattern.

**Use proper pitch.** Don't speak in an unnaturally deep voice. Instead, maintain a close-to-normal (for you) range of high and low pitches, avoiding an artificial monotone.

**Dictate smoothly.** Try not to "punch" words or begin them too abruptly and forcefully.

**Maintain moisture.** Drink plenty of water to keep the membranes of your throat moist.

**Keep breathing.** Don't rush to complete sentences because

Anger and frustration just make things worse.

—Aoife McEvoy

perience proved so frustrating that I quickly returned to using the mouse and the keyboard to find my way around.

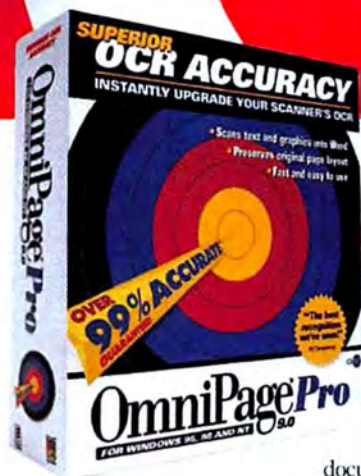
If you still feel tempted by the low price of this package, remember that FreeSpeech doesn't come with a headset. Though the software will work with any PC microphone, you'll get better results from a headset, which costs \$30 or more. Free speech is usually worth fighting for, but this product isn't.



Find articles from PC World cited in this story at PC World Online. Stan Miastkowski is a contributing editor for PC World. Harry McCracken is a senior writer and Aoife McEvoy an associate editor for PC World. Executive Editor Daniel Tynan, Associate Test Center Director Ulrike Diehlmann, and San Francisco-based freelance writer Susan Fry contributed to this article. ■



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By Harry McCracken

# Shots

GOOD LOOKS go only so far. Take digital cameras, for instance. Since their inception, they've been among the flashiest gizmos a gadget freak could tote; but if you were after more than oohs and aahs, many early models were bound to disappoint. Despite their steep prices, they couldn't hold a flash bulb to the picture quality of a \$10 disposable camera.

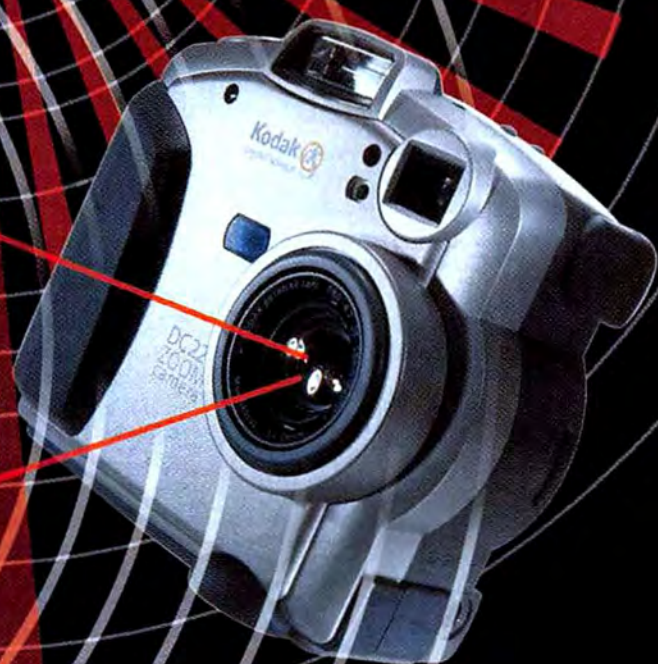
Suddenly, though, digital photography looks a lot brighter. Image quality is advancing rapidly, and new cameras carry a fuller complement of useful features. Has yesterday's cool status symbol morphed into today's mundane business tool? Not yet, except for folks whose jobs revolve around instant images—such as insurance adjusters and real estate agents. Still, judging from the ten cameras we reviewed for this article, digital photography is well on its way to joining the mainstream. ►

**Better pictures, snappier features, lower prices:**

**New megapixel cameras deliver substance and style.**



Toshiba PDR-M1



Kodak DC220



The new generation of megapixel models, by definition, can produce images comprising at least 1 million pixels, allowing you to print 5-by-7-inch photos. Even if you're not a full-time shutterbug, these cameras can serve as useful alternatives to their film-based forebears.

Priced between \$399 and \$899, the upscale consumer cameras here combine high resolutions and multiple functions with point-and-click simplicity. Two rate as Best Buys: Toshiba's no-frills \$499 PDR-M1 produces fine images, while Kodak's \$699 DC220 packs an array of features, including audio recording and a Universal Serial Bus port.

### PROOF IS IN THE PIXELS

DIGITAL CAMERAS' picture quality remains a major concern. For this review, five editors critiqued the image quality—on screen and in print—of unlabeled images taken at maximum resolution. Samples included an indoor still life, taken without flash; a conference room scene of two businesspeople, taken with flash; and an outdoor scene shot in the midday sun. For these test images, we pressed the shutter and let each camera's

## Best Buys



On a budget? Toshiba's PDR-M1 delivers great images for just \$499. For \$200 more, Kodak's \$699 DC220 offers the most useful array of features of any camera here.

autofocus and other electronic smarts do the work. (All the cameras permit manual adjustment of at least some settings, such as exposure.) Nikon's Coolpix 900 produced the best-looking images overall, rivaling scanned 35mm pictures. (At press time, Nikon replaced this camera with a slightly fuller-featured model, the Coolpix 900s.) Agfa's EPhoto 1680 and Toshiba's PDR-M1 weren't far back; and Fujifilm's MX-700, Kodak's DC220, and Konica's QM100-V also rated well.

Maximum resolutions ranged from the Kodak's 1152 by 864 pixels to the Agfa's 1600 by 1200. Even the Kodak (whose resolution falls 4672 pixels short of a million, if you're counting) packs more than three times the pixels of 640

by 480 cameras. But that many pixels fill up lots of memory: The Agfa's standard memory holds just six shots at the camera's best-quality setting.

When you print the images, however, those extra pixels pay off. Using Epson's Stylus Photo 700 printer, we got 5-by-7-inch photos that could pass for 35mm prints. But even megapixels have their limits: When we enlarged pictures to 8.5-by-11 inches, they looked jaggy.

Creating digital photos wasn't painless or cost-free. We often had to darken, lighten, or otherwise tweak images with the cameras' bundled software. Each image took several minutes to print, and the ink and glossy paper we used cost around 60 cents per print.

### TIME AND MONEY SAVINGS

DIGITAL CAMERAS are most appealing if some of your photos will remain in digital form—whether as images on a Web site, elements in a presentation, or cyber-snapshots to e-mail to friends.

Though printed digital photos match 35mm quality only under ideal circumstances, they look fine on screen, where high resolution isn't essential. When

## DIGITAL CAMERAS

## FEATURES COMPARISON

CAMERA	Comments	Street price (10/10/98)	Features			
			Weight (ounces) <sup>1</sup>	Standard memory (MB)/card type	Resolution (minimum/maximum)	Picture capacity (minimum/maximum) <sup>2</sup>
Agfa EPhoto 1680 888/281-2302 www.agfahome.com	Impressive image quality, rotating zoom lens; large, no optical viewfinder.	\$899	13.7	4/ SmartMedia	640 x 480/ 1600 x 1200	6/48
Casio QV-5000SX 800/836-8580 www.caslo.com	Allows minivideos, panoramas, and image editing; image quality fair.	\$499	9	8/fixed	640 x 480/ 1280 x 960	16/88
Epson PhotoPC 700 800/463-7766 www.epson.com	Versatile, presentation friendly; uneven picture quality, poor battery life.	\$599	10.2	4/ CompactFlash <sup>3</sup>	640 x 480/ 1280 x 960	7/50
Fujifilm MX-700 800/378-3854 www.fujifilm.com	Compact, good image quality, easy to use, long battery life; skimpy memory.	\$599	10.4	2/ SmartMedia	640 x 480/ 1280 x 1024	2/38
Hewlett-Packard PhotoSmart C20 800/752-0900 www.photosmart.com	Low price, designed for home users; average image quality, short battery life.	\$399	11.1	4/ CompactFlash	576 x 436/ 1152 x 872	8/40
Kodak DC220 800/235-6325 www.kodak.com	Optical zoom lens, good image quality, 8MB of memory; bulky and heavy.	\$699	22.4	8/ CompactFlash	640 x 480/ 1152 x 864	23/106
Konica QM100-V 800/285-6422 www.konica.com	Fairly good image quality; ambiguous controls, software, and documentation.	\$599	10.4	4/ CompactFlash	576 x 436/ 1152 x 872	10/50
Nikon Coolpix 900 800/526-4566 www.nikonusa.com	Best image quality, rotating zoom lens; no TWAIN driver.	\$799	12.2	4/ CompactFlash	640 x 480/ 1280 x 960	6/96
Ricoh RDC-4300 800/225-1899 www.ricohcpg.com	Compact, rotating zoom; no optical viewfinder, so-so picture, short battery life.	\$599	10.2	4/ SmartMedia	640 x 480/ 1280 x 960	6/70
Toshiba PDR-M1 800/288-1354 www.dsc.toshiba.com	Low price, pleasing image quality, easy to use, best battery life; skimpy bundle.	\$499	8.8	4/ SmartMedia	640 x 480/ 1280 x 1024	5/80



Best Buy

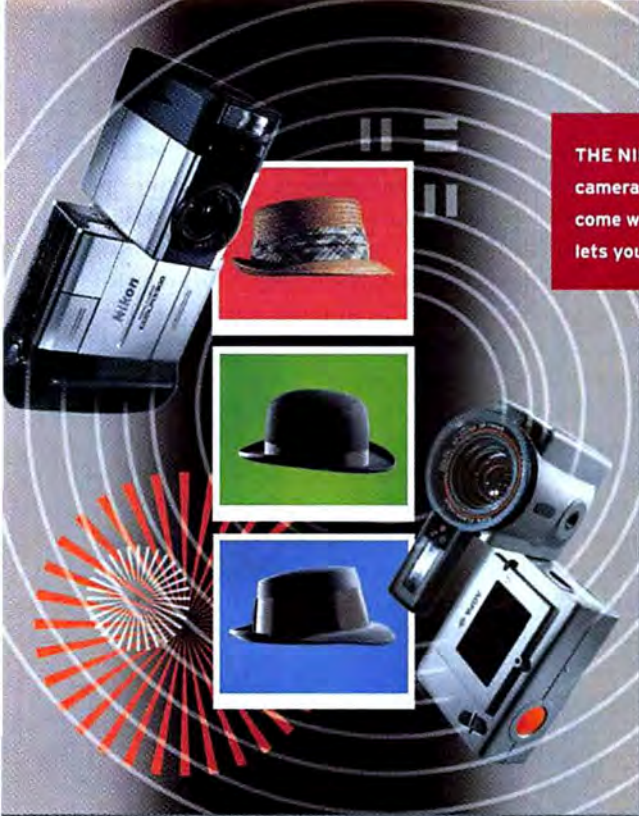
● Yes ○ No

<sup>1</sup> With batteries.

<sup>2</sup> With standard memory.

<sup>3</sup> All cameras were tested with four AA alkaline batteries, except for the Epson, which uses NiMH AAs, and the Fujifilm, which uses a proprietary lithium ion battery. We performed a sequence of tasks, including powering up the camera, taking four pictures with flash, deleting them, and pausing; taking four pictures without flash, deleting them, pausing, and powering down; and then repeating until battery power was depleted. We used the LCDs in these tests but permitted power-management settings (when available) to shut off the display after a predetermined period of inactivity.





**THE NIKON (LEFT) AND AGFA cameras take sharp photos and come with a rotating zoom lens that lets you snap shots at odd angles.**

768 resolution and a fixed-focus lens, is one good low-cost option.

### ALL SHAPES AND SIZES

OF THE TEN cameras we tested, no two possess exactly the same look and feel. Some, like HP's PhotoSmart C20, resemble 35mm point-and-shoots; others, such as Agfa's innovative, swiveling EPhoto 1680, owe no discernible debt to tra-

All can hook up to a TV or VCR for fast playback. And except for HP's PhotoSmart C20, all include a zoom feature. (Cameras with a true optical zoom lens, such as the Kodak and Nikon, permit precise zooming without degrading quality; the alternative, digital zoom, usually offers a single magnification level, and only at the camera's lowest resolution.)

LCD displays let you see pictures the moment you take them, but they don't render old-fashioned optical viewfinders obsolete. The lack of an optical viewfinder was a big black mark against the Agfa and Ricoh cameras, even though these models sport nifty rotating lenses that let you snap shots at any angle. We had to leave their LCD displays turned on, draining the batteries, and the screens were hard to read in dimly lit rooms and sunny outdoor locales.

Digital cameras' battery life can be brief indeed. In our tests, we took pictures with and without flash, deleted images, and performed other typical tasks; only the Fujifilm and Toshiba eked out more than 2 hours of duty. Our advice: Use the LCD sparingly, and keep extra batteries on hand for emergencies.

shooting images for on-screen use, you can choose a lower-res setting, optimizing the camera's memory.

For the same reason, Web-only photographers can economize by buying a basic, lower-resolution camera. Agfa's \$250 EPhoto 780, which offers 1024 by

ditional camera design. In size they vary from Fujifilm's surprisingly pocketable MX-700 to Kodak's chubby DC220, a handful at almost a pound and a half.

All the cameras have color LCD displays that you can use to compose shots and view the pictures stored in memory.

35mm-equivalent lens size (mm)/zoom	Shutter speed range (seconds)	Closest focus range (inches)	Viewfinder	Output methods	Battery type/rechargeable	Battery life (hr:min) <sup>1</sup>	Bundled software	Support policies			
								Warranty (years)	Support hours/weekends	Toll-free support	PC World InfoNet number <sup>4</sup>
38-114/3X optical, 2X digital	1/2-1/500	3.9	LCD	serial, video	AA/●	0:57	PhotoWise, LivePix SE, PhotoVista	1	11/○	○	697
36/4X digital	1/6-1/500	4	optical, LCD	serial, video	AA/○	1:13	PhotoDeluxe, Spin Panorama, Spin PhotoObject, Ixla Digital Camera Suite	1	13/●	●	698
36/2X digital	1/4-1/500	4	optical, LCD	serial, video	NiMH AA/●	0:44	Photo File uploader, utility to download images to camera	1	12/●	○	-
35/2X digital	1/4-1/1000	3.5	optical, LCD	serial, video	Li/●	2:05	PhotoDeluxe	1	8/○	●	699
39/none	4-1/500	9.5	optical, LCD	serial, video	AA/○	0:45	PhotoSmart, Picture-It	1	16/●	○	700
29-58/2X optical, 2X digital	1/2-1/360	8	optical, LCD	serial, USB, infrared, video	AA/○	1:25	Picture Easy, PhotoDeluxe, PageMill	1	11/○	●	701
39/2X digital	1/6-1/500	7.9	optical, LCD	serial, video	AA/○	1:03	PhotoDeluxe	1	13/●	●	702
38-115/3X optical, 2X digital	1/4-1/750	3	optical, LCD	serial, video	AA/○	1:10	PhotoDeluxe, Slides and Sounds, QuickStitch	1	12/○	○	703
35-105/3X optical	1-1/500	3.2	LCD	serial, video	AA/●	0:33	PhotoBase, PhotoStudio, QuickStitch 360, Kai's PowerShow, LogoMotion	1	15/●	●	704
35/2X digital	1/4-1/1000	3.5	optical, LCD	serial, video	AA/○	2:13	ImageExpert	1	12/○	●	705

<sup>4</sup> For more information about all products in this article, select PC World InfoNet no. 908, or visit [www.pcworld.com/infonet](http://www.pcworld.com/infonet).

<sup>1</sup> Includes fixed memory and empty CompactFlash slot.



Every camera here except the Casio includes a memory-card slot—luckily, since it's so easy to max out the standard storage. Shades of the Betamax/VHS wars, there are two incompatible memory-card types. SmartMedia cards (used by Agfa, Fujifilm, Ricoh, and Toshiba) are wafer-thin wonders of miniaturization. The slightly chunkier CompactFlash cards (used by Epson, HP, Kodak, Konica, and Nikon) support up to 64MB, versus SmartMedia's maximum of 16MB. Each type costs from \$5 to \$10 per megabyte.

### SLOW GOING

BECAUSE DIGITAL cameras are actually tiny computers that crunch massive graphics files, they're slow: slow when you power them on (many take 7 or 8 seconds to wake up), slow when you snap a shot (processing takes several seconds), and slow when you try to flip through stored images (except for the zippy Casio).

Transferring pictures to your PC tends to be the most sluggish task of all—most cameras use an archaic serial-port cable to do the job. Even the speediest units took more than half a minute to send each megapixel picture. Alone among these cameras, the Kodak has a USB port as well as a serial one. If you have a USB-savvy PC, it's the way to go: It took just 25 seconds to transfer four pictures.

For cameras that use SmartMedia, you can buy SmartDisk's \$100 FlashPath adapter, a SmartMedia carrier that fits into a PC's floppy drive. It copied four pictures from the Fujifilm camera to our PC in just 1 minute, 28 seconds, versus 9 minutes via serial. Similarly, ActionTec's CameraConnect Pro, a \$119 parallel-port box, copied six full images from the Nikon's CompactFlash card in just 23 seconds.

### A DIGICAM IN EVERY HOME?

WITH PRICES sinking and feature options and image quality on the rise, digital camera sales are skyrocketing—from 372,000 units in 1996 to an estimated 1.2 million in 1998, according to Lyra Research of Newton, Massachusetts. Granted, that pales in comparison to the 9 million 35mm point-and-shoots sold last year. But digicams at last have a secure market foothold; in fact, they now outsell 35mm single-lens reflex models.

Someday, a generation of Americans will be as unfamiliar with 35mm-film canisters as today's kids are with 8-track tapes. It's just a question of when.

# Image Quality

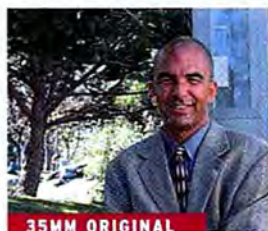
## Nikon's Coolpix wins in a photo finish

MEGAPIXELS ARE MAKING their mark on digital-camera image quality. Many of the cameras we tested did a respectable job, but Nikon's Coolpix 900 came closest to matching the colors and fine detail of a 35mm photograph. Agfa's EPhoto 1680 and Toshiba's PDR-M1 were nearly as pleasing.

We wanted to test the cameras themselves, not our technical skills. So we took these photos using automatic settings, and didn't tweak them using image-editing software. No camera performed flawlessly—most of the images are a tad dark, and the Kodak's is too light. You may get better results by adjusting camera controls or running pictures through an image editor.

One other note: With relatively small pictures such as these, differences aren't as dramatic as you would see at a larger size—say, 4 inches by 5 inches or above. In particular, images from a nonmegapixel camera would begin to look grainy at larger sizes.

**OLD-FASHIONED 35mm** photography (left) remains the gold standard in picture quality. But digicams such as Nikon's Coolpix 900 are catching up.



35MM ORIGINAL



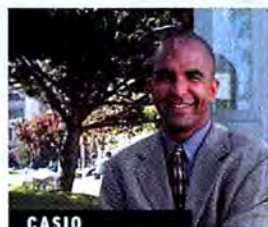
BEST PHOTO: NIKON



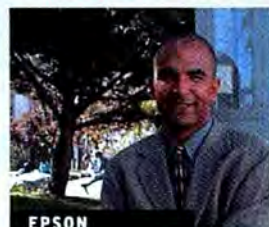
NONMEGAPIXEL



AGFA



CASIO



EPSON



FUJIFILM



HEWLETT-PACKARD



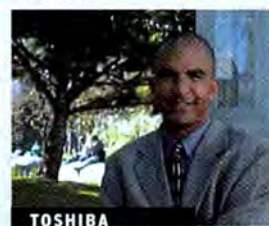
KODAK



KONICA



RICOH



TOSHIBA



### AGFA EPHOTO 1680

**PRO:** Great picture quality, rotating variable zoom lens, easy controls and PC software

**CON:** Pricy, no optical viewfinder, fairly large, minimal printed documentation

AGFA'S \$899 EPHOTO 1680 received high marks for its pictures, especially the realism of subtly textured items. Its rotating zoom lens enables you to take angled shots or snap photos of yourself.

The unit features an easy-to-use download tool, and its thumbwheel lets you flip through shots and select camera options quickly. You also get rechargeable AAs and a charger. However, the EPhoto ran for less than an hour in our tests.

Our biggest complaint: The Agfa lacks an optical viewfinder, and its LCD is almost unusable in dimly lit rooms or in bright sunshine. A smaller quibble: Documentation is mostly on CD-ROM, but cameras need portable manuals.

### CASIO QV-5000SX

**PRO:** Reasonable price, movie recording feature, BMB of standard memory, fast playback

**CON:** Mediocre picture quality, no memory-card slot, some confusing controls

IF THERE WERE an award for Most Off-beat Features in a Low-Cost Digital Camera, Casio's \$499 QV-5000SX would win it in a heartbeat. This model can capture 6-second silent minimovies, stitch multiple shots into an extra-wide image, alter a picture's resolution, convert it to black and white, or rotate it 90 degrees. The unit also lets you flip swiftly through images on its LCD, and its 8MB of standard memory is twice the norm.

But images had an oddly reddish cast. And once you fill the on-board memory, you're done until you download the photos: The camera has no memory-card slot.

Other weaknesses include inscrutably labeled options (better get out the manual) and bare-bones download software.

### EPSON PHOTOPC 700

**PRO:** Versatile settings for photographic effects, excellent manual, seven-day phone support

**CON:** Uneven picture quality, unwieldy controls  
EPSON'S PHOTOPC 700 is one of the best cameras here for under \$600. It resembles a stylish 35mm point-and-shoot,

with a smooth raised grip on one side to make holding it easy. The unit's monochrome and panorama modes are a kick, and an adapter lets you mount telephoto, wide-angle, and close-up lenses. Image quality, however, wavers from impressive to adequate; one indoor flash picture of people had realistic color, but other images were dark, obscuring fine details.

The Epson carries rechargeable NiMH AAs and a charger—and drains them fast, getting 44 minutes of power in our tests. A utility captures images from your PC and downloads them to the camera.

Unfortunately, the unit's unnecessarily complex push-button controls cry out for streamlining—and common sense. The default battery-saving mode (which you can override, thank goodness) aggravatingly shuts the LCD off after each shot. Want to take a (digital) zoom shot? You have to remember a five-click process. By contrast, Toshiba's PDR-M1 lets you do the same job with a single press.

### FUJIFILM MX-700

**PRO:** Convenient size, good image quality

**CON:** Skippy memory, limited support hours  
UNLIKE MOST megapixel cameras, Fuji-

film's MX-700 is petite enough to slip comfortably into a shirt pocket. Its distinctive vertical orientation makes it easy to grip and use, and its menu-based controls are great.

Though the MX-700 produces pleasing images, some pictures had a yellow tinge or slight fuzziness. The lithium ion battery lasted over 2 hours in our tests, but recharging it took a glacial 7 hours in the camera or 2.5 hours in its charging unit.

Despite its virtues, the \$599 MX-700 comes with the least memory here—a parsimonious 2MB, which accommodates only two pictures at the camera's best-quality (1280 by 1024) setting.

### HP PHOTOSMART C20

**PRO:** Low price, clear software and manual

**CON:** So-so LCD display, mediocre image quality, no zoom mode, clumsy controls

MORE THAN ANY OTHER camera here, HP's PhotoSmart C20 seems meant for home users who'd otherwise tote point-and-shoot 35mm cameras. Its \$399 price is appealing, it looks like a film cam- ▶



**STYLISH cameras** from Casio (top), Fujifilm, and Epson (bottom) come in easy-to-hold cases. The controls of the pocketable Fujifilm MX-700 sit on an adjustable wheel.



era, and its software and manuals assume minimal technical expertise. But it's neither simple enough to make digital photography a no-brainer nor loaded with features to satisfy serious shutterbugs. (It's the only camera here with no zoom option, for example.)

The camera's grainy, slow LCD display makes snapping pictures a chore; using the optical viewfinder is less frustrating and conserves battery power (an important consideration since it ran for just 45 minutes on AAs in our tests). Camera options rely on simple menus, but you navigate them with tiny triangular keys that you have to squeeze with viselike pressure. (An unmarked purple button proved to be the LCD switch.)

The PhotoSmart C20's pictures looked too dark, obscuring fine details. Luckily, the bundled Microsoft Picture-It image-editing application makes it easy to transfer, touch up, and print photos; you can even produce handy index prints.

## KODAK DC220

**PRO:** Fine image quality, variable zoom lens, audio recording and other extras, fast USB port, 8MB of memory, generous software bundle

**CON:** Chunky and heavy, no weekend support



**AT FIRST IMPRESSION**, Kodak's DC220 doesn't come across as a serious photographic instrument: Its case is bulbous and a bit funny looking; it makes a goofy "ka-chunk" sound when pressing the shutter; and the LCD employs funky color fonts. Once we started working with this camera, though, we found ourselves hooked. It produces pleasing photos, offers lots of easy-to-use features, and packs 8MB of memory as well as good bundled software like Adobe's PhotoDeluxe and PageMill. Even priced at \$699, it's a good value.

The DC220's picture quality didn't quite match that of the top-tier Agfa, Nikon, and Toshiba models, but the Kodak produced adequate color and detail. Its features include a 2X optical-zoom lens, audio capabilities for annotation, and time-lapse photo options. It even detects when you've rotated it in your hands to take a vertically oriented shot; it flips these images in its memory, so you needn't adjust them later. The

# Snapshots

## New Digital Cameras Come Into Focus

AS WE WROTE THIS ARTICLE, four companies announced new models, varying in style, price, and features. Here's a peek...

Canon's first megapixel with 1536 by 1024 max resolution, the \$1199 PowerShot Pro70, has two memory-card slots and no built-in flash, though you can attach an external one. It includes a rotatable LCD panel, 2.5X optical zoom lens, and 8MB of memory. The Pro70 uses rechargeable NiMH batteries and takes an optional 2CR5 lithium battery (commonly used in film cameras). Bundled software includes Adobe Photoshop LE and Ulead's PhotoImpact. **Canon Computer Systems**, 800/652-2666, [www.powershot.com](http://www.powershot.com)

PC WORLD INFONET NO. 759

Minolta's premier megapixel model, the \$899 Dimâge EX Zoom 1500, supports 1344-by-1008-pixel resolution and has a detachable 3X optical zoom lens. Like its Dimâge V predecessor, it has 4MB of standard mem-

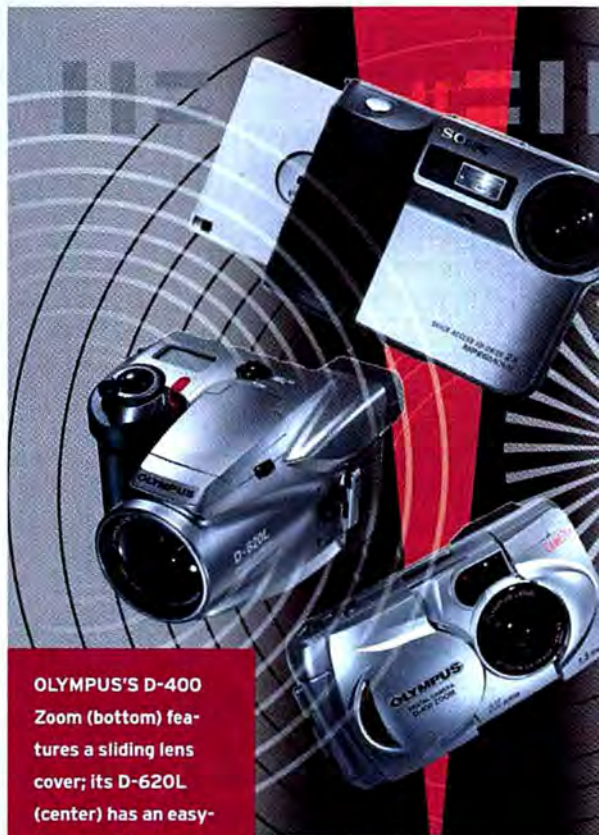
ory, runs on AAs, and lacks an optical viewfinder. **Minolta**, 201/825-4000, [www.minoltausa.com](http://www.minoltausa.com)

PC WORLD INFONET NO. 760

Olympus put its film-camera expertise to use in building the \$799 point-and-shoot D-400 Zoom and the \$1199 D-620L megapixel cameras. In my tests of beta units, both captured beautiful, sharp photos. The cameras include a 3X optical zoom lens, an 8MB SmartMedia card, and Adobe PhotoDeluxe software. The D-400 Zoom, meant for novices, supports resolutions of up to 1280 by 960 pixels, runs on optional AAs, and includes a FlashPath adapter. Aimed at serious photographers, the 1280-by-1024-pixel D-620L includes rechargeable NiMH batteries and a charger. **Olympus**, 888/553-4448, [www.olympus.com/digital](http://www.olympus.com/digital)

PC WORLD INFONET NO. 761

**OLYMPUS'S D-400 Zoom (bottom) features a sliding lens cover; its D-620L (center) has an easy-grip body. The Sony MVC-FD81 (top) stores photos on floppy disks.**



Sony added two models to its Digital Mavica family: the \$899 MVC-FD81 and the

\$1099 MVC-FD91. Like their siblings, they store images on 3.5-inch floppies and (at 1024 by 768 pixels) produce almost-megapixel images. Both can capture 15 seconds of choppy MPEG video (at 320 by 240 resolution) and audio. The MVC-FD81 has a 3X variable zoom lens but no optical viewfinder. The MVC-FD91 includes a fine 14X optical zoom lens and an optical viewfinder. **Sony**, 888/315-7669, [www.sony.com/mavica](http://www.sony.com/mavica)

PC WORLD INFONET NO. 762

—Grace Aquino





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unit's USB port provided speedier image downloads than the sluggish serial connections of other cameras.

The DC220's contoured body rests comfortably in your hands, but it isn't perfect: The power switch sits perilously close to the shutter button, so you risk turning off the camera by accident instead of snapping a shot. And when the Kodak's zoom lens retracts, your finger can get pinched between the camera's lens and body. Ouch!

#### KONICA QM100-V

**PRO:** Decent image quality, attractive case

**CON:** Vague controls, software, and documentation, substandard LCD, no online support

A KISSING COUSIN of the HP PhotoSmart C20, Konica's \$599 QM100-V is the same size, offers similar features and controls, and—we're sorry to say—suffers from the same gritty-looking LCD screen. But several features distinguish this camera. Despite criticizing the inac-

curate colors it sometimes produced, our judges preferred the QM100-V's pictures to the HP's overall. Unlike the HP, the Konica offers a 2X digital zoom. And (let's be superficial) the camera's retro, art-deco case is certainly appealing. It fits the hand comfortably, too.

Otherwise, this camera runs short on assets that might justify its costing \$200 more than the HP. Unlike most models, it lacks a clearly marked mode indicator; at times, you can't tell whether the camera's powered down, in playback mode, or ready to take pictures. Its PC download software lags behind HP's in friendliness and functionality, and its online help can't be accessed from within the application. The printed documentation doesn't help much, either; it scrambles together English, French, and German instructions, creating a manual of babel.

#### NIKON COOLPIX 900

**PRO:** Superb picture quality, rotating lens with optical viewfinder, multioption manual mode

**CON:** Perfunctory printed documentation, no TWAIN driver, five-day phone support a toll call  
NO DOUBT ABOUT IT: Nikon's \$799 Coolpix 900 (replaced at press time by the Coolpix 900s, also priced at \$799, which features 8MB of memory, a hot shoe for an external flash, and, according to Nikon, faster switching between modes) makes an outstanding camera for serious picture takers. It bowled us over with the most high-fidelity photographs of any camera here; viewed on screen, they sometimes looked *better* than 35mm prints. In images of people,

## Photo Ops

### Shutterbugs Rate the New Cameras

THE WORLD is full of people who take pictures, and no two of them have the same reaction to digital photography. We found three businesspeople who use photos for different purposes, supplied each with a megapixel camera, and asked them to report on their experiences.

Overall, they were enthusiastic about the cameras, but all had reservations, too.

**Martha Lepore**, a photojournalist in Coronado, California, has taken 35mm photos for three decades, but was new to digital photography. She loved HP's PhotoSmart C20, and "found the ease of going from picture taking to computer to cropped print exhilarating." The feature she missed most: an optical zoom lens, which the HP lacks. Though photos looked fine on screen, she was disappointed at how some looked in print; images produced on an Epson Stylus Color 740 ink jet "were soft and indis-

tinct compared to 35mm prints." Photos printed on an industrial-strength dye-sublimation printer looked terrific.

**Kip Williams**, who designs ad materials for garden stores in eastern Virginia, already uses a 640 by 480 digital camera. But he found the Epson PhotoPC 700's images better:

"I photographed Bill, our trees and shrubs buyer. It was deadline time, and a 35mm photo vanished in the mail." After touching up a digital shot with an image editor, he e-mailed it to the magazine. He also enjoyed using the camera for casual picture-taking, but plans to wait until prices drop further before buying one—"maybe next year."

**Josh Feldman**, creative director at Frogdesign in San Francisco, tried out Nikon's Coolpix 900. Though he disliked its

size and short battery life, it was "a perfect camera for the photography we do for Web sites." The Coolpix delivered impressive image quality, but Feldman, like Williams, performed some fine-tuning in an image editor: "The brightness and contrast almost always needed a little work." Given digital photography's limited resolution, he'd use the Nikon only for Web sites or small images when going to print; for bigger photos, he'd stick with 35mm.

—Harry McCracken



**Josh Feldman**, creative director at Frogdesign



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fine details like eyelashes and skin texture were remarkably clear. "You can see things that you'd rather not see," observed one judge approvingly.

Though we achieved excellent results simply by pressing the shutter, the Coolpix 900's manual mode lets you fiddle with such key photographic variables as exposure and white balance. (But while you can take either low- or high-resolution pictures in manual mode, automatic mode functions only at the camera's full resolution of 1280 by 960. There goes the memory.) It's also the only camera here that has both a rotating lens and a traditional optical viewfinder.

The Coolpix 900 includes software that installs a camera icon in your My Computer folder; you transfer photos from the camera by dragging and dropping thumbnail images. Even so, Nikon should have included a TWAIN driver (an image-importation standard). The printed manual looks big and comprehensive, but it repeats itself in three languages—the bulk of the documentation is stored on CD-ROM. Fortunately, you shouldn't have to consult it often: The camera has intuitive controls.

### RICOH RDC-4300

**PRO:** Rotating optical zoom lens, audio recording ability, bountiful software, long support hours

**CON:** Subpar picture quality, no optical viewfinder, short battery life, rudimentary download tool  
AT FIRST BLUSH, Ricoh's RDC-4300 seems to combine nifty features from several cameras in one appealing package. Like the Agfa and the Nikon, it packs a rotating zoom lens, but does so in a smaller, more portable size. Like the Kodak, it lets you annotate photographs with audio notes. And like the Agfa and the Epson, the Ricoh helps you put a cap on operating costs by including rechargeable AA batteries and a charger unit.

**ALL CAMERAS** we reviewed, including the Ricoh (top left), HP (top right), and Konica models here, sport a color LCD display. Ricoh's RDC-4300 also has a rotating zoom lens.

al vividness, and details that other cameras caught disappeared. Like the Agfa EPhoto 1680, the RDC-4300 lacks an optical viewfinder—a hassle in poor ambient lighting environments, where the LCD may black out. Plus, it ran for only 33 minutes using AAs before it demanded fresh ones.

Ricoh's rich software bundle includes an image editor, a photo organizer, and a 360-degree panorama utility. However, transferring photos is a chore—unlike other cameras, you must preview one thumbnail image at a time. If your heart is set on a model with a rotating lens, spring for Nikon's Coolpix 900s.

### TOSHIBA PDR-M1

**PRO:** Fine image quality, low price, relatively compact, easy to use, good battery life

**CON:** Slow autofocus, PC download software a bit rough, no weekend phone support



**STILL UNCONVINCED** that digital cameras have moved from fantasy to reality? Check out Toshiba's practical PDR-M1. Though it lacks flashy features like an optical zoom lens and audio recording capabilities,

So far, so good. But unfortunately, the RDC-4300 proved disappointing in several fundamental areas. Our judges were unimpressed by its picture quality: Colors sometimes displayed unnatur-

this camera takes nice pictures, is reasonably easy to use, and squeezes nearly 2.25 hours from AAs—the best battery life of any model we tested. And at \$499, it's an outstanding deal.

This camera isn't as tiny as Fujifilm's MX-700 (though the two do bear a slight resemblance, since Fujifilm had a hand in Toshiba's design), but it's the lightest camera here, and it shares the MX-700's plain-English approach to controls. Our panel liked the PDR-M1's pictures nearly as much as those from the pricier Agfa and Nikon. Some pictures were a tad fuzzy in spots, but overall color and detail looked excellent. Advanced photographers will appreciate the manual mode, which adjusts exposure, white balance, and flash settings.

One key defect could knock it out of the running if you take lots of action photos: Once you press the shutter button, the camera takes longer than most to focus. Toshiba's PC download software could use more polish, too. Though the software includes helpful built-in image-editing tools such as a handy quick-fix option, some icons are cryptic.



For more image quality test photos, see [www.pcworld.com/jang99/photos](http://www.pcworld.com/jang99/photos). Harry McCracken is a PC World senior writer, and Grace Aquino is a PC World staff editor. Testing performed by Ulrike Diehlmann and Alex Jorg of the PC World Test Center. ■







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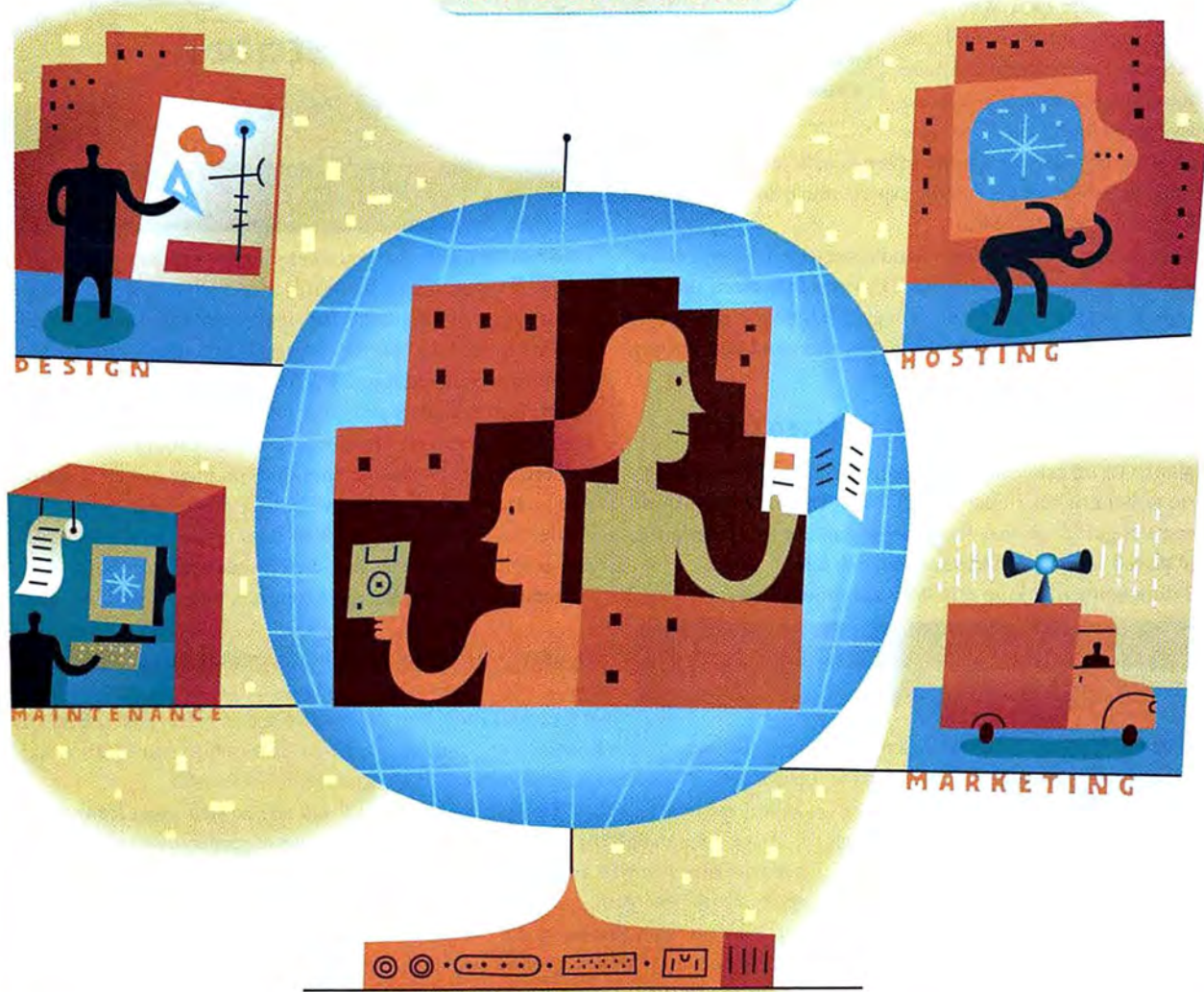


# { Got Web? }

If your business isn't on the Net yet, it should be.  
Here are four painless ways to get there.

BY VICTORIA HALL SMITH

ILLUSTRATIONS  
BY DOUG ROSS





**It's the American Dream:** Take a small business and build it to national—or even international—proportions. For many Internet-wise business owners, the Web has made such growth a reality, as they're able to reach potential customers anywhere, anytime, regardless of their brick-and-mortar addresses. According to a recent study conducted by the International Data Corporation, one-third of the small

businesses that use the Internet increased their revenues by at least 10 percent over the previous year. The kicker: Only a quarter of small businesses in general matched that rate of growth.

While you may not want to turn your local diner into the next Denny's, you've no doubt thought of ways to attract more customers and retain the existing ones. A well-designed Web site can help you meet your goal, however modest or ambitious it may be.

Some businesses create and maintain their own Web sites using such common tools as Microsoft FrontPage and Adobe Photoshop. But what if you're too busy (or too intimidated) to create a site yourself? We have tips and advice to walk you through the easier route: Finding experts who'll do it for you for reasonable fees.

Hundreds of companies now handle some or all aspects of creating and maintaining a Web site. The key is to find one that will give you the most site for your money. We'll help you to decide what type of site you need, to look for designers and Web hosting services, and to ask the right questions.

### NOT ALL WEB SITES ARE CREATED EQUAL

A WEB SITE DOESN'T have to hold the promise of fame and fortune to benefit your business. A bagel shop owner with no dreams of going national, for example, can use a well-designed, well-placed site as an effective advertising tool.

Before you embark on this Web adventure, however, you'll

#### Webbing in the Heartland

Midstate Realty owner Norman Aldinger hired a local college student in Jamestown, North Dakota, to build his site for \$300. Now he gets many more calls from distant buyers.



need to determine what you want your site to accomplish. Will it simply serve as a fancy billboard, or do you want it to become a major source of revenue? What are you willing to budget for this project? Experts we talked to suggest bringing in a consultant to examine your business as a whole and determine what is appropriate. Web designers and hosts (businesses that maintain your site on their servers) often provide such analyses free. See the section "Find a Home for Your Site" on page 165 for information on locating and dealing with these specialists.

There are four basic types of Web sites: static billboards, dynamic billboards, database-driven sites, and storefronts.

**Static billboards**, the most common type of site, serve most-

## Key Questions to Ask Providers

PUTTING YOUR BUSINESS on the Web may be a terrific boon—or a waste of your time and money. Asking designers and hosting services the right questions can make all the difference. Our top ten essential questions:

**Do I need a site?** If the designer says yes, they should be able to provide examples of businesses similar to yours that have benefited from having a Web site.

**What can you do for me?** Many companies

offer all-inclusive packages for Web design and hosting, marketing, and maintenance. Unless you have specialized needs, the all-in-one approach is probably the easiest and least expensive way to go.

**Got a portfolio?** The designer should be happy to give you Web addresses that show some of their handiwork.

**How fast can you build it?** The job of mounting a simple site shouldn't take more than a week or two, and a storefront site should be up and running within several months.

**Which browser do you favor?** This is a trick question. The correct answer is "Neither." A designer should create pages to appear and function identically in both Internet Explorer and Netscape Navigator.

**How fast do your pages load?** If a designer isn't sure or appears bored by the question, a red flag should go up. Pages should appear within 15 seconds even with a 28.8-kbps modem; otherwise, you'll end up losing many potential customers.

**Which search engines do you list in?** "Dozens of them" doesn't cut it. Make sure your



ly as ads. Such sites are often called "brochureware" because, as Phil Whittemore of the Houston-based Boss Design ([www.bossgroup.com](http://www.bossgroup.com)) explains, clients hand over their company's printed brochure and say, "Here, put this on the Web."

A billboard site may provide a description of your business, a list of products or services, phone and fax numbers, your e-mail address, hours of operation, and perhaps a map. This type of content doesn't change very often (it may need updating only when you raise your prices) and thus requires minimal maintenance or additional cost beyond creation and design.

A static billboard site should be easy and cheap to set up; be wary of overpriced deals. For example, AT&T rents out server space to small businesses with simple templates for site information, but charges a steep \$500 for setup and \$195 per month for its basic plan, which includes only 25MB of server space and 200MB of data transfer per month. Many providers

offer the same level of service for one-tenth the cost.

**Dynamic billboards** require daily or weekly updates of specific items. The classic candidates for this type of site are real estate agencies, which need to change their listings regularly. If you choose a dynamic billboard site, your two main concerns will be determining who will post new information and at what cost.

Norman Aldinger owns Midstate Realty in Jamestown, North Dakota. Aldinger, a real estate broker for 12 years, realized that he needed a Web site to compete with national franchise realtors. He hired a local college student, who designed the site ([www.fm-net.com/midstater Realty](http://www.fm-net.com/midstater Realty)) for \$300—billed at \$20 per hour, the same rate the student charges for weekly updates. More frequent updates may be too much for a busy student to handle, in which case it would make sense to hire a professional outfit.

Aldinger's local Internet service provider hosts his site on a server shared with other local businesses and the chamber of commerce. His total monthly fee for Web access, e-mail, and

15MB of storage space is \$27. Aldinger says that since he put up his site, he's pulled in a lot more business from outside his area.

Putting e-mail forms on your site is a great way to connect with potential clients. Make sure you're prepared to respond, however: Unanswered e-mail is as big a turnoff as unanswered calls. Consider using your ISP's autoresponder to acknowledge received e-mail. It lets the visitors know their message arrived and gives you an opportunity to thank them for visiting the site. ISPs usually charge a modest \$5 to \$8 per month for this service.

**Database-driven sites** require frequent updates of hundreds or even thousands of items, making them very difficult to maintain. To overcome this obstacle, they rely on a database (say, Oracle) that you or your employees update regularly via a custom

program. You and your staff are shielded from the confusing Web tools and can continue to use your familiar database (say, Access or FileMaker).

You might want to consider a database-driven site if you are, for example, an especially active real estate broker who processes dozens of new listings every week. But be aware that it may require extra steps such as converting your existing data to a

format that your Web designer will be able to work with.

**Storefronts** are more complicated than all the above site types. Storefront sites may rely on a database of their inventory, in addition to providing a secure server so that visitors can confidently purchase products or services online with credit cards or electronic cash. These complex e-commerce sites are by far the most expensive type to set up and maintain.

Halco Business Products ([www.halconet.com](http://www.halconet.com)) jumped on the Web several years ago. This Houston-area office supply and printing services company is owned by Henry Levy, who has long dreamed of taking his business national. His site now accounts for one-third of his new customers, most of whom live outside of his local area, and his overall sales increased by a whopping 50 percent.

Lynda DeTray of Troy, New Hampshire, is another success story. DeTray, who sells Beanie Babies from her site ([www.bears4sale.com](http://www.bears4sale.com)), says her sales more than quadrupled when she began accepting credit cards. Credit card processing, however, is one of the hardest site components to set up.

What makes adding credit card transactions so complex? You have to deal with both a merchant bank and a credit card processor, and use a secure server to collect the information ▶

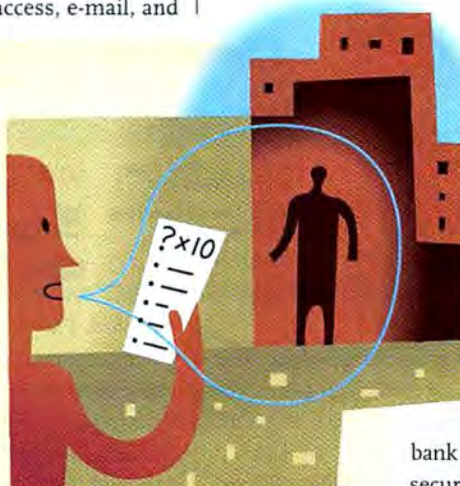


site gets listed prominently in the top search engines (see "Promote Your Site," page 170).

❑ **Got references?** Designers should supply you with at least three names, preferably five.

❑ **What's in your contract?** Don't let a Web hosting service lock you into a long-term contract. Insist on a month-to-month agreement or another short-term solution that will accommodate your site's actual performance.

❑ **Got traffic reports?** Your Web hosting service should deliver well-formatted reports of traffic to your site, including the numbers of page views and unique visitors.







## For \$50 or less per month, many ISPs offer secure servers for merchants to keep

from your site and pass it along. The merchant bank provides the credit card account, but the credit card processor transfers the data. Software such as CyberCash's NetVerify or Tellan Software's PCAuthorize can do the verification and provide a direct connection to your bank using your dial-up modem. The bank then passes the transaction information along to a service such as Paymentech, which handles the settlement of funds and fees at the end of the day.

Merchant bank fees range from 1.9 percent to 2.7 percent per transaction, and the processor's bite is usually 30 cents per transaction plus \$10 per month. If you're quoted a higher fee, shop around. We've seen fees as high as \$1 per transaction—enough to eliminate any profit on low-price items. Nearly all hosts and many ISPs offer secure shared servers for merchants, and the service shouldn't cost you more than \$50 per month.

• **NetVerify**; \$900 first year; CyberCash; 800/666-5777; [www.cybercash.com](http://www.cybercash.com)

PC WORLD INFONET NO. 710

• **PCAuthorize**; \$349; Tellan Software; 408/274-1110; [www.tellan.com](http://www.tellan.com)

PC WORLD INFONET NO. 711

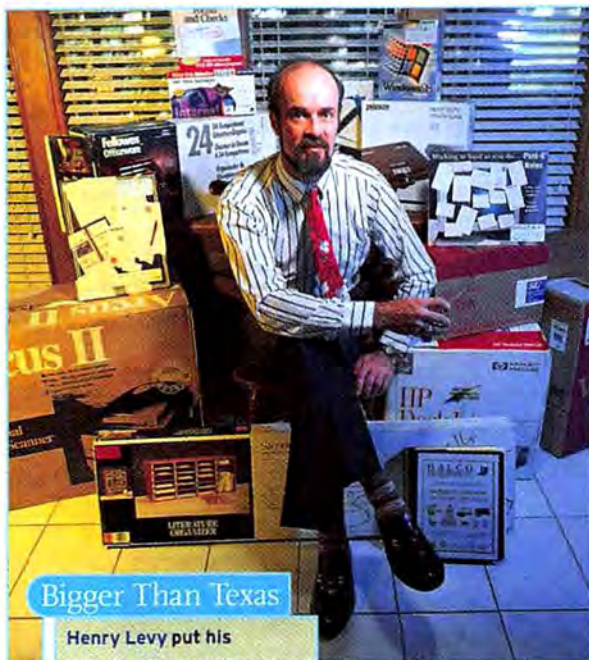
### CARE AND FEEDING OF YOUR WEB SITE

ONCE YOU'VE figured out what type of site you need, it's time to figure out who will create it and how much it will all cost.

Web design firms consist of much more than just graphic designers. These specialized companies frequently offer several of the crucial services needed to make a site successful:

**Design.** This entails not only the graphic design of the Web site, but also the creation of any necessary custom programs (for linking to databases, for example) and of data entry forms used for collecting information from visitors.

**Hosting.** Where will your site physically reside? While it's pos-



### Bigger Than Texas

Henry Levy put his Houston-based office supply storefront on the Web last year. Sales soared, and he now gets a third of his business through the site, from customers located all over the country.

sible to post your entire site on the space provided by an ISP (most ISPs offer 10 megabytes or more to users who sign up for Internet access), only the most basic billboard sites should opt for this least-expensive option. Everybody else needs a Web-hosting service. Most ISPs won't let you post database-driven sites and storefronts on the servers allotted for casual use.

**Marketing.** If you build it, they likely won't come if they don't know about it. You can market the site yourself by posting information about it on the most popular search engines and hoping that it shows up on the search sites' matches whenever visitors type specific key-

words. Alternatively, you can rely on your design or host services to undertake this marketing effort for you.

**Maintenance.** The type of site you've chosen will determine the frequency and method of updates. You may need to rely on the people who create your site to handle these tasks (which means ongoing cost). But if you're lucky, your designers are sophisticated enough to create automatic-posting tools for you so you can update the site yourself without having to know anything about HTML, FTP, or other technical matters.

The simplicity or complexity of your site will help you determine how to contract out these four services. For elaborate, spe-

cialized sites, you may want to negotiate separately for each of them. But in general, it's easier and cheaper to purchase them together in one package, which many ISPs now offer.

One-stop shops include regional services such as CitySearch ([www.citysearch.com](http://www.citysearch.com)) and Sidewalk ([www.sidewalk.com](http://www.sidewalk.com)). These are ideal solutions for restaurants and shops in need of a simple static

billboard. They'll set up and maintain a Web page for you, and point to it from their directory-type listings. While figures are hard to come by (these services do their best to confuse you with a dizzying array of options), Microsoft's Sidewalk representative cited a basic setup fee of "under \$100" and monthly fees starting at \$50. Both Sidewalk's and CitySearch's clear advantage is market-





## their online customers' sensitive data, such as credit card numbers, from prying eyes.

ing. Each has millions of visitors every year; more importantly, they're not just random visitors but residents of specific regions looking for goods and services in their hometowns. The odds of your intended customers finding you are therefore very high.

But before you sign up with a service, be sure to do your homework. Florida resident Marcia Halpern plunked down \$1800 to set up a storefront on I-netmall to sell arthritis pain relief medicine. I-netmall, one of hundreds of Internet malls to sprout up in the last two years, promised to handle the design work, host the site, process credit card transactions, and forward her the orders.

But Halpern says I-netmall took months to get her site online and make even simple updates to it. Furthermore, the company didn't offer any compensation for lost business after its credit card processing server went down for an entire week. A company official has admitted to having had technical problems, but told us that they were being addressed. Halpern has since moved her site ([www.pain-relief.net](http://www.pain-relief.net)) to a local service.

Our advice: Before you sign up with a full-service mall site, check with businesses listed on that mall about their experiences.

### FIND AND DEAL WITH DESIGNERS

SEARCHING FOR a Web designer shouldn't be very difficult. No matter where in the world they're located, you can peek into their "portfolios" as fast as you can type a Web address into your browser.

Start by cruising the Web for site designs that appeal to you. Also check out designer resource sites such as [Webdesignlist.com](http://www.webdesignlist.com) ([www.webdesignlist.com](http://www.webdesignlist.com)). This site, which is not affiliated with any design firms, lets you compare designer services. You can search alphabetically by company, location, and design specialty, such as animation or scripting.

Qualified designers who live outside major metropolitan areas often charge much less than their city-based counterparts. Our quick survey found that small-town designers usually charge \$200 to \$600 for designing a basic site, compared with the \$1000 of a typical New York City design firm. If these fees are too steep for

you, many ISPs can put you in touch with students or hobbyists who are willing to do the job for a lot less.

Once you've narrowed your list to several candidates, it's time for the interviews. Since they are the experts, let them do the ask-

ing, while you note their thoroughness. Do they take the time to understand the nature of your business and how the Web site will fit into it? If they estimate overall costs too quickly, you can be almost certain of budget overruns.

Expect a static billboard site to take anywhere from a few days to a few weeks to create; a storefront site can take several months. Independent designers charge a wide range of hourly rates (\$40 to \$150), but large

firms usually charge by the project. If your designer works by the hour, ask for an estimate of the number of hours needed, and ask

to be alerted if that estimate is going to be exceeded. Make sure your designer isn't biased toward a particular browser. Your site should look and function identically on both Netscape Navigator and Internet Explorer. You may want to ask for examples of sites designed for other businesses and visit them using both browsers.

Designers must remember that most Web visitors are plodding along at 33.6 kilobits per second or less. Pages should download fully in 10 to 15 seconds at that speed.

You may want to throw in fancy elements such as frames, animations, and tables, but you'll pay a price in reduced speed, and

fast performance is always better. If you're putting up photos, identify exactly what they should convey and ask the designer to crop out inessential portions.

### FIND A HOME FOR YOUR SITE

WHEN YOU'RE shopping around for a host, keep the following two questions in mind: How complex will your Web site be, and how

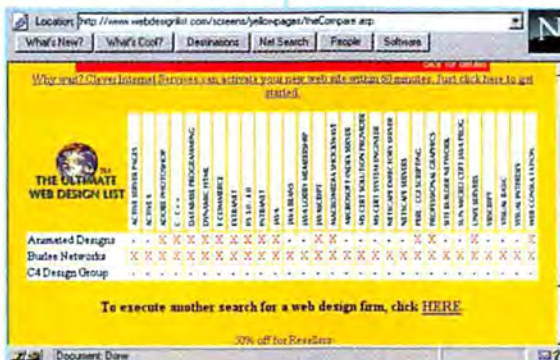
much traffic do you realistically expect it to generate?

Most hosting services offer a variety of packages based on the hard disk space required and the monthly volume of data transfer. In this context, the Web pages and images viewed by visitors translate into data they download to their systems. The host- ▶

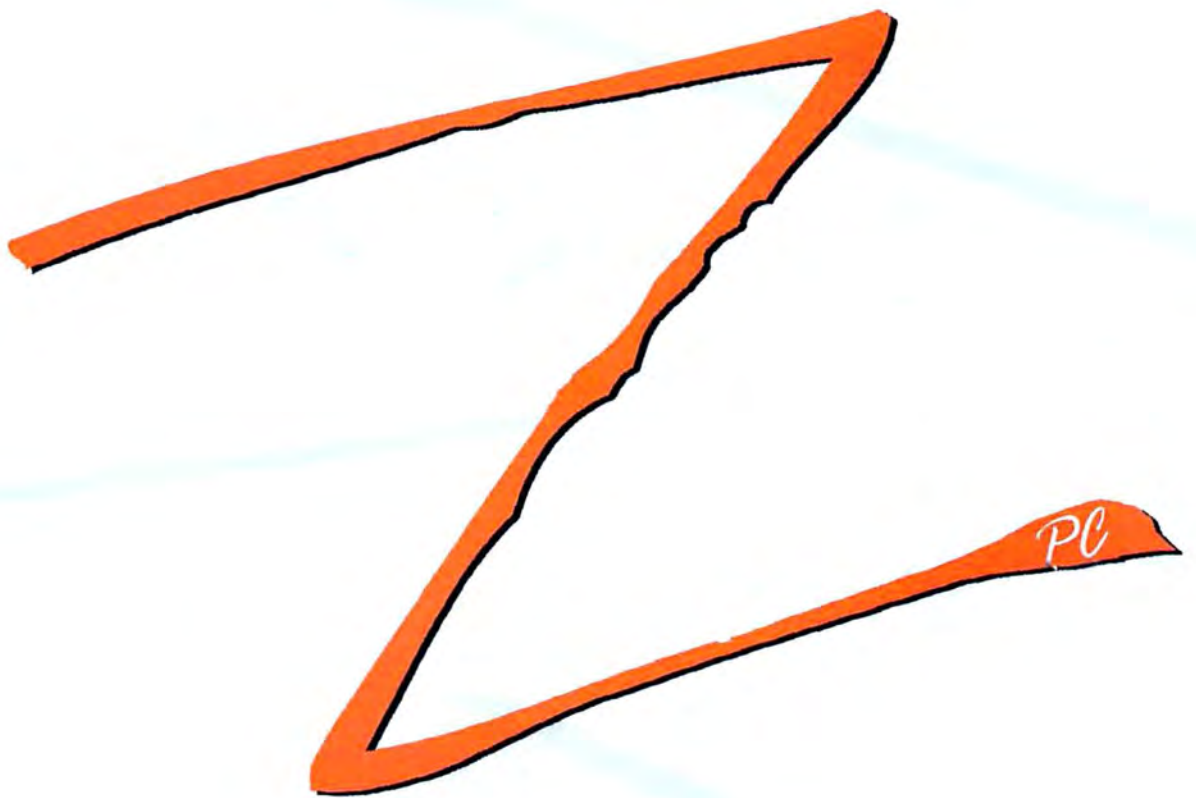


**HOST OF HOSTS:** TopHosts.com (above) is one of several search sites that list Web hosting services, enabling you to find the ones that match your criteria.

**DESIGNER SITE:** Webdesignlist.com (below) lists hundreds of designers around the country. You can quickly hone your search to meet your needs once you know what they are.







**Happy Holidayz.**





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### Please Stop the Pain

**Marcia Halpern of Palm Beach, Florida, relocated the Web site of her arthritis medicine business to a local provider after experiencing some technical and service difficulties on an Internet mall site.**

ing service will charge you according to these two variables—hard disk space and data transfer volume—and will add incremental charges if you exceed preset limits. We can't outline all the different cost offerings here, but we can give you some pointers for picking out the best one.

The amount of server space and data-transfer units you need can vary wildly. In general, a static billboard site may take up only a megabyte or less on the server, while a dynamic billboard may require not only a few megabytes of server space but also several hundred megabytes of data transfer per month. For both types of site, you can expect to pay around \$15 to \$50 per month, with an additional \$25 to \$50 setup fee. A typical electronic storefront site can gobble up 10MB or more of disk space and incur gigabytes of data transfer each month. For such volume, you should expect to shell out between \$100 and \$500 per month, on top of a \$50 to \$100 setup fee.

But these are just general guidelines. Static billboard sites may be basic, but some can enjoy heavy rates of traffic that necessitate gigabytes of data transfer per month. On the other hand, a storefront that offers a select number of obscure specialty items may have relatively modest server needs.

The reality is that it's difficult to project exactly how much server space and data transfer you'll end up needing, so it's important to get flexible terms. Don't let anyone rope you into a long-duration contract. Most providers will let you switch packages from month to month so that you can minimize costly overrun charges.

In addition to cost issues, you need to decide how critical it is to keep your site up every minute of the day. Most Web hosting services guarantee your site will



be up 95 to 99 percent of the time. This sounds impressive at first, but at the 95 percent level, your site could be down for over 8 hours in the

course of a week. Ask the hosting service if it uses multiple connections from different providers to the Internet backbone. That way, if one provider is down, traffic can still get in and out, and your business can stay online. Check to see that credit is given whenever downtimes exceed the guarantee, and that support personnel are on call around the clock.

Programs that connect Web pages to databases have a way of breaking down at any time.

Getting traffic reports for your site is a must. Most Web hosting services will distill the data into easy-to-read reports and send them to you; we recommend signing up with a service that delivers these preformatted reports. And make sure you get enough information—at the very least, the number of unique users ▶

## ONLINE ECONOMICS

### The Cost of Doing Business on the Web

SERVICE	Billboard site	...with forms, frequent updates	...and database links	...and credit card processing
Setup fee	\$25-\$50	\$25-\$50	\$50-\$75	\$50-\$100
Web site design	\$200-\$1000	\$200-\$1000	\$500-\$1500	\$1500-\$6500
Web site hosting/maintenance	\$15-\$25/month	\$25-\$50/month	\$50-\$150/month	\$100-\$500/month
Secure server	not applicable	not applicable	\$50/month	\$50/month
Secure server certification	not applicable	not applicable	\$125	\$125
Domain name	\$3-\$4/month	\$3-\$4/month	\$3-\$4/month	\$3-\$4/month
Total setup cost	\$225-\$1050	\$225-\$1050	\$675-\$1700	\$1675-\$6725
Total monthly fees	\$18-\$29	\$28-\$54	\$103-\$204	\$153-\$554 <sup>1</sup>

<sup>1</sup> Plus standard credit card fees.





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POWERLINE NETWORKING





The Web is **evolving at a frantic pace**. New trends and site design elements are popping up faster than new hot-stock offerings in a **raging bull market**.

(identified by their Internet addresses), as well as the number of page views. Some services will report the number of hits, which is a totally useless figure, representing the number of individual elements (images, frames, and so on) viewed by your visitors. If you have to go with a host that gives out nothing but raw data files, we recommend a utility that will generate meaningful reports out of them, such as the \$299 WebTrends.

If you're going to collect personal and credit card information, you'll need a secure server. Most hosting services now offer this feature directly or through partnership with a secure service provider, but you have to pay extra for it. Costs cover a wide range. One provider may charge only \$20 extra per month for secure server transactions, while another may charge a hefty \$200.

If you want to update your site yourself, you must choose good file transfer protocol tools. Our favorite, the \$38 WS\_FTP Pro (available from [www.fileworld.com/magazine](http://www.fileworld.com/magazine)), makes the process as painless as dragging and dropping files between folders in Windows.

Most people get a host when they sign up for a site design and maintenance package. If you don't like the host you're assigned, try the Ultimate Web Host List ([www.webhostlist.com](http://www.webhostlist.com)) or Top-Hosts.com ([www.tophosts.com](http://www.tophosts.com)). Neither is affiliated with any host service.

• **WebTrends**; \$299; WebTrends; 503/294-7025; [www.webtrends.com](http://www.webtrends.com)

PC WORLD INFONET NO. 712

• **WS\_FTP Pro**; 800/793-4825 \$38; Ipswitch; [www.ipswitch.com](http://www.ipswitch.com)

PC WORLD INFONET NO. 713

## PROMOTE YOUR SITE

ONCE YOUR SITE is up, you need to make the public aware of its existence. For this reason, many design firms also market Web sites. Make sure you get listed in the top search sites—well-known names such as Yahoo, AltaVista, Excite, Infoseek, Lycos, WebCrawler, HotBot, and Magellan.

It's critical to get prominent placement in each search engine, especially with 1.5 million new pages going up every day. Once the company says it has marketed your site, use generic keywords

on the search sites to see how prominently your site appears. If it's showing up in the first batch or two of search hits, you've arrived. If you're number 143 down the list, you may as well be under a rock—no one will ever see you.

Designers that do serious marketing for their clients regularly track placement and the traffic it generates. In addition, you may want to get your hands on a tool such as Web-Position Analyzer, which tracks your placement in the top search engines.

• **WebPosition Analyzer**; \$99 standard version; FirstPlace Software; 800/962-4855; [www.firstplacesoftware.com](http://www.firstplacesoftware.com)

PC WORLD INFONET NO. 714

## JUST THE BEGINNING

YOU'VE FINALLY DONE IT. Your site is a thing of beauty, and it has a good home on a nice, snappy server. Furthermore, its name jumps out from all the search engines that matter. So now you can kick back and watch the orders start to roll in, right?

Not quite. The Web is evolving at a frantic pace. New trends and design elements are popping up faster than initial public stock offerings in a raging bull market. How to keep pace? Surf the Web frequently—especially the sites of your competitors—and make note of any innovative features. And when new versions of the leading

browsers come out, ask your designer if they support new features that would improve your Web site. If you've had the same design for longer than a year, it's time to consider a makeover. In short, stay on top of new developments to help your site pay off.

As Internet connection speeds shift into overdrive, the Web approaches the sophistication of print and TV, while remaining the most interactive medium short of face-to-face contact. Can you imagine a better place for your business to be?



Find files from this article on PC World Online at [www.fileworld.com/magazine](http://www.fileworld.com/magazine). Victoria Hall Smith is an award-winning journalist who has been covering business computing in both television and print since 1983.

## What's in a Name?

PLENTY, IF YOU'RE putting your business on the Internet. Your own domain name, such as [www.yourcompany.com](http://www.yourcompany.com), is a precious commodity. Securing a domain name is not difficult, provided that nobody has beaten you to the name you want. Few hosts charge extra these days to carry your domain name; your only cost is \$35 to \$50 per year to an Internet domain registration service such as Internic Software ([www.internic.com](http://www.internic.com)), Tabnet ([www.tabnet.com](http://www.tabnet.com)), or any of hundreds of other services. For a complete list of these services, type domain names into the keyword field of any major search site.

**Use these tips for choosing a site name:**

**Keep it sensible.** Use your company's name if possible. If the name is longer than one word, run the words together with no spaces. If that option is not available, put hyphens between the words. If you can't get your company's name in any form, go for something short and simple.

**Keep it fresh.** Avoid threadbare words like *cyber*, *tech*, and *net*. They have little impact and will get lost on the search engines in the swarm of similar names.

**Keep it yours.** Make sure you're listed as the registrant and billing contact for the name, or you may be forced to buy it back at a high cost. Also make sure you get the bill. If you don't pay your bill, you'll lose the name—no exceptions.





# You

Okay, this is the big one. Now, how are you going to present to the head honchos in New York, the top dogs in Dallas and the big guys in San Francisco all at once? I mean, you've got video files, audio files, flow charts, a white paper... you name it. You've got to put it together into a tight presentation on the Web. And on top of it all you've got fifteen minutes to do it. Our instructions: take a deep breath and...



# Blend

(it's that easy)

Finally, there's software that gives you the power to get it all together and post it on the Web. But remember, Yesler Alive™ isn't just for "the big presentation." Its specialty is helping you put it together. Whatever "it" may be. So if you have information that you want to share with others, let Yesler Alive help you blend it together into a hassle-free, stylized, multimedia format. Hey, go ahead and try the future of Web communications for FREE. [www.yesler.com](http://www.yesler.com)

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STAND & DELIVER

# VIEWS FROM THE FRONT

SHOP TALK ON WORLD-CLASS  
PRESENTATIONS FROM THOSE WHO  
DELIVER THEM FOR A LIVING

CHRISTOPHER HARTLOVE



Jean Statler, who travels with her InFocus LP425 and a laptop computer, is prepared to give highly professional presentations anywhere, anytime.

NOT LONG AGO, BLACK-AND-WHITE slides on an overhead projector and a pile of photocopied handouts were all anyone expected from a professional presentation. Avoid typos, burned-out bulbs, or saying "umm" too many times, and you'd do fine.

Things have changed, though. The MTV generation isn't just buying CDs these days—it's running businesses. Many of your clients have surround-sound theaters in their living rooms. And flashy Web sites have raised the bar for what people expect to see on a computer screen. You'd better pull out all the stops if you're going to compete with all that, right?

That's not necessarily the case, according to some professional presenters. Yes, the technology exists to help you create a multimedia extravaganza—and sometimes you should. But if you don't have a solid grasp on the basics, your customers will leave with a ringing in their ears, not your message in their minds.

We talked to a pair of pros who spend most of their time trying to get their ideas across to an audience. What they learned from years of experience, you can learn by reading the next few pages.



The Proxima UltraLight LS1 and the NEC MultiSync LT100 offer the features you need to make compelling, successful presentations.



## STAND &amp; DELIVER



# EXPERTS SPEAK OUT ON HOW TO GIVE WINNING PRESENTATIONS

**Y**OU MAY NOT HAVE heard of Wirthlin Worldwide, but you can bet a lot of people inside the Beltway and in the Fortune 500 have listened to what this company has to say. Wirthlin provides survey research and communications strategies for everyone from Republican political candidates to the plastics industry.

Just doing the research doesn't pay any bills, however. Wirthlin still has to convince someone it's worth buying.

That's where Jean Statler comes in. As senior vice president for political and public affairs, Statler spends much of her time presenting Wirthlin's information to audiences who want to know everything from what the public thinks about product packaging to who they'll vote for in the next election and why.

Wirthlin doesn't expect its clients to come calling, so Statler is often on the road, complete with laptop and InFocus LP425 projector. Statler carries her own gear for a couple of reasons. Not only does it mean she's always familiar with her presentation equipment, but her LP425 is bright enough that she doesn't have to dim the lights to give her spiel.

"I've done many presentations in hotels where the ballroom is almost dark, and it's hard to make eye contact," Statler says. That visual connection is key: Statler doesn't agree with those presenters who seem to believe that what's on the screen should be the focal point for the audience.

"I want them to look at me,"

Statler says. "A lot of presenters put all the words up on the slides. If the words are up there, why am I talking?" This overemphasis on the presentation itself is a key mistake that many presenters make, she says. Instead, the slides should merely act to reinforce and expand on what the presenter is saying.

Getting the presentation to that final stage doesn't have to be a long process. Once Statler has a new

study in hand, her team can have the presentation ready to go within a

couple of days, thanks to a relatively small set of templates the company uses for various types of data.

Statler also relies heavily

on presentation graphics packages, such as Software Publishing Corp.'s Harvard Graphics and Microsoft's PowerPoint, to help her optimize her presentations. Her team often adds hyperlinks to slides, providing Statler with quick access to additional explanatory information behind key phrases or ideas.

The graphics software also comes in handy between meetings, particularly in those cases where she'll be giving a presentation both to a Wirthlin client and that client's customers on the same day. With the graphics package on hand, she can integrate client suggestions immediately.

"They'll change words, like 'The objective should be said this way instead of that way,' and we'll just edit it right there," she says. "If I had overheads, I'd be dead in the water."

Clients don't always request simple changes to the wording, however. Sometimes they do something more drastic, such as suddenly changing a 30-minute meeting to a 10-minute briefing. But rather than trying to stuff the 30-minute version into the tinier slot, as she's seen some other presenters do, Statler will quickly cut down her slides in the moments before the meeting starts. "We can have

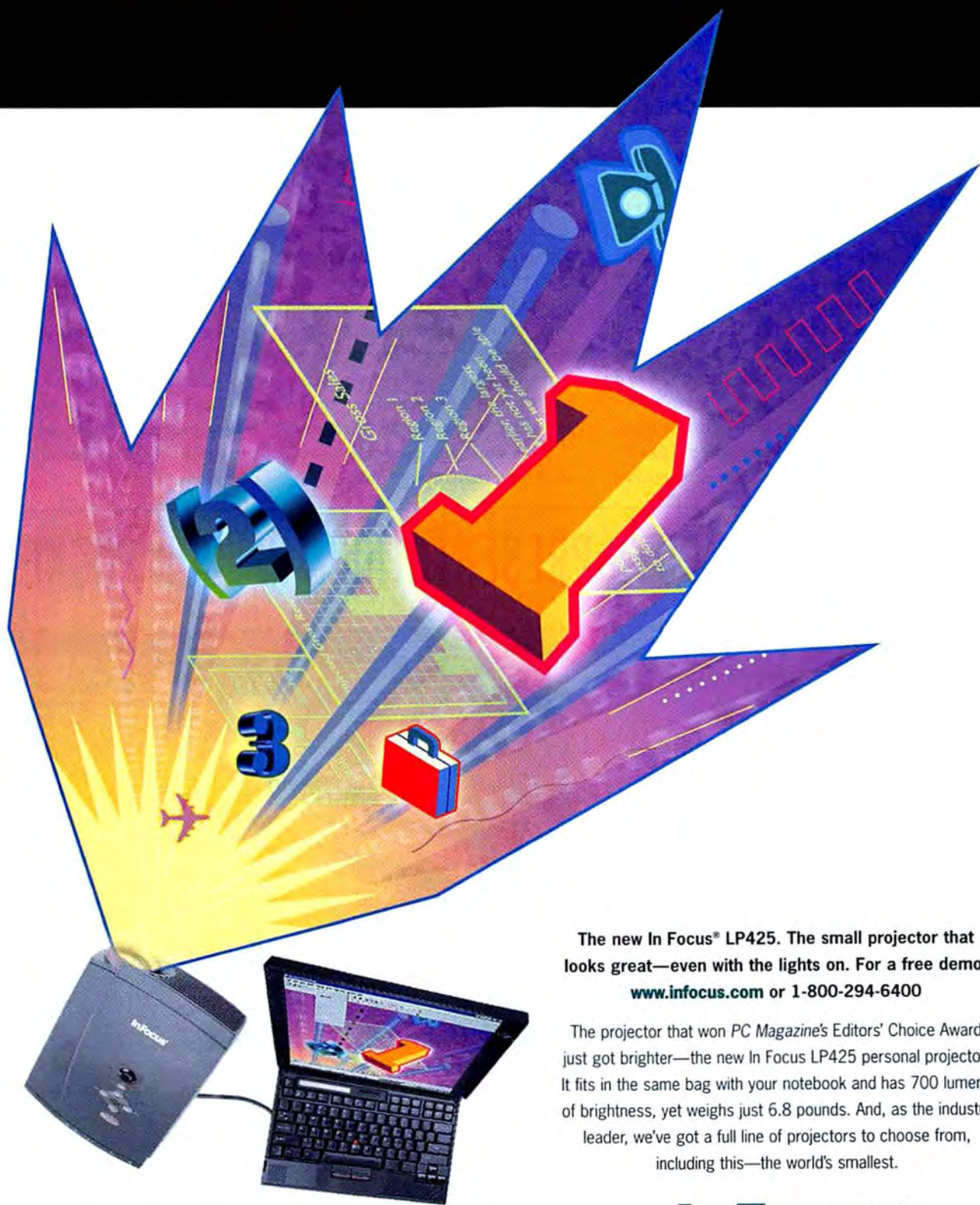
**JEAN STATLER**  
SENIOR VICE PRESIDENT  
WIRTHLIN WORLDWIDE  
MCLEAN, VIRGINIA



**The speaker, not the slides, should be the focal point of a presentation.**



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## STAND & DELIVER



ical when technology fails. When on the road, Campbell usually brings along her own projector, but not always. And when a promised projector or multimedia meeting room fails to materialize, she needs to be ready to improvise. Once again, being fully prepared is key. "Even without that backup information, if you feel like you need to sit down at a table and have a roundtable discussion about your topic instead of doing a more formal presentation, then you can do that," she says.

Missing equipment isn't the only kind of emergency Campbell has faced. More than once, she's visited

a city expecting to meet with one or two customers, only to have a Compaq sales person ask her to meet with someone else about a topic she wasn't prepared to discuss. Luckily, her laptop is ready to come to the rescue. Since her system doubles as both presentation device and productivity machine, Campbell has access to data from a variety of non-presentation sources, from spreadsheets to white papers. "I can throw all that information together and very quickly create a presentation that may not be glamorous, but it gets the job done."

Such situations only make it easier to appreciate the high-tech confer-

ence room back at the home office. Besides the advantages of using multiple screens for multimedia, Compaq keeps technical people on hand to help should problems arise. Campbell can even store demonstration units in the room for easy access on a moment's notice. "Our briefing center has made a huge improvement in the quality of presentations that we're able to give to our customers," she says.

And when you're trying to convince someone that your company makes great products, it can't hurt to show them equally outstanding presentations. ♦

## PHENOM PUTS PRESENTATIONS IN YOUR POCKET

**S**ometimes even an ultralight laptop is more weight than you want to cart around. Yet having your presentations available on a moment's notice could be the difference between getting a new sale or going home empty-handed.

What do you do? The LG Electronics ([www.lge.co.ke](http://www.lge.co.ke)) Phenom H/PC handheld computer can come to the rescue. This tiny Windows CE 2.0 PC weighs under two pounds, yet it has everything you need to show your presentation practically anytime and anywhere.



With the Phenom Express, an impressive presentation is never any farther away than your pocket.

The included version of Microsoft's Pocket PowerPoint Viewer lets you take presentations created on your desktop or laptop computer and display them in 256 colors on any VGA display (monitor, projector, or otherwise) thanks to the Phenom's built-in VGA port.

And while you can't edit slides

in Pocket PowerPoint, you can customize your presentation for different audiences or time restrictions by changing your title slide and rearranging the slides quickly and easily.

So forget that clumsy laptop. Drop a Phenom in your pocket and hit the road. ♦



# DLP VS. LCD: A DIGITAL DIFFERENCE YOU CAN SEE AND FEEL.

By S. E. Easter

### DIGITAL IMAGE QUALITY

*Incredible digital images are composed of 16.7 million digitally correct colors.*

### DIGITALLY DOWNSIZED

*100% digital display system is smaller and lighter than LCD, enabling high performance in projectors as light as 7 pounds.*

### DIGITAL BRIGHTNESS

*Unique digital design produces "digital light," more of which ends up on the screen than with traditional LCD, over 600 lumens.*

DLP technology has pioneered a new class of extremely bright ultraportables. A projector weighing under 10 pounds can now deliver over 600 lumens of digital light.

system. DLP technology is able to achieve higher levels of brightness through its all-digital design, producing more usable light than traditional LCD systems for brilliant, lifelike displays.

Another digital advantage is the DLP system's enhanced image quality. The unique digital image projected by a DLP system contains 256 grade levels for each of the primary colors, producing 16.7 million digitally correct color combinations. Projected images appear precise and film-like. And DLP technology's digital design creates a clearer, seamless image, unlike LCD technologies that suffer from the infamous "screen door" effect.

Digital Light Processing technology from Texas Instruments. Another reliable semiconductor innovation from The World Leader In Digital Signal Processing Solutions. Now available in ultraportable projectors.

For more information on DLP technology or for a complete list of manufacturers using DLP technology, call us toll-free or visit us on the Web.



Digital Light Processing™  
(DLP™) technology from

Texas Instruments is a revolutionary all-digital technology that enables lighter and smaller projectors. Unlike conventional LCD systems that contain large,

heavy optics, DLP technology allows a smaller, more compact optical system that delivers phenomenal visual impact.

Brightness is a critical performance factor in any projector and an important function of the DLP optical

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**[www.ti.com/dlp/it](http://www.ti.com/dlp/it)**



## STAND &amp; DELIVER



# MAVICA DIGITAL SNAPSHOTSPICE UP PRESENTATIONS

**W**HEN SONY first introduced its Mavica line of digital cameras, it caused quite a stir. The Mavicas were the first digital cameras to store images on inexpensive, easy-to-use 3.5-inch floppy disks instead of limited internal memory or pricey flash RAM cards.

For the professional presenter, the Mavica's floppy feature can be extremely handy. Whether you're taking pictures of a product, a place, or people to add to your slides, you can simply remove the disk and pop it into any desktop or portable PC that has a floppy drive—no cables or proprietary software to worry about. The Mavica stores its images in industry-standard JPEG format, so practically any



Digital Mavica MVC-FD81

photo-editing package can open them with ease.

You don't have to worry about running out of storage, either. Each disk holds as many as 20 high-resolution (640 x 480 pixels) or 40 low-resolution images. And once you fill up a disk, just pop it out, insert a new one, and keep shooting.

Sony ([www.sony.com](http://www.sony.com)) has several Mavica models to choose from. The MVC-FD5 (\$499.99 MSRP) features built-in flash and a 2.5-inch LCD screen that acts as both a viewfinder and a picture previewer. The included rechargeable Lithium-Ion battery can provide power for up to 500 continuous shots without a recharge. The MVC-FD7 (\$699.99 MSRP) includes all the FD5's features and adds a 10-to-1 optical zoom lens for getting close to the action. It also provides the option of automatic or manual focus, plus five pre-programmed exposure modes to help you get the best pictures for everything from landscapes to fast action shots.

If you're looking for a way to add some professional or personal touches to your presentations, give a Sony Mavica a try. ♦



The Mavica line of digital cameras store images on floppy disks that can be popped into your PC for viewing.



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**There are enough uncertainties in a million dollar pitch.  
Her projector won't be one of them.**



With 1000 ANSI lumens and XGA resolution, the new MultiSync® LT100™ has the power to handle any sales presentation.

Do your salespeople have to present in a bright conference room? No problem—our ultra-portables deliver brilliant, detailed images under any condition. They're left with just minutes to set up? Quick and easy connection lets them plug in and play. And the do-everything remote lets your sales professionals run the show from anywhere in the room. Even our InstaCare™ guarantee prepares them for the unexpected: a replacement within 24 hours, or repairs within 72. When there's a lot riding on a sales presentation, go with a sure thing. MultiSync ultra-portable projectors, featuring the MultiSync LT100 and the SVGA MultiSync LT81™

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## STAND &amp; DELIVER



# DLP PUTS BRIGHT LIGHTS IN SMALL PACKAGES

Until recently, many projectors, both portable and stationary, suffered from a variety of flaws that robbed presentations of their maximum impact. "Lightweight" travel units were often too heavy to be truly portable, or they weren't bright enough to use without turning the lights off first. And even the best stationary models could suffer from image flicker and blur, especially when showing off video.

Texas Instruments' ([www.ti.com/dlp](http://www.ti.com/dlp)) Digital Light Processing™ (DLP™) technology solves these



Proxima's UltraLight DS1 ([www.proxima.com](http://www.proxima.com)) is a sub-10-pound projector that features 600 lumens of light output, making it suitable for lights-on presentations. A 1.3 to 1 manual zoom lens lets you adjust the projected image to fit the room. The unit's remote control features a built-in laser pointer for highlighting key points on your slides. Plus, you get special effects software to add more flash to your presentations.

problems, combining exceptional brightness with remarkable portability in travel units, allowing users to display their presentations in their full glory while on the road. Stationary systems also benefit, with outstanding color, brightness, and image clarity.

At the core of any DLP system lies TI's Digital Micromirror Device™ (DMD™). In simplest terms, the DMD is an



Kodak ([www.kodak.com](http://www.kodak.com)) offers a pair of lightweight DLP projectors. The DP850 Ultra features 450 lumens of brightness, an 800 x 600 optical resolution, and 1.5x power zoom feature, allowing you to adjust the projected image's size remotely without moving the projector. The DP1050 Ultra adds 200 more lumens (for 650 total) and supports 1,024 x 768 resolution without software compression, allowing for incredibly detailed images. Both projectors weigh in at under 10 pounds, making them easily portable, and each can accept an optional TV tuner.

array of hundreds of thousands of tiny mirrors on a chip. Each mirror can be electronically deflected to turn a beam of light on and off thousands of times per second. By rapidly combining these beams into patterns, the



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Has Never Been Easier.

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## **NEW MVC-FD81**

- XGA Resolution (1024x768)
- Voice Memo Mode
- MPEG Movie Mode

- E-Mail Mode • Whole Disk Copying • Quick Access 2x Floppy Disk Drive
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[www.sony.com/mavica](http://www.sony.com/mavica) <http://imagestation.sony.com>

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## STAND & DELIVER



DMD projects what appears to be a seamless image, or even video, onto a screen.

For users, the difference is dramatic. "The greatest benefit to the end user is light weight combined with brightness," says Jan Hogan Spence, Channel Marketing Programs manager at TI in Dallas.



Features such as a zoom lens and wireless remote control are standard on NEC's MultiSync LT80 ([www.nec-global.com](http://www.nec-global.com)). The LT80, which tips the scales at just under 10 pounds, offers a maximum PC resolution of 1,024 x 768 with software-image compression at 600 lumens of light output. That's more than enough for a good-sized conference room.

If you're willing to carry a few more ounces, you can get even more power and features from NEC's MultiSync LT100 projector. Weighing in at just under 11 pounds, the LT100 throws a powerful 1,000 lumens of light at a true 1,024 x 768 resolution without compression. It also features a unique PC card option: Simply create your presentation, then store it on a PCMCIA memory card, and insert it into the projector for playback with no laptop required.

"Companies using DLP technology have the lightest projectors on the market, some less than seven pounds. Not only can the end user easily carry the system, but also, it is easy to set up and use. At present, DLP is the only digital projection solution available to complete the chain and produce an entirely digital video infrastructure."

However, while white light and mirrors would be enough for black-and-white images, today's presentations need serious color. DLP delivers this by passing a beam of light through a rapidly rotating color wheel. By carefully synchronizing the wheel's rotation and the mirrors' movements, a DLP projector can create vividly hued images in millions of shades.

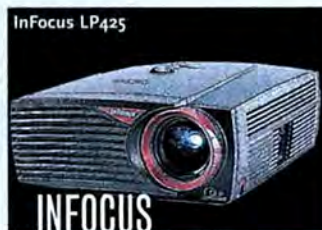
All this adds up to serious advantages over the competition. For instance, the DMD's mirror pixels sit closer together than pixels in the LCD panels used in LCD projectors.

This results in sharper, more seamless images. And because DLP projectors

use simple optics rather than the complex optics and filters found in LCD projectors, they are bright enough to be used without dimming the lights in the presentation room.

DLP's superiority is measured in more ways than improved image quality. Despite their relatively recent appearance, DLP projectors have made rapid inroads into the presentation projector market, thanks to the more than 20 companies that have licensed the technology for their own projectors.

What can customers expect from



At only 6.8 pounds, the InFocus LP425 ([www.infocus.com](http://www.infocus.com)) is one of the lightest projectors on the market. Yet it still pumps out a dazzling 700 lumens of light in 16.7 million colors at 800 x 600 optical resolution or 1,024 x 768 software-compressed resolution. It's a flyweight with the power of a heavyweight.

DLP technology in the future? According to TI's Spence, "Users can expect products using DLP to get smaller and brighter. Our customers are now selling the DLP XGA product

**"COMPANIES USING DLP TECHNOLOGY HAVE THE LIGHTEST PROJECTORS IN THE MARKET, SOME LESS THAN SEVEN POUNDS."**

and are maintaining their lead in the lightness/brightness ratio. At TI we continue to make technological advancements that broaden our product applications and deliver excellent image quality. This is such a new technology that has come a long way in two years." ♦

### SUPPLEMENT SPONSORS:

Sony  
[www.sony.com](http://www.sony.com)  
LG Electronics  
[www.lge.co.kr](http://www.lge.co.kr)  
Texas Instruments  
[www.ti.com](http://www.ti.com)

Kodak  
[www.kodak.com](http://www.kodak.com)  
Proxima  
[www.proxima.com](http://www.proxima.com)  
NEC  
[www.nec-global.com](http://www.nec-global.com)  
InFocus  
[store.infocus.com](http://store.infocus.com)



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**EPSON**

COLOR.

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SEE HER  
EVERY  
GOLDEN  
STRAND  
OF HAIR.

HERE YOU  
SEE THE  
PROJECTOR  
THAT WEIGHS  
LESS THAN  
SHE DOES.

Just like her, this incredible projector can easily hold an audience. Because instead of having only one imaging processor like other ultraportables, the PowerLite™ 5500C was born with three — for the brilliance of a large projector, without the bulk. In fact, at 650 ANSI lumens and only 9 1/2 pounds, this little baby will have everyone going ga-ga.



Epson PowerLite 5500C

**THE NEW POWERLITE 5500C ULTRAPORTABLE PROJECTOR. 3 LCDs BRIGHT - 9 1/2 LBS LIGHT.**

Epson®, the world leader in high-performance portable projectors, brings you a full-featured ultraportable with: Exclusive SizeWise™ technology that allows compatibility with computer resolutions up to 1024 x 768 • Zoom lens, remote control and amazing SRS 3D sound • Dedicated phone support and RoadService exchanges, usually within 24 hours.

For more information or a free video on Epson's award-winning line of projectors,  
call 1-800-442-1977 (ask for Oper. 3102) or visit [www.epson.com](http://www.epson.com).

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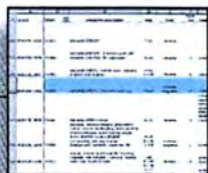
# Simply

put, the new KODAK DP1050 Ultra Digital Projector makes it easy to deliver a presentation that reflects all the work you put into it.



High-impact photos

That's because Kodak's exclusive Image Manager lets you select the



Easy-to-read spreadsheets

very best projection for every type of image. There's no high-tech tweaking required—just push a button on the remote. And you get bright, colorful

photos. Clear, readable spreadsheets. And eye-popping graphics.



Sharper graphics

Other features include XGA resolution to match the capabilities



Optimize at the push of a button

of today's laptops, and *true* 650 ANSI lumens for maximum brightness.

The new KODAK DP1050 Projector. It's not just a good decision, it's downright


# Brilliant.



Call 1-800-KODAK22. Or visit [www.kodak.com/go/projectors](http://www.kodak.com/go/projectors).



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# TOP 100

## Pentium II-450s: *Power* Meets *Budget*

190 Power Desktops



204 Budget Desktops



214 Notebooks



218 Home PCs



221 Printers



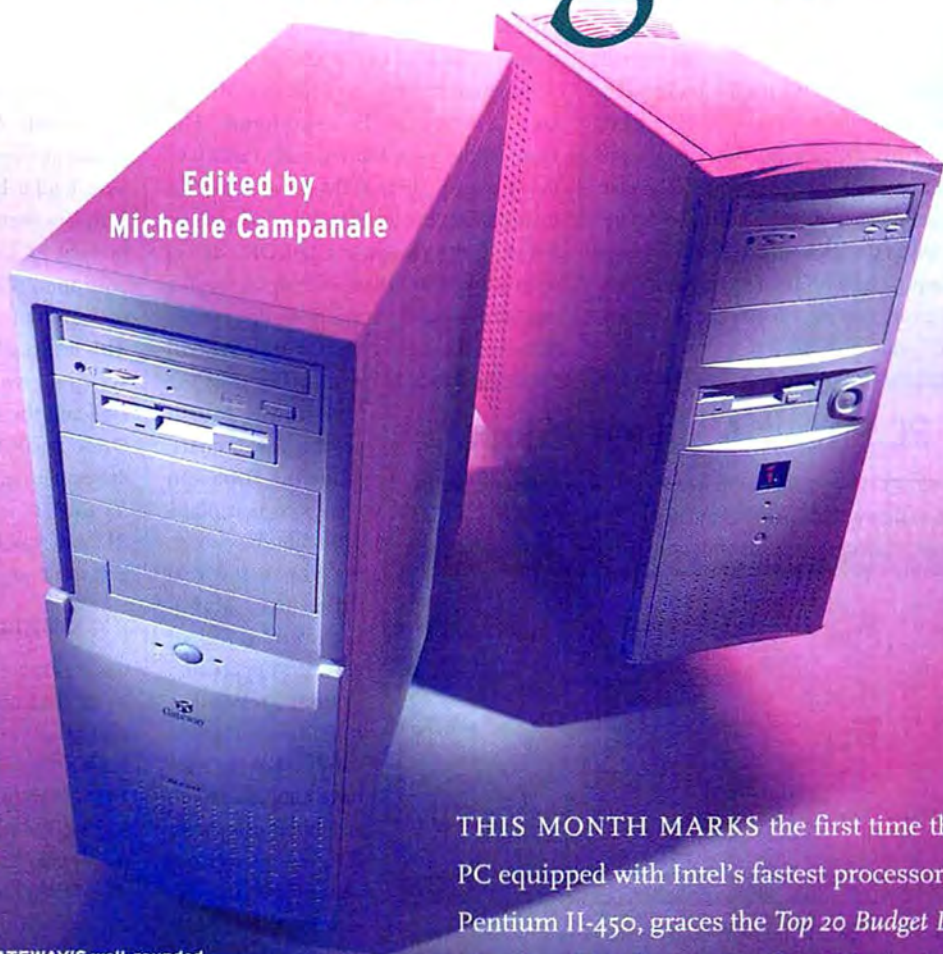
225 Monitors



227 Graphics Boards



Edited by  
Michelle Campanale



GATEWAY'S well-rounded  
GP6-450 (left) and IDot.com's  
bargain Entrepreneur BX450.

THIS MONTH MARKS the first time that a PC equipped with Intel's fastest processor, the Pentium II-450, graces the *Top 20 Budget Desktops* chart. This feat, accomplished by the \$1998 IDot.com Entrepreneur BX450, is even more ►



impressive considering that we introduced Pentium II-450 PCs into the *Top 20 Power Desktops* chart just two months ago, and that a number of other vendors' similarly configured PII-450 systems failed to make the charts at all. The new year also signals a shift in our power chart. Machines based on Intel's latest CPU now occupy 13 of the 20 slots; PCs with PII-400s make up the difference.

We've revamped other parts of the *Top 100*. Last month we featured color printers; this month we go monochrome. And check out our expanded modem coverage in this month's roundup, "V.90 Modems: The End of the Line" (page 110), which has details on our new V.90 test suite.

### PII-450s: NOW OR LATER?

WHILE 450- and 400-MHz systems take up the entire power chart, the budget chart showcases a gamut of processor speeds and types. The chart's lone Pentium II-450 system nevertheless signals what the future holds for the budget list. By the time you read this, AMD's next-generation processor, the K6-2-400, should be available. And you can expect PII-450 prices to drop even further in the next few months to make room for systems equipped with Intel's 500-MHz Pentium processor (code-named Katmai), which is due in April.

With fast, cheap CPUs on the horizon, are there enough reasons to buy a Pentium II-450 today? The average PII-450 PC WorldBench 98 score reaches 215 this month, compared to 200 for PII-400s—a difference of 7.5 percent. For most business uses, such a small margin won't make much of a difference, but if you run a lot of heavy-duty applications for, say, image editing or video conferencing, the extra performance could be meaningful.

Pentium II-450 systems cost an average of \$2535 this month, while the typical PII-400 computer costs \$2132, a difference of just \$400. Prices vary widely within each processor class, however. Dell's \$2579 Dimension XPS R450, for example, costs almost \$600 more than IDot.com's Entrepreneur BX450. We find very little difference in the two systems' performance: Each earns a respectable PC WorldBench score (212 for the Dimension, 218 for the Entrepreneur). The Dimension is configured with 128MB of RAM, a 4.8X DVD-ROM drive, and a Zip drive, versus the Entrepreneur's 64MB of RAM and 17X-40X CD-ROM drive; upgrading the Entrepreneur to the Dimension's configuration would put the prices of the two systems within \$100 of each other. But the Dell ranks fourth on the power chart, while the IDot.com clings to last place on the budget chart. So what's the real difference? Manufacturers' levels of service, support, and system reliability may differ significantly. We don't yet have enough data to accurately determine IDot.com's system reliability and service, but Dell has a well-established reputation in both of those key areas.



Find an expanded roundup of our latest top modem picks in "V.90 Modems: The End of the Line," page 110.

### DVD-ROM BUDGET BLITZ

AS PRICES of new systems continue to drop, key peripherals are enhanced, especially among lower-priced systems. Take hard drives, for example. A few months ago, the average power system boasted a 6.4GB or 8.4GB disk; today, most power systems have room for at least 10GB. And

14.4GB hard drives are starting to appear on power chart systems like NEC's Direction

SP B450 and PowerMate 8100. Some machines we'll review next month have even more storage space. The Quantex QP6/450 SM-4XSE, for example, comes with a 16.8GB hard drive.

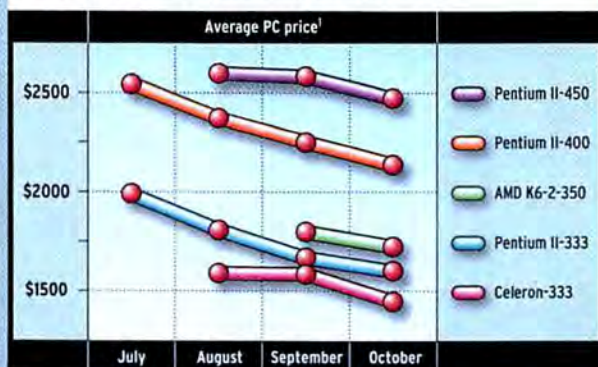
Budget-conscious PC buyers also have reason to celebrate this month. Besides being able to buy a 450-MHz PC for about the same price as a Pentium II-400 system, you'll find that budget machines equipped with PII-400 processors cost an average of 20 percent less than they did last month. Although you won't get the fastest processor at that price, PII-400 systems tend to have peripherals comparable with—or even better than—PII-450s. Five budget PCs on this month's chart are equipped with DVD-ROM drives, and they aren't just bargain-basement drives with last year's technology: Three budget systems—two high-ranking models from Dell and the seventh-place Axis Systems Orion 100R PII-400—pack DVD-ROM drives with 4.8X speed. The power chart, meanwhile, is home to six PCs with DVD-ROM drives, but only one of those drives is faster than 2X.

### SMALL-BUSINESS BOOM

ON BOTH THE budget and power charts, we're beginning to see more computers that target small to medium-size businesses, including Dell's Dimension XPS R350, our number three budget PC; Gateway's GP6-450, which places third on the power chart; and IBM's PC 300 PL, a middle-of-the-chart power system. Since the success of Compaq's recently introduced Prosignia line of built-to-order systems with a small-to-midsize-business focus, other companies have jumped into the

## PC Prices: A Slippery Slope

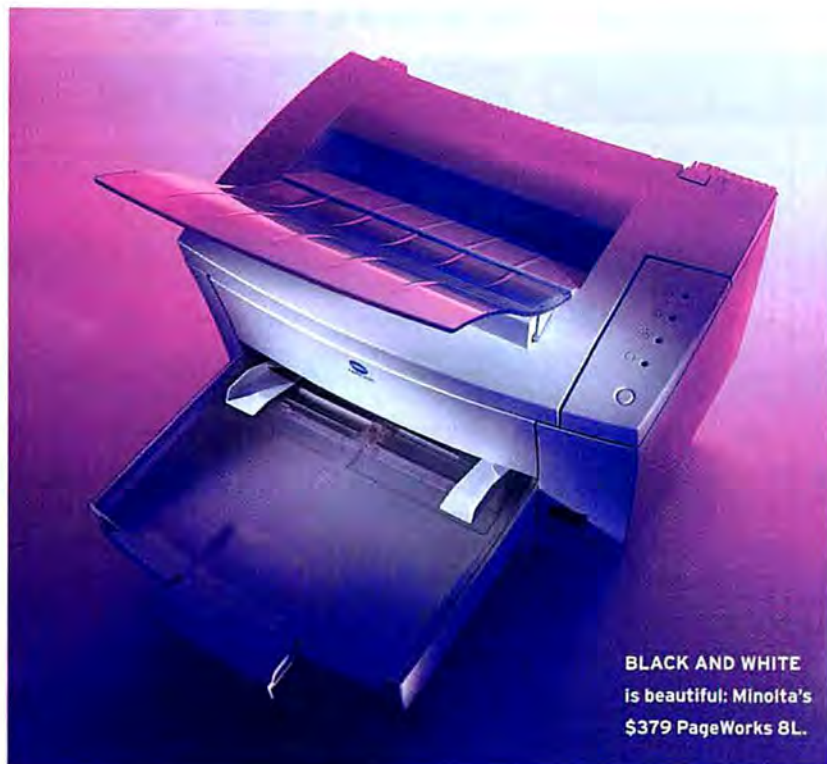
AS SYSTEMS APPEAR with newer, faster processors, prices drop rapidly on PCs powered by older processors.



<sup>1</sup>Prices are as collected for our Top 20 charts. Months represent the dates in 1998 when we collected prices, not the magazine issue. The number of averaged PCs ranges from 3 for the AMD K6-2-350 to 37 for the Pentium II-400.



# YOUR GUIDE TO THE TOP 100



**BLACK AND WHITE**  
is beautiful: Minolta's  
\$379 PageWorks 8L.

*The monochrome market is alive and well, with new models from numerous vendors at every speed level and price point.*

act. NEC's Direction line, for example, squarely targets the smaller-business customer, as does a newcomer to the Top 20, the Orion series from Axis Systems.

## PRINTERS AND PORTABLES


SMALL AND not-so-small businesses alike will appreciate the influx of monochrome printers in this month's *Top 10 Printers* chart. The monochrome market is alive and well, with new models from numerous vendors at every speed level and price point. We retooled the *Top 10 Printers* charts in last's month's issue, where our first color-only chart debuted; this month marks the appearance of our first all-monochrome chart. Three new printers earn spots in the Top 10—more new arrivals than we've had in quite some time. On the small-business/home side, the Minolta PageWorks 8L lands at number two and the Brother HL-1040 enters at number three. Among corporate printers, the Lexmark Optra K 1220 cracks the chart for the first time, at number five.

Gateway not only hits Best Buy pay dirt


with its powerful GP6-450 desktop, but also holds sway on the budget notebooks chart. The company's Solo 2500SE hangs on to the top spot, while its second-place Solo 3100SE sets a record as the lightest standard notebook we've tested. The svelte portable is pricey for a PII-233 notebook at \$2499, but it's slightly smaller than a standard notebook and weighs just 6.1 pounds including the AC adapter and CD-ROM drive.


*Michelle Campanale is an associate editor for PC World. Senior Associate Editors Vince Bielski, Bryan Hastings, and Karen Silver; Associate Editors Andrew Brandt and Cameron Heffernan; Staff Editor Grace Aquino; Assistant Editor Mick Lockey; Editorial Assistant Kalai Murugesan; and freelance writers Jim Martin and Gordon Meyer contributed to the Top 100. Testing for the Top 100 was performed by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeff Kuta, Nancy Miller, and Mike Salayko of the PC World Test Center. See page 14 for contact information.* ▶


QUESTIONS ABOUT OUR CHARTS? The following section should answer most of them.


 **How do the charts work?** The Top 20 and Top 10 charts are evolving lists of the best PCs, printers, monitors, graphics boards, and modems we've tested. System charts are divided by price. Power desktops cost \$2000 or more; power notebooks cost \$2750 or more. We compare new products to previously reviewed hardware, updating the charts to reflect price cuts and other changes.

 **Where do you get your prices?** We estimate street prices based on vendor information and our own research, including surveys of retail outlets. We recheck all prices every month.

 **What does the overall rating mean?** This 100-point scale reflects results from our hands-on evaluations and performance tests. A score in the 90s is exceptional, while one in the 80s is among the best and one in the 70s above average.

 **What does the PC WorldBench 98 score mean?** It's a measure of how fast a PC is in relation to our baseline machine, a Gateway PMMX-200 configured with 32MB of RAM, a 2GB hard drive, and 512KB of secondary cache. A PC that scores 200, for instance, is twice as fast as the baseline system.






 **Where do the scores for reliability, support quality, and support policies come from?** Reliability and support quality scores are based on surveys of *PC World* readers and anonymous support calls made by *PC World* staff. The policies score is based on vendor support policies.

 **What do all those word scores mean?** Word scores for performance and price are based on a product's rating in relation to other products in its category. For instance, we score the performance of Windows NT PCs separately from that of Windows 95 machines. (Based on our PC WorldBench 98 tests, Windows NT machines are faster on average than Win 95 PCs.)

 **Check out PC World's Top 400 reviews online.** Point your browser to PC World Online ([www.pcworld.com/top400](http://www.pcworld.com/top400)) to explore our Top 400, which provides comprehensive reviews and ratings for products in 16 different categories. You'll also find reviews not available in print.



## TOP 20 POWER DESKTOPS

	SYSTEM	Last month	Month tested	Street price (10/9/98)	CPU	Comments
1	 <b>Micron Millennia 400 Max</b> 888/634-8799 <a href="http://www.micronpc.com">www.micronpc.com</a>	1	July 98	\$2221	Pentium II-400	DVD-ROM, Zip drive, and advanced sound; Millennia 450 Max also a good deal.
2	 <b>Dell OptiPlex GX1 400</b> 800/289-3355 <a href="http://www.dell.com">www.dell.com</a>	3	Aug 98	\$2420	Pentium II-400	Powerful corporate desktop with easy service design.
3	 <b>Gateway GP6-450</b> 800/846-2000 <a href="http://www.gateway.com">www.gateway.com</a>	n/a	NEW	\$2493	Pentium II-450	Nice general-business PC with management options, network card, and modem.
4	 <b>Dell Dimension XPS R450</b> 800/388-8542 <a href="http://www.dell.com">www.dell.com</a>	4	Nov 98	\$2579	Pentium II-450	Small-to-midsize-business PC includes Zip drive and DVD-ROM.
5	 <b>MidWest Micro Business Solutions 400</b> 800/728-8582 <a href="http://www.mwmicro.com">www.mwmicro.com</a>	5	Dec 98	\$2014	Pentium II-400	Corporate PII-400 with NT, network card, and LS-120 drive gets \$185 price drop.
6	<b>Polywell Poly 800B5 PII450</b> 800/999-1278 <a href="http://www.polywell.com">www.polywell.com</a>	n/a	NEW	\$2295	Pentium II-450	Fastest Win 98 system we've tested has powerful multimedia and value price.
7	<b>NEC Direction SP B450</b> 888/863-2669 <a href="http://www.necnow.com">www.necnow.com</a>	7	Dec 98	\$2799	Pentium II-450	Expensive PC offers good speed, 19-inch monitor, and great reliability scores.
8	<b>Micron ClientPro 400</b> 888/634-8799 <a href="http://www.micronpc.com">www.micronpc.com</a>	9	Oct 98	\$2049	Pentium II-400	Sluggish for a PII-450; \$200 price drop, network-ready, built-in management.
9	<b>Compaq Deskpro EP 6450</b> 800/345-1518 <a href="http://www.compaq.com">www.compaq.com</a>	n/a	Nov 98	\$2343	Pentium II-450	Price of corporate speedster with convertible case is slashed \$236.
10	<b>Premio Apollo BX 450</b> 800/677-6477 <a href="http://www.premlopc.com">www.premlopc.com</a>	n/a	NEW	\$2224	Pentium II-450	Inexpensive for a PII-450; lots of RAM and a DVD-ROM drive.
11	<b>NEC PowerMate 8100</b> 888/863-2669 <a href="http://www.necnow.com">www.necnow.com</a>	n/a	NEW	\$2768	Pentium II-450	Pricey PC has network card and USB monitor out, but no software bundle.
12	<b>IBM PC 300 PL</b> 800/426-2968 <a href="http://www.ibm.com">www.ibm.com</a>	n/a	NEW	\$2549	Pentium II-450	Network-ready speed demon has good price.
13	<b>Sys Technology Performance Pro 450</b> 800/613-9963 <a href="http://www.sys.com">www.sys.com</a>	8	Dec 98	\$2699	Pentium II-450	Second-fastest PII-450 with Win 98 has network card, 40X CD-ROM, and LS-120.
14	<b>Acma ZPower 6450 PII-450</b> 800/786-6888 <a href="http://www.acma.com">www.acma.com</a>	10	Nov 98	\$2395	Pentium II-450	Includes top-notch graphics card, ethernet.
15	<b>Quantex QP6/400 SM-4X SE</b> 800/896-4898 <a href="http://www.quantex.com">www.quantex.com</a>	n/a	Oct 98	\$2199	Pentium II-400	Loaded PII-400 has 19-inch monitor, DVD-ROM, Zip drive; \$300 price slash.
16	<b>NexTrend NexStar-450 PWJ</b> 888/838-7827 <a href="http://www.nextrendpc.com">www.nextrendpc.com</a>	n/a	NEW	\$2599	Pentium II-450	Swift system packs Zip drive and hardware MPEG decoder.
17	<b>MidWest Micro Office Pro 450</b> 800/728-8582 <a href="http://www.mwmicro.com">www.mwmicro.com</a>	n/a	NEW	\$2499	Pentium II-450	Midrange performer has Zip drive, 40X CD-ROM, and multimedia software bundle.
18	<b>Acer Power 8000-450A</b> 800/733-2237 <a href="http://www.acer.com">www.acer.com</a>	12	Dec 98	\$2144	Pentium II-450	Cheap PII-450 has good warranty, price, and speed; but no modem or network card.
19	<b>HP Vectra VL Series 8</b> 800/322-4772 <a href="http://www.hp.com">www.hp.com</a>	18	July 98	\$2543	Pentium II-400	HP chops price \$251 on corporate PC with good scores for reliability and support.
20	<b>Gateway E-4200 400</b> 800/779-2000 <a href="http://www.gateway.com">www.gateway.com</a>	13	Sept 98	\$2463	Pentium II-400	Corporate system with the works has network card and modem; slow for a PII-400.



Best Buy

See features chart, page 192; test report, page 194.

n/a = not applicable

<sup>1</sup>A system's performance word score is relative to scores of other PCs running the same operating system. For more details see "Your Guide to the Top 100" on page 189.<sup>2</sup>For more information about all products in this table, select PC World InfoNet no. 903 or visit [www.pcworld.com/infonet](http://www.pcworld.com/infonet).

**PRICE OR PERFORMANCE?** On this month's power desktops chart, it's a toss-up between Pentium II-400 and Pentium II-450 PCs. Of the top five systems, numbers 1, 2, and 5 are equipped with the more affordable but still quick Pentium II-400. The overall Best Buy remains the Micron Millennia 400 Max, a fast general-business machine with a nice set of extras and a low price. The only newcomer to the top five is Gateway's GP6-450. It costs \$272 more than the Micron, but it's a bit faster and comes with an ethernet card standard and a 19-inch monitor. Aside from the Gateway, six other new systems—all of them powered by Intel's Pentium II-450 CPU—earned spots on our power chart.



## SCORECARD

★ Overall rating	PC WorldBench 98/operating system	Performance <sup>1</sup>	Features and design	Vendor's system reliability	Price	Vendor's support quality/policies	PC World InfoNet number <sup>2</sup>
87	210/Win 95	very good	good	good	inexpensive	good/good	629
86	244/Win NT 4.0	very good	good	good	average	good/outstanding	630
86	213/Win 98	very good	very good	good	average	fair/outstanding	631
84	212/Win 98	very good	good	good	average	good/good	632
83	233/Win NT 4.0	good	outstanding	<sup>3</sup>	very inexpensive	good <sup>4</sup> /good	633
82	224/Win 98	outstanding	very good	<sup>3</sup>	average	fair <sup>4</sup> /fair	634
82	220/Win 98	outstanding	good	outstanding	expensive	good <sup>4</sup> /good	635
80	228/Win NT 4.0	good	good	good	inexpensive	good/good	636
80	214/Win 98	very good	good	good	average	fair/outstanding	637
80	214/Win 98	very good	very good	<sup>3</sup>	inexpensive	good <sup>4</sup> /good	638
80	218/Win 95	outstanding	satisfactory	outstanding	expensive	good <sup>4</sup> /good	639
79	219/Win 98	very good	good	fair	average	good/good	—
79	222/Win 98	outstanding	good	<sup>3</sup>	expensive	good <sup>4</sup> /good	640
78	217/Win 98	very good	good	<sup>3</sup>	average	good <sup>4</sup> /outstanding	641
78	200/Win 95	good	very good	<sup>3</sup>	inexpensive	fair <sup>4</sup> /good	642
77	218/Win 98	very good	very good	<sup>3</sup>	average	fair <sup>4</sup> /good	643
77	210/Win 98	very good	very good	<sup>3</sup>	average	good <sup>4</sup> /good	644
76	216/Win 98	very good	satisfactory	fair	inexpensive	fair/good	645
75	207/Win 95	very good	good	good	average	good/poor	646
74	190/Win 98	satisfactory	good	good	average	fair/outstanding	647
Scorecard weightings		Performance 25 percent	Features 25 percent	Reliability 15 percent	Price 15 percent	Quality/policies 10 percent each	


<sup>1</sup> Insufficient data to give a rating.

<sup>2</sup> Scores were derived from anonymous support-quality calls due to insufficient data from survey.

## This Month's Best Buys

### 1 MICRON MILLENNIA 400 MAX

**PRO:** Fastest Win 95 PII-400 we've tested, affordable, DVD-ROM drive, top reliability and service  
**CON:** Mediocre audio and monitor

 The Micron Millennia 400 Max set the performance standard among Pentium II-400 systems

when we first reviewed it in July 1998. Six months later, its PC WorldBench 98 score of 210 still makes it the speediest Windows 95-based PII-400 system we've tested. At \$2221, it's easy on the wallet, too. The Millennia 400 Max is loaded with features, and our readers tell us that the company's systems are reliable.

The Millennia 400 Max even looks fast, with chiseled curves and molded slots for

the floppy, Zip, and DVD-ROM drives. The ports on the back of the system are helpfully color-coded, and the midtow-



**Micron Millennia 400 Max**

er's case opens easily to reveal a tidily arranged interior with plenty of open drive bays, card slots, and DIMM sockets.

The Diamond Viper V330 AGP card delivers snappy graphics, but the 17-inch monitor is less impressive. Images appeared washed out and a bit fuzzy at the edges. Sound quality of the bundled Advent AV390PL speakers and subwoofer was fine for common business use, but you have to crank up the volume to get any bass out of the subwoofer. Micron also bundles Microsoft Office 97 Small Business Edition and a 56-kilobits-per-second x2-compatible modem from 3Com.

Beyond the manuals for individual components, the documentation provided for the Millennia 400 Max is sparse. Micron offers 24-hour tech support and a solid five-year warranty on the CPU and main RAM, but its one-year labor warranty is shorter than we'd like.

### 2 DELL OPTIPLEX GX1 400

**PRO:** Attractively designed corporate system, easy access to interior, excellent monitor

**CON:** Integrated graphics chip



The Dell OptiPlex GX1 400 is the top corporate PC on our power chart. This quick \$2420 midtower NT 4.0 machine features integrated remote management hardware, an easy-to-access interior, and an above-average (for comparable systems) PC WorldBench 98 score of 244. Dell's reliability and service scores make the OptiPlex GX1 400 a great addition to any corporate IS manager's shopping list.

The OptiPlex's **Dell OptiPlex GX1 400** modular case design allows every part of the system to swivel, glide, or swing open for easy access. To remove the cover, you simply press a button on the front and flick the case-lock switch at the back, ►





	SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	Hard drive (GB)	Graphics adapter (AGP)	Video RAM (MB/type)	Monitor tube/viewable diagonal (inches)	Modem speed (kbps)
1	Micron Millennia 400 Max*	Pentium II-400	Windows 95	64	512	10	Diamond Viper V330	4/SGRAM	17/16	56 <sup>2</sup>
2	Dell OptiPlex GX1 400*	Pentium II-400	Windows NT 4.0	64	512	6.4	Integrated ATI 3D Rage Pro	8/SGRAM	17/15.9	not included
3	Gateway GP6-450*	Pentium II-450	Windows 98	64	512	10	ATI Xpert98	8/SDRAM	19/18	56 <sup>2</sup>
4	Dell Dimension XPS R450*	Pentium II-450	Windows 98	128	512	10	STB Velocity 128zx	8/SGRAM	17/16	56 <sup>2</sup>
5	MidWest Micro Business Solutions 400*	Pentium II-400	Windows NT 4.0	128	512	12.7	Matrox Millennium G200	8/SDRAM	17/15.8	not included
6	Polywell Poly 800B5 PII450	Pentium II-450	Windows 98	128	512	10	Matrox Millennium G200	8/SGRAM	17/16	56 <sup>4</sup>
7	NEC Direction SP B450	Pentium II-450	Windows 98	64	512	14.4	Diamond Viper V550	16/SDRAM	19/17.9	56 <sup>2</sup>
8	Micron ClientPro 400	Pentium II-400	Windows NT 4.0	128	512	6.4	Diamond Viper V330	4/SGRAM	17/16	not included
9	Compaq Deskpro EP 6450	Pentium II-450	Windows 98	64	512	10	Matrox Millennium G200	8/SGRAM	17/16	56 <sup>5</sup>
10	Premio Apollo BX 450	Pentium II-450	Windows 98	128	512	10.2	Matrox Millennium G200	8/SGRAM	17/16	56 <sup>4</sup>
11	NEC PowerMate 8100	Pentium II-450	Windows 95	64	512	14.4	Accel Graphics AccelStar 3D II	8/SDRAM	17/15	not included
12	IBM PC 300 PL	Pentium II-450	Windows 98	64	512	9.1	Matrox Millennium G200	8/SGRAM	17/16	not included
13	Sys Technology Performance Pro 450	Pentium II-450	Windows 98	128	512	10.1	Matrox Mystique G200	8/SGRAM	17/15.8	56 <sup>2</sup>
14	Acma ZPower 6450 PII-450	Pentium II-450	Windows 98	128	512	10.1	Real 3D StarFighter AGP	8/SGRAM	17/16.1	56 <sup>4</sup>
15	Quantex QP6/400 SM-4X SE	Pentium II-400	Windows 95	128	512	11	Real 3D StarFighter AGP	8/SGRAM	19/18	56 <sup>5</sup>
16	NexTrend NexStar-450 PWJ	Pentium II-450	Windows 98	128	512	14	STB Velocity 128zx	8/SGRAM	19/18.2	56 <sup>4</sup>
17	MidWest Micro Office Pro 450	Pentium II-450	Windows 98	128	512	13.6	Matrox Millennium G200	16/SGRAM	19/18	56 <sup>5</sup>
18	Acer Power 8000-450A	Pentium II-450	Windows 98	64	512	8.4	STB Lightspeed 740	8/SDRAM	17/15.7	not included
19	HP Vectra VL Series 8	Pentium II-400	Windows 95	64	512	10	Matrox Productiva G100	4/SGRAM	17/15.9	not included
20	Gateway E-4200 400	Pentium II-400	Windows 98	128	512	10	Integrated ATI 3D Rage Pro	8/SGRAM	19/17.9	56 <sup>2</sup>

\* Best Buy

<sup>1</sup> PC World defines towers as taller than 20 inches, midtowers as 15.5 inches to 20 inches, and minitowers as shorter than 15.5 inches.<sup>2</sup> Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.<sup>3</sup> Five years on CPU and main RAM, three years on other parts.

and the cover swings up out of the way. Expansion cards mounted on a separate chassis slide out as you press a lever—no scraped knuckles here. The power supply pivots upward to make RAM slots and the motherboard readily accessible.

Unfortunately, there's no AGP slot, so you can't upgrade the integrated AGP graphics with an AGP graphics board later on. But in general, upgrades should not enter the picture for a while, thanks to the hardware Dell includes. The 6.4GB hard disk suffices for most uses, though we're starting to see much larger drives on other top-end systems. Dell's bundled UltraScan 1000HS monitor, one of the best 17-inch Trinitron displays currently available, delivers excellent image quality.

Dell ships the OptiPlex with the Win-

dows NT 4.0 operating system, offers a three-year warranty on parts and labor, and provides 24/7 tech support.

### 3 GATEWAY GP6-450

**PRO:** Good performance, includes network card and modem, easy setup

**CON:** Questionable reliability, no DVD-ROM drive



With a price of \$2493 and a middle-of-the-road PC WorldBench 98 score of 213, the GP6-450 balances affordability with solid performance. Ultimately, the GP6-450 is built for business, packing a 56-kbps modem and an ethernet card that's ready to plug into a cable modem or small business network. It also ships with a

19-inch monitor—great for really large spreadsheets—but lacks a DVD-ROM drive; our test system included a 13X–32X CD-ROM drive instead.

During the PC World Test Center's 2D tests, the GP6-450 delivered high frame rates, guaranteeing sharp business presentations. The system's Altec Lansing speakers are okay for casual music listening, but lack extended bass and treble.

Gateway systems tend to be easy to set up and use, and the GP6-450 is no exception. Color-coded ports make plugging in the corresponding cables a breeze, and terrific documentation smooths out installation rough spots. The intuitive monitor and multimedia controls include



Gateway GP6-450



## EXPANDABILITY

## CUSTOMER SUPPORT

CD/DVD-ROM drive speed	Sound board	Case style <sup>1</sup>	Max. RAM (MB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
2X DVD-ROM	Integrated Crystal PnP	midtower	384	2	2/1	4	varies <sup>2</sup> /1	24	Sat., Sun.	BBS, CIS, WWW
14X-32X	Integrated Yamaha OPL3	midtower	384	2	2/1	7	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
13X-32X	Creative Audio PCI 64V	midtower	384	2	3/2	3	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
4.8X DVD-ROM	Turtle Beach Montego	midtower	768	2	2/1	2	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
14X-32X	Aureal A3D PCI	midtower	384	2	3/1	3	varies <sup>2</sup> /3	24	Sat., Sun.	BBS, WWW
2X DVD-ROM	Aztech PCI 338-A3D	midtower	1024	3	3/1	3	3/5	24	Sat., Sun.	WWW
14X-32X	Integrated Crystal PnP	midtower	384	2	3/1	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
20X-32X	Integrated Crystal PnP	midtower	384	2	3/1	4	varies <sup>2</sup> /1	24	Sat., Sun.	BBS, CIS, WWW
12X-32X	Integrated ESS 1869	desktop	384	2	0/1	3	3/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
2X DVD-ROM	Sound Blaster AWE64	midtower	1024	3	3/2	3	3/3	9	none	BBS, WWW
12X-32X	Integrated Crystal PnP	midtower	384	2	2/1	5	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
14X-32X	Integrated Crystal PnP	desktop	384	2	1/0	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
17X-40X	Sound Blaster AWE64	midtower	1024	3	3/2	4	varies <sup>2</sup> /5	24	Sat., Sun.	WWW
12X-32X	Integrated Crystal PnP	midtower	384	2	0/1	3	3/1	24	Sat., Sun.	BBS, WWW
2X DVD-ROM	Ensoniq AudioPCI 9817	midtower	384	1	2/3	3	3/1	24	Sat., Sun.	BBS, WWW
2X DVD-ROM	Sound Blaster PCI 128	midtower	1024	2	1/1	3	3/3	24	Sat., Sun.	none
17X-40X	Sound Blaster AWE64D	midtower	768	2	2/1	4	varies <sup>2</sup> /3	24	Sat., Sun.	BBS, WWW
12X-32X	Integrated Crystal PnP	midtower	384	1	2/2	4	3/3	24	Sat., Sun.	BBS, WWW
12X-32X	HP Audio (AZT 1008)	midtower	384	1	2/1	4	3/1	7	none	AOL, BBS, CIS, WWW
13X-32X	Ensoniq AudioPCI	midtower	384	2	3/2	2	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW

<sup>1</sup> Downloads only, uploads at 33.6 kbps; uses cross-compatible V.90 standard.

<sup>2</sup> Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

<sup>3</sup> Six years on CPU and main RAM, three years on other parts.

<sup>4</sup> HP's offering of 11 hours of week-day support is not toll-free.

such welcome extras as audio adjustments and programmable application-launching keyboard buttons.

The GP6-450's three open slots ensure trouble-free expandability. If the system's 10GB hard drive begins to fill up, you can use one of the three free externally accessible drive bays to add a second hard disk, a Zip drive, or a tape backup unit.

When the system is configured with 64MB of RAM, the tall midtower's roomy interior includes two free memory sockets, though you might want to order yours with 128MB, since doubling the RAM can cost as little as \$100.

Bundled with the GP6-450 are three extremely useful software titles for small-office/home-office use: Microsoft's Office 97 Small Business Edition, Expedia

Streets 98, and Bookshelf 98. In our recent reliability and service survey, participating *PC World* subscribers rated the reliability of Gateway's business PCs highly; the company fared especially well in the "problems per year" category. Readers reported long waits for technical support, but in our anonymous calls to Gateway's 24-hour support line, we waited an average of only one minute, and the courteous technicians gave us good advice.

#### 4 DELL DIMENSION XPS R450

**PRO:** Impressive performance, extensive features including high-quality DVD playback

**CON:** 56-kbps modem not V.90 standard



If you're venturing away from the corporate fold, Dell's latest Windows 98 midtower is a terrific

choice. It's a bit pricey at \$2579, but its fast performance, multimedia features, and strong reliability and support combine to make it one of our top picks for power-hungry small or home businesses.

This Dimension sports the latest Intel processor on the market, the 450-MHz Pentium II, and it shows: The R450 loads Microsoft Word and Internet Explorer on the screen almost instantly, chalking up a PC WorldBench 98 score of 212. File junkies and pack rats will benefit from the 10GB hard drive and Iomega Zip drive.

Multimedia capability is one of this system's strengths. DVD video plays back ▶



Dell Dimension XPS R450



as smooth as a baby's forehead, thanks to the XPS R450's effective MPEG-2 playback, substantial 128MB of RAM, and 17-inch Trinitron monitor. Even with half a dozen apps churning in the background, playback remained flawless. The included Altec Lansing ACS295 speaker-subwoofer combination offers powerful sound with a crystal-clear tone. Just make sure you have enough space under your desk to accommodate it all: The subwoofer's the size of a small microwave oven.

Besides price, the only nit we found to pick involves the system's x2-standard 56-kbps modem. Unlike many of its competitors, Dell has yet to offer bundled modems with the global V.90 56-kbps standard. In every other respect, though, the Dimension XPS R450 is a well-built, well-documented system. Dell backs it with a support policy that includes around-the-clock telephone support every day of the week. Our readers rate Dell's system reliability as good.

## 5 MIDWEST MICRO BUSINESS SOLUTIONS 400

**PRO:** Comes with outstanding speakers and a SuperDisk drive, inexpensive

**CON:** Performance is somewhat lackluster for a PII-400 running Windows NT



The S2014 Business Solutions 400 is a serious machine with fun on its mind. Running Windows NT 4.0, the system racked up a 233 on our PC WorldBench 98 tests. Not only will the Business Solutions 400 help you get ▶

## TOP 20 POWER DESKTOPS

## TEST REPORT

	SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	PC WorldBench 98 score	Faster	Average of tested Pentium II-400s <sup>1</sup>
1	Micron Millennia 400 Max*	Pentium II-400	Win 95	64	512	210		
2	Dell OptiPlex GX1 400*	Pentium II-400	Win NT 4.0	64	512	244		
3	Gateway GP6-450*	Pentium II-450	Win 98	64	512	213		
4	Dell Dimension XPS R450*	Pentium II-450	Win 98	128	512	212		
5	MidWest Micro Business Solutions 400*	Pentium II-400	Win NT 4.0	128	512	233		
6	Polywell Poly 800B5 PII450	Pentium II-450	Win 98	128	512	224		
7	NEC Direction SP B450	Pentium II-450	Win 98	64	512	220		
8	Micron ClientPro 400	Pentium II-400	Win NT 4.0	128	512	228		
9	Compaq Deskpro EP 6450	Pentium II-450	Win 98	64	512	214		
10	Premio Apollo BX 450	Pentium II-450	Win 98	128	512	214		
11	NEC PowerMate 8100	Pentium II-450	Win 95	64	512	218		
12	IBM PC 300 PL	Pentium II-450	Win 98	64	512	219		
13	Sys Technology Performance Pro 450	Pentium II-450	Win 98	128	512	222		
14	Acma ZPower 6450 PII-450	Pentium II-450	Win 98	128	512	217		
15	Quantex QP6/400 SM-4X SE	Pentium II-400	Win 95	128	512	200		
16	NexTrend NexStar-450 PWJ	Pentium II-450	Win 98	128	512	218		
17	MidWest Micro Office Pro 450	Pentium II-450	Win 98	128	512	210		
18	Acer Power 8000-450A	Pentium II-450	Win 98	64	512	216		
19	HP Vectra VL Series 8	Pentium II-400	Win 95	64	512	207		
20	Gateway E-4200 400	Pentium II-400	Win 98	128	512	190		

\*Best Buy

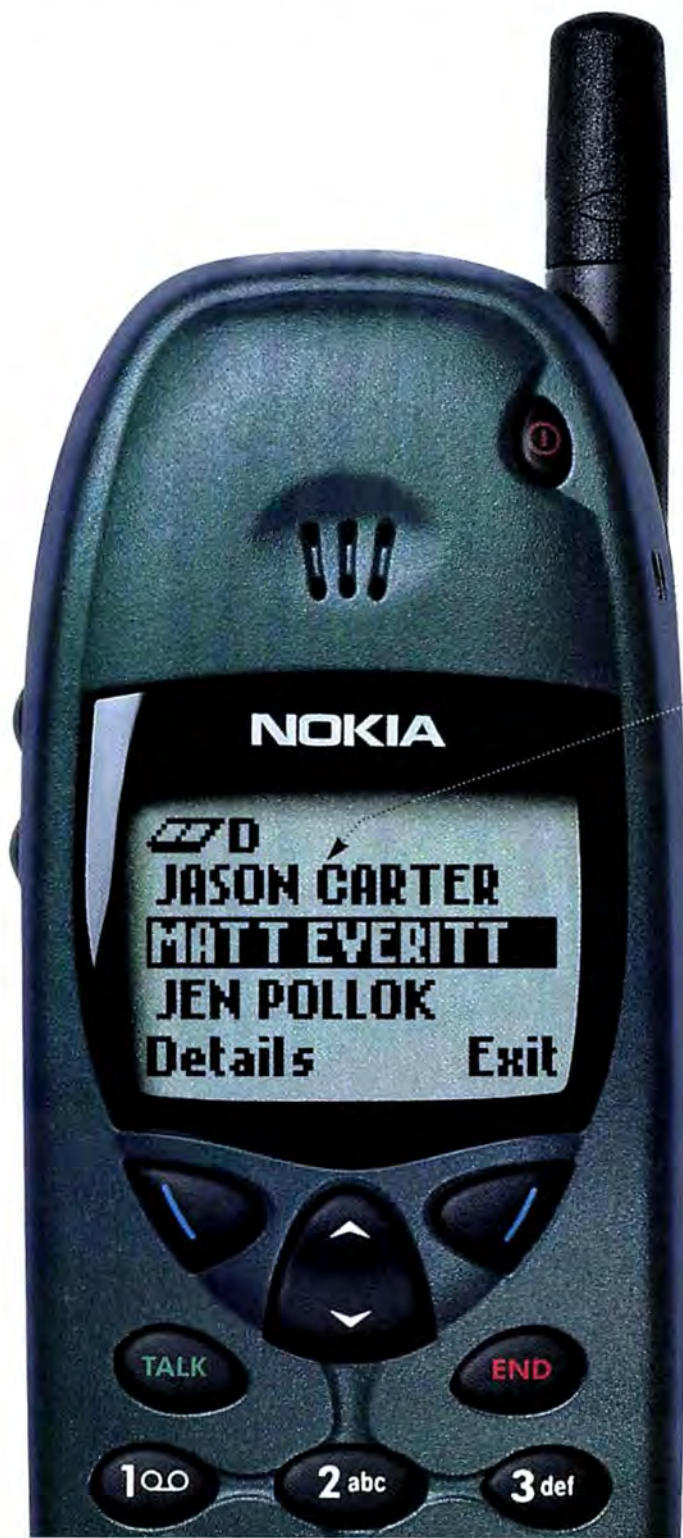
Application test times in minutes



**TEST HOW WE TEST** All systems are tested with PC WorldBench 98, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs are tested with Windows 95, Windows 98, or Windows NT 4.0, and video resolution is set to 800 by 600 in 65,536 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench 98 score is a sum of the weighted, normalized result of each script: Word 97 (10 percent), Word Pro 97 (10 percent), Excel 97 (20 percent), 1-2-3 97 (20 percent), Paradox 8.0 (20 percent), and Picture Publisher 7.0 (20 percent). For more details on our benchmark and how we run it, see PC World Online ([www.pcworld.com/testing](http://www.pcworld.com/testing)). <sup>1</sup>Under Windows 95.



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work done during the business day, but its multimedia enhancements (which include the first pair of USB speakers we've seen in a Top 20 system plus all the RAM you're likely to need) will keep this system rocking into the night. The PC's Matrox Millennium G200 AGP graphics board claims the top spot among AGP graphics boards on this month's *Top 10 Graphics Boards* list. The USB-based Altec Lansing ADA305 speakers sound great and don't require a sound card to work.

The Business Solutions 400 will fit well into any corporate environment where PC management is not envisaged. Though the system includes a 3Com ethernet adapter for quick connection to the corporate LAN, it lacks management features such as DMI 2.0 support. On the other hand, you'll find the task of archiving important business files quick and easy. The PC comes with a SuperDisk drive in place of the standard 1.44MB floppy disk, which means that you can read and write to 120MB SuperDisk media as well as to 1.44MB floppies.

Servicing or upgrading the Business Solutions 400 is simple: You can open the case without tools, and inside you'll enjoy unfettered access to every slot and

bay. Four of the seven drive bays are open, as are three of the six expansion slots. The accompanying manuals provide instructions for quick setup, plus such additional technical upgrade information as a motherboard manual.

MidWest Micro's parts warranty covers the CPU and main RAM for five years (other parts for three years); the company also offers a three-year labor warranty and around-the-clock tech support. Though we've received little feedback from readers on the reliability of MidWest Micro systems, the quality of the vendor's support seems to be good. In responding to our anonymous support calls, the staff seemed knowledgeable, though they rarely agreed to answer our questions unless we first supplied a serial number.

## New This Month

The following PCs made our Power Desktops chart for the first time this month. For original reviews of previously tested systems on the chart, visit our Web page ([www.pcworld.com/top400](http://www.pcworld.com/top400)).

### 6 POLYWELL POLY 800B5 PII450

**PRO:** Fast, solid graphics board, crisp monitor

**CON:** Unimpressive software bundle, speaker controls are on subwoofer

With a PC WorldBench 98 score of 224, Polywell's \$2295 Poly 800B5 PII450 is the fastest Windows 98 system we tested this month; only the Windows NT-based units outpaced it.

But beyond sheer speed, does this midtower deserve your attention? If efficient performance for office productivity applications is your overriding criterion, yes. Otherwise, the picture's less clear.

The Poly 800B5 brings notable assets to multimedia and graphics, including a Matrox Millennium G200 AGP graphics adapter—one of the best for handling fast image display and maintaining 3D graphics quality. Our system shipped with a high-quality 17-inch DecaView V387 monitor that includes an easy-to-use adjustment wheel, up and down arrows, and a button that conveniently activates an on-screen display control menu.

The PC's sound card, an Aztech PCI 338-A3D, generated above-average audio and 3D sound, with the help of a Juster multimedia speaker system and 3D-sound subwoofer. But the speakers' power, volume, and bass controls are located on the bulky subwoofer, so you'll have to place the subwoofer on or near your desktop to get at those controls—bad news for users who are short on desktop space.

The system is bundled with software of dubious value. It was a shock, for instance, to find the 1995 edition of Microsoft Encarta among the offerings. The Poly 800B5's user manual, which comes in its own binder and storage box, is extremely detailed, but we'd

have appreciated a few more diagrams. Checking under the hood requires using a screwdriver to loosen one screw, but the side panel pops off and on easily, and you've got free and clear access to the open memory and card slots. Toll-free telephone tech support is available 24 hours a day, including weekends, and the three-year parts, five-year labor warranty should suffice for most people.

### 10 PREMIO APOLLO BX 450

**PRO:** Longer-than-average labor warranty, supports up to 1GB of RAM

**CON:** Blurry monitor, only one open ISA slot

Premio almost put together a stellar multimedia system with the \$2224 Apollo BX 450, but it fell short by including a substandard monitor and offering few expandability options. On the positive side, the BX 450 comes with 128MB of RAM in one DIMM socket, leaving its other three open. But while we appreciate the graphical interface of the Creative Labs DVD-ROM kit, Premio's fuzzy monitor makes the blurry DVD video picture appear even worse. The three-year warranty on both parts and labor significantly improves on the three-year parts, one-year labor warranties that accompany many systems.

### 11 NEC POWERMATE 8100

**PRO:** USB monitor, network support

**CON:** Ships with Win 95, awkward internal design

The PII-450 NEC PowerMate 8100 is one of the first systems we've seen with a monitor that includes a USB port on its stand. This lets you attach USB peripherals (if you have any), such as a scanner or digital camera, to the 17-inch VistaScan monitor's base—a more convenient location than the back of your PC.

The monitor may be state-of-the-art, but the PowerMate itself isn't. Ours shipped with Windows 95 preinstalled, and its cluttered interior makes upgrading difficult. The system's PC WorldBench 98 score of 218 is respectable, and the sys-



Poly 800B5 PII450



Business Solutions 400



Premio Apollo BX 450



NEC PowerMate 8100



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a presentation that has 80 slides, and I can do it with 11 or 12 slides," she says. "When you're in a marketing business, you want to be able to give them the 10-minute [version]. It just generates more goodwill." Goodwill that may just translate into some good sales.

**W**HEN YOU deliver more than 100 presentations a year, you have to learn something about the craft. And Emily Campbell has learned a lot.

As product manager for enhancements and monitors at Compaq, Campbell gives customers a glimpse of what her company is up to, from flat-panel displays to palmtop PCs. They're exciting products, and thanks to Compaq's recently installed multimedia briefing center, Campbell's presentations can be pretty exciting themselves.

With a pair of video monitors and a large backlit projection display, she can run through her slides and simultaneously highlight key points with Compaq promotional videos. It's a high-tech way to prove that Compaq is a decidedly high-tech business.

But Campbell knows that there's more to a great presentation than flash and sizzle. The most important key, she says, is preparation.

"I try to be as organized and knowledgeable as possible about the

topics that I'm going to be talking about," she says. To help her prepare, Campbell runs her presentations past colleagues in her group and experts familiar with the content she plans to cover. And she revisits these people from time to time to make sure her presentations are up-to-date. These test run-throughs ensure that she hasn't

missed any key points. They also provide background knowledge that she can use when she leaves the safety of her slides—a common occurrence, especially when she speaks in front of smaller groups.

"I fully intend to go off the track based on what the customers are asking for," she says. "I use the presentations as a tool to talk around.

90% of what I talk about is not on the slides."

This willingness to be flexible often results in very interactive presentations. To promote this give and take, Campbell often finds that a humorous story or anecdote as things

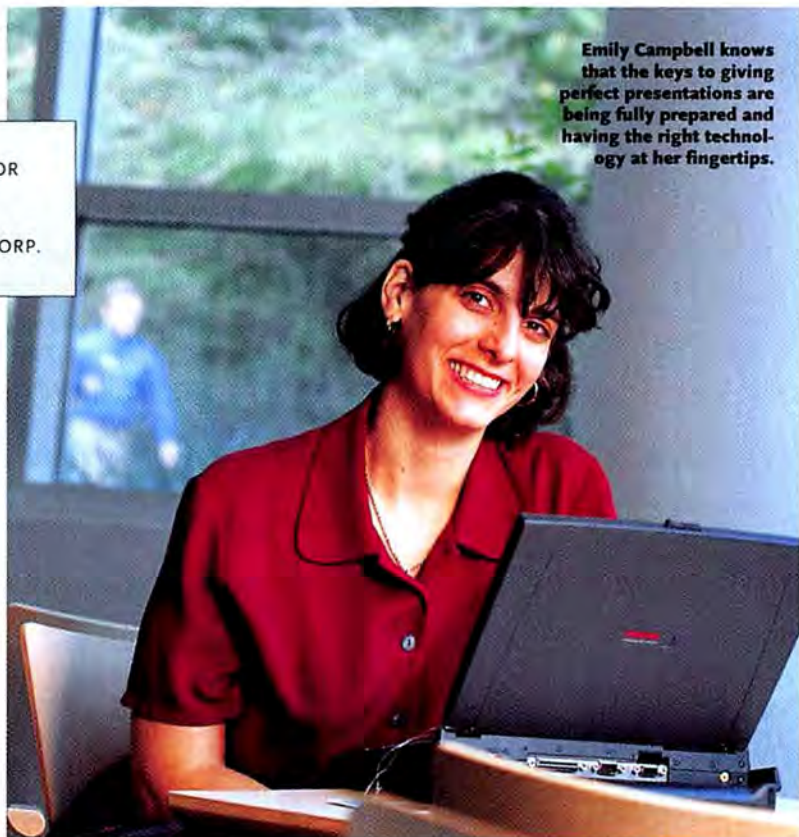
**"I USE THE PRESENTATIONS AS A TOOL TO TALK AROUND. 90% OF WHAT I TALK ABOUT IS NOT ON THE SLIDES."**

get under way can help break the ice. And if the audience gets involved, she can often get something more than just an opportunity to plug her company. Customer questions and comments can help her tweak her presentation to be even more effective the next time around.

Building a relationship with the audience can become even more crit-

**EMILY CAMPBELL**  
PRODUCT MANAGER FOR  
ENHANCEMENTS AND  
MONITORS  
COMPAQ COMPUTER CORP.  
HOUSTON, TEXAS

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#### **KEY FEATURES**

- > NEC Integrated MIPS Processor
- > 24MB ROM
- > 16MB RAM, upgradeable to 32MB
- > 9.4" 640x480 256-color DSTN display
- > 16.5mm center-to-center keyboard
- > Built-in 33.6Kbps software-based modem
- > Type II PC Card and Compact Flash slots
- > IrDA support
- > 12-hour Lithium ion rechargeable battery pack
- > Rechargeable backup battery
- > Dimensions: 11.25" x 8.75" x less than 1"
- > Full travel weight with batteries and AC adapter: 3 lbs., 5 oz.
- > Bundled accessories: stylus, travel dock, AC adapter

#### **CLIO SOFTWARE**

- > Microsoft® Windows® CE, H/PC Pro Edition Software, version 3.0
- > Microsoft Pocket Outlook™ Professional
  - Contacts
  - Tasks
  - Calendar
  - Inbox Professional
- > Microsoft Pocket Office Professional
  - Microsoft Pocket Word
  - Microsoft Pocket Excel
  - Microsoft Pocket PowerPoint
  - Microsoft Pocket Access
- > Microsoft Pocket Internet Explorer
- > ParaGraph CalliGrapher® handwriting recognition
- > Vadem ViewFinder™ screen-based intelligent finder and viewer
- > BSQUARE® bFAX® Pro

#### **PC SOFTWARE**

- > Windows CE Services 2.2 with ActiveSync™
- > Microsoft Schedule+ 7.0a



tem includes built-in 100-mbps ethernet support. Overall, the \$2768 PowerMate 8100 rates as a decent power system for business use, but you can find better buys in the same category elsewhere.

## 12 IBM PC 300 PL

**PRO:** Built-in ethernet, lots of open expansion slots, good performance

**CON:** Poor drive-bay access, case is hard to close There's an old saying about IBM PCs: "You can buy better, but you can't pay more." That old saw rings a lot less true today. IBM has priced its PC 300 PL at \$2549—squarely in the middle of the power PC pack. It's not hard to find a less expensive PII-450 system on the market; but on the other hand, only three other Win 98-based PII-450 PCs outpointed the IBM on PC WorldBench 98.

To enhance the 300 PL's value as a network node, IBM includes a useful library of LAN and management software, including Client Services for Netfinity Manager, IBM Universal Management Agent, Co-Session, and Intel LANDesk Manager. Rather than taking up a PCI or ISA slot, the ethernet adapter is integrated onto the motherboard. With a total of four open expansion slots, (one ISA, two PCI, and one shared ISA/PCI) and two open DIMM sockets, the machine leaves you with plenty of room for future upgrades.



**IBM PC 300 PL** Since the 300 PL is designed to be integrated into a network, IBM's designers may have assumed that the majority of users wouldn't be cracking open the horizontal desktop case (which takes up a fair amount of real estate on a desk). Though opening the case was simple enough, we had a hard time closing it so that all of the catches lined up properly. Once inside, we had little trouble reaching the expansion slots and RAM. Storage access was another story, however, with only one free 5.25-inch bay available and no free 3.5-inch bays at all. Worse yet, to use the one open bay, we would have had to totally remove the CD-ROM drive, install our new device, and then reinstall the CD-ROM drive.

The bundled 17-inch monitor nicely complements the Matrox Millennium G200 AGP graphics adapter, with good color reproduction and crisp, easy-to-read text. IBM continues to provide excellent documentation for its machines, as well as three free years of around-the-clock technical support and a three-year parts, one-year labor warranty.

## 16 NEXTREND NEXSTAR-450 PWJ

**PRO:** Terrific performance and features; above-average support policy

**CON:** Pricey; bare-bones user manual

Judging by the NexStar-450 PWJ, NexTrend is close to perfecting its formula for small- and home-office PCs. If you need speed, have a big enough budget, and possess a little PC savvy, this \$2599 midtower makes an excellent choice. With a score of 218 on the PC WorldBench 98 test suite, the exceptionally well-appointed system ranks as about average among the Windows 98 PII-450s we've examined.

NexTrend covers the system for three years on both parts and labor, and provides around-the-clock technical support, but—especially at this price point—we expect a little more hand-holding than NexTrend's documentation and support reps provide. The thin system guide contains small text, few pictures, and a meager troubleshooting section. In our anonymous calls, support representatives were generally courteous and provided some knowledgeable advice, but they were less helpful than we expected—telling us, for example, to call the modem manufacturer with our modem-related questions.

## 17 MIDWEST MICRO OFFICE PRO 450

**PRO:** Reasonable price, spacious hard drive

**CON:** Awkward monitor adjustments, case difficult to close properly, lackluster support

If you're hunting for an attractive price on a full-featured PC, Midwest Micro's Office Pro 450 might be the system you're after. At \$2499, it costs about \$150 less than you'd expect for a system with its configuration. And the Office Pro 450 car-



NexStar-450 PWJ

ries enough high-tech extras to keep your small or home office abuzz with activity.

This PII-450 midtower, the younger sibling of the Office Pro 400, improves noticeably on its elder. It comes with

Microsoft's Office Small Business Edition, a 13.6GB hard disk, and 128MB of RAM. Despite these impressive components, however, it earns an underwhelming PC WorldBench 98 score of 210.

The 19-inch ClearMax monitor is easy to hook up, thanks to its color-coded cable. Set at the recommended resolution of 1280 by 1024, it displays text and graphics adequately. On-screen controls are organized on a single button in the center of the bezel, but to make adjustments you have to resort to either a heavy hand or to wearily repetitive pressing.



Office Pro 450

Adding hardware upgrades like sound or graphics cards or additional RAM should be easy, since the interior is roomy and easy to access at the bottom half of the Office Pro's chassis. But up top, where you might want to hook up another hard drive, for example, things are a bit more crowded. The case's two side panels slip off without much trouble, thanks to their convenient latches, but you'll find that it's not quite as easy to align them properly for relatching.

The clearly written, well-organized system documentation includes a concise setup card, but it lacks a troubleshooting section. Midwest Micro's warranty covers parts for up to five years, while labor is covered for three. The company's technical support representatives, although courteous, were at times unhelpful. ▶

## BEYOND THE TOP 20



We evaluated the following systems along with the others, but they didn't score high enough to reach the Top 20 Power Desktops chart. For write-ups, visit PC World Online ([www.pcworld.com/t20pcs](http://www.pcworld.com/t20pcs)).

◆ Axis Systems PII 450

◆ IDot.com 450 BX



# TOP 20 BUDGET DESKTOPS

	SYSTEM	Last month	Month tested	Street price (10/9/98)	CPU	Comments
1	 <b>Micro Express MicroFlex-35A</b> 800/989-9900 www.microexpress.net	1	Dec 98	\$1199	AMD K6-2-350	Price of fast PC with robust multimedia components and great warranty falls \$150.
2	 <b>Gateway E-3200 400</b> 800/779-2000 www.gateway.com	3	Dec 98	\$1829	Pentium II-400	Corporate PC drops \$120; has network card, great support, and is fully manageable.
3	 <b>Dell Dimension XPS R350</b> 800/388-8542 www.dell.com	2	Nov 98	\$1899	Pentium II-350	Great all-around PC for small business gets \$80 price increase; has DVD-ROM drive.
4	 <b>Micro Express MicroFlex C400A</b> 800/989-9900 www.microexpress.net	n/a	NEW	\$1799	Pentium II-400	Low price for a PII-400; plenty of RAM and a DVD-ROM drive, but monitor is so-so.
5	 <b>NEC Direction SP E333</b> 888/863-2669 www.necnow.com	5	May 98	\$1598	Pentium II-333	Company's high system reliability scores accompany upgrade to 2X DVD-ROM drive.
6	<b>Dell Dimension V333c</b> 800/388-8542 www.dell.com	6	Nov 98	\$1849	Celeron-333	Pricey for a Celeron-333; includes Zip drive and 4.8X DVD-ROM drive.
7	<b>Axis Systems Orion 100R PII-400</b> 800/378-9014 www.axisys.com	n/a	NEW	\$1999	Pentium II-400	Fast but expensive PC comes with 4.8X DVD-ROM drive.
8	<b>Quantex OP6/400 SM-3x</b> 800/896-4898 www.quantex.com	11	Oct 98	\$1799	Pentium II-400	Zip drive, nice-looking monitor, and great support policies for \$150 less this month.
9	<b>Compaq Deskpro EP C333</b> 800/345-1518 www.compaq.com	18	Nov 98	\$1729	Celeron-333	Well-configured corporate PC propelled up the chart by \$154 price drop.
10	<b>MidWest Micro Office Pro 350</b> 800/728-8582 www.mwmicro.com	10	Nov 98	\$1529	Pentium II-350	Fast PII-350 drops \$106 thanks to CPU price cuts; includes SuperDisk drive.
11	<b>Unicent Avanta E333</b> 800/308-3614 www.unicent.com	12	Nov 98	\$999	Celeron-333	Cheapest system on chart sheds \$112, could have better phone support.
12	<b>MidWest Micro Pro Office 400</b> 800/728-8582 www.mwmicro.com	n/a	Dec 98	\$1649	Pentium II-400	Great performance for the price, especially after \$110 price cut.
13	<b>Sys Technology Performance 350K2</b> 800/613-9963 www.sys.com	n/a	NEW	\$1699	AMD K6-2-350	Speedy for an AMD K6-2-350; fast graphics card, 40X CD-ROM drive.
14	<b>Racer Talladega 333PS</b> 800/843-8458 www.racerpc.com	n/a	Aug 98	\$1319	Pentium II-333	Big \$250 price drop on PII-333 with Microsoft Office 97.
15	<b>ProGen Atlas X PII-350</b> 888/776-9595 www.progen.com	n/a	July 98	\$1169	Pentium II-350	Cheapest PII-350 after \$130 price cut includes natural keyboard and video camera.
16	<b>CyberMax Entrepreneur PII-300</b> 800/437-4596 www.cybermaxpc.com	7	May 98	\$1499	Pentium II-300	Business bargain includes Zip drive but offers relatively slow performance.
17	<b>Acma NPower 6333P</b> 800/786-6888 www.acma.com	13	Aug 98	\$1498	Pentium II-333	Ethernet-ready PII-333 has good documentation and 24/7 support.
18	<b>Unicent Avanta L333</b> 800/308-3614 www.unicent.com	17	June 98	\$1499	Pentium II-333	Relatively slow PII-333 now costs \$100 less; phone support could be better.
19	<b>PowerSpec MT 6320 PII-350</b> 888/480-3353 www.powerspec.com	n/a	NEW	\$1398	Pentium II-350	PII-350 packs good speed and includes satisfactory components.
20	<b>IDot.com Entrepreneur BX450</b> 888/388-4368 www.idot.com	n/a	NEW	\$1998	Pentium II-450	Inexpensive for its class; only PII-450 on the budget chart.



Best Buy

See features chart, page 206; test report, page 208.

n/a = not applicable

<sup>1</sup> A system's performance word score is relative to scores of other PCs running the same operating system. For more details see "Your Guide to the Top 100" on page 189.

<sup>2</sup> For more information about all products in this table, select PC World InfoNet no. 904 or visit [www.pcworld.com/infonet](http://www.pcworld.com/infonet).



AT FIRST GLANCE, the new budget chart might look like a twin of last month's chart: The same impressive systems from Micro Express, Gateway, Dell, and NEC still rule Best Buy territory, thanks partly to substantial price cuts. Just one new system, Micro Express's MicroFlex C400A, a Pentium II-400 machine, cracks the top five. It offers a winning combination of PII-400 speed, good features, and a low price. For the first time, meanwhile, a Pentium II-450 system finds its way onto the budget chart: Sneaking in at number 20, IDot.com's \$1998 Entrepreneur BX450 is the second-cheapest PII-450 system we've seen. (The new ProGen Polaris PII-450 is priced at \$1879, but it failed to make the Top 20.)



# SCORECARD

★ Overall rating	PC WorldBench 98/operating system	Features and design	Price	Performance <sup>1</sup>	Vendor's system reliability	Vendor's support quality/policies	PC World InfoNet number <sup>2</sup>
85	179/Win 98	good	inexpensive	good	3	fair <sup>4</sup> /outstanding	648
85	224/Win NT 4.0	good	expensive	outstanding	good	fair/outstanding	649
82	188/Win 98	satisfactory	expensive	good	good	good/good	650
81	204/Win 98	very good	expensive	very good	3	fair <sup>4</sup> /outstanding	651
81	169/Win 95	satisfactory	average	good	outstanding	good <sup>4</sup> /good	652
79	170/Win 98	good	expensive	good	good	good/good	653
79	201/Win 98	very good	expensive	very good	3	fair <sup>4</sup> /outstanding	654
79	198/Win 95	good	expensive	very good	3	fair <sup>4</sup> /good	655
78	176/Win 98	satisfactory	average	good	good	fair/outstanding	656
78	186/Win 98	good	average	good	3	good <sup>4</sup> /good	657
78	171/Win 98	satisfactory	very inexpensive	good	3	fair <sup>4</sup> /outstanding	658
78	199/Win 98	good	average	very good	3	good <sup>4</sup> /good	659
78	181/Win 98	very good	average	good	3	good <sup>4</sup> /good	660
77	167/Win 98	satisfactory	average	good	3	good <sup>4</sup> /outstanding	661
76	181/Win 95	good	inexpensive	good	3	poor <sup>4</sup> /fair	662
76	152/Win 95	very good	average	satisfactory	3	good <sup>4</sup> /good	663
76	177/Win 95	satisfactory	average	good	3	good <sup>4</sup> /good	664
74	158/Win 95	good	average	good	3	fair <sup>4</sup> /outstanding	665
74	180/Win 98	good	average	good	3	fair <sup>4</sup> /fair	666
74	218/Win 98	very good	expensive	outstanding	3	good <sup>4</sup> /poor	667
Scorecard weightings		Features 25 percent	Price 22 percent	Performance 18 percent	Reliability 15 percent	Quality/policies 10 percent each	

<sup>1</sup> Insufficient data to give a rating.


<sup>2</sup> Scores were derived from anonymous support-quality calls due to insufficient data from survey.

## This Month's Best Buys

### 1 MICRO EXPRESS MICROFLEX-35A

**PRO:** Long warranty, good speakers, neat interior

**CON:** Case is somewhat difficult to open

 Our number one budget Best Buy for two months running features a great interior design, a good audio subsystem, and a lengthy warranty.

Micro Express's MicroFlex-35A offers the budget-conscious power user high-quality components, strong performance, and an extremely reasonable price that falls \$150 this month.

The low \$1199 price doesn't mean you have to sacrifice good speed or useful features. Inside the plain beige midtower case lies a 350-MHz K6-2 processor—the fastest yet from AMD. The MicroFlex

35A's performance score of 179 is similar to that of the average Pentium II-350 system.



The MicroFlex-35A is also fully equipped. The combination of a 7.5GB hard disk, a 56-kbps modem, and a 12X-32X CD-ROM drive make it suitable for most business applications. And if you build heavy-duty multimedia presentations, the Diamond Multimedia Viper V330 AGP graphics adapter included with the 35A won't disappoint. The MicroFlex's sound system is also powerful: Creative Labs' standard Sound Blaster PC128 audio card surrounds you with sound when it's connected to a four-speaker sound system (which is not included).


The MicroFlex-35A's interior is so clean and well organized, you'd think a drill sergeant had designed it. If only getting inside were simpler—you have to remove four Phillips screws and then lift off the three-sided steel case. Realignment the cover and sliding it securely back in place is even more difficult.

MicroExpress backs its PCs with an above-average four-year warranty on parts and labor, including one year of free-on-site service. Toll-free phone support is available around the clock.

## 2 GATEWAY E-3200 400

**PRO:** Well-supported corporate PII-400 system with easy-access interior

**CON:** Subpar performance for a PII-400 running Windows NT, mediocre monitor

 Corporate buyers looking for a high quality, relatively inexpensive managed PC should seriously consider Gateway's E-3200 400 desktop. The \$1829 price, down \$120 from last month, buys you a network-ready computer that's easy to service and has built-in remote management hardware.

Performance isn't the E-3200 400's strong suit, however. Its PC WorldBench 98 score of 224 is about 6 percent lower than the average PII-400 running Windows NT—closer to scores we've seen from PII-350 machines.

But the E-3200 400 compensates ▶



	SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	Hard drive (GB)	Graphics adapter (AGP)	Video RAM (MB/type)	Monitor tube/viewable diagonal (inches)	Modem speed (kbps)
1	Micro Express MicroFlex-35A*	AMD K6-2-350	Windows 98	64	1024	7.5	Diamond Viper V330	4/SGRAM	17/15.9	56 <sup>2</sup>
2	Gateway E-3200 400*	Pentium II-400	Windows NT 4.0	64	512	10	integrated ATI 3D Rage Pro Turbo	4/SGRAM	17/15.9	not included
3	Dell Dimension XPS R350*	Pentium II-350	Windows 98	64	512	10	STB Velocity 128zx	8/SGRAM	17/16	56 <sup>3</sup>
4	Micro Express MicroFlex C400A*	Pentium II-400	Windows 98	128	512	10	ATI Expert@Work	8/WRAM	17/16.1	56 <sup>2</sup>
5	NEC Direction SP E333*	Pentium II-333	Windows 95	64	512	6.4	integrated ATI 3D Rage Pro Turbo	4/SGRAM	17/16	56 <sup>3</sup>
6	Dell Dimension V333c	Celeron-333	Windows 98	64	128	8.4	integrated ATI 3D Rage Pro	8/SDRAM	17/15.9	56 <sup>3</sup>
7	Axis Systems Orion 100R PII-400	Pentium II-400	Windows 98	64	512	10	Matrox Millennium G200	8/SGRAM	17/16	56 <sup>4</sup>
8	Quantex QP6/400 SM-3x	Pentium II-400	Windows 95	64	512	8.1	Real 3D StarFighter AGP	8/SGRAM	17/15.7	56 <sup>2</sup>
9	Compaq Deskpro EP C333	Celeron-333	Windows 98	64	128	10	Matrox Millennium G200	8/SDRAM	17/15.9	56 <sup>2</sup>
10	MidWest Micro Office Pro 350	Pentium II-350	Windows 98	64	512	11.5	ATI Xpert@Work	4/SGRAM	17/15.7	56 <sup>2</sup>
11	Unicent Avanta E333	Celeron-333	Windows 98	64	128	4	integrated ATI 3D Rage Pro	4/SGRAM	15/13.7	56 <sup>4</sup>
12	MidWest Micro Office Pro 400	Pentium II-400	Windows 98	64	512	6.4	STB Velocity 128	4/SGRAM	17/15.8	56 <sup>2</sup>
13	Sys Technology Performance 350K2	AMD K6-2-350	Windows 98	64	512	10.1	Matrox Millennium G200	8/SGRAM	17/15.8	56 <sup>4</sup>
14	Racer Talladega 333PS	Pentium II-333	Windows 98	64	512	9.6	Asus 3DExplorer 3000	4/SGRAM	17/15.6	56 <sup>3</sup>
15	ProGen Atlas X PII-350	Pentium II-350	Windows 95	64	512	8.4	Intel Express 3D	4/SGRAM	17/16	56 <sup>3</sup>
16	CyberMax Entrepreneur PII-300	Pentium II-300	Windows 95	64	512	8.4	Intel Express 3D	4/SGRAM	17/16.1	56 <sup>2</sup>
17	Acma NPower 6333P	Pentium II-333	Windows 95	64	512	6.4	Diamond Stealth 3D 4000	4/SGRAM	17/15.8	not included
18	Unicent Avanta L333	Pentium II-333	Windows 95	64	512	8.4	ATI Xpert@Work	4/SGRAM	17/15.9	56 <sup>3</sup>
19	PowerSpec MT 6320 PII-350	Pentium II-350	Windows 98	64	512	6.4	Permedia 2	4/SGRAM	17/15.9	56 <sup>4</sup>
20	IDot.com Entrepreneur BX450	Pentium II-450	Windows 98	64	512	10.1	Matrox Millennium G200	8/SGRAM	17/16.1	not included

\* Best Buy

<sup>1</sup> PC World defines towers as taller than 20 inches, midtowers as 15.5 inches to 20 inches, and minitowers as shorter than 15.5 inches.<sup>2</sup> Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

with smart remote management features and a clever modular design. Its motherboard supports DMI 2.0, and the system comes with Intel LANdesk Client Manager software, which lets IS personnel monitor the PC remotely.

The E-3200 400's design should make it one of the easier systems to service. Normally tedious tasks that involve removing the case cover and exchanging a component (whether it's the processor or just system memory) require very little time and few tools. You get unimpeded access to the memory and expansion slots, and you can even remove and replace the entire motherboard in less than a minute. Color-coded cables for the mouse, key-



Gateway E-3200 400

board, and monitor help make setup straightforward.

The E-3200's components, though not state-of-the-art, suffice for general business applications. The motherboard integrates a Crystal PnP sound chip

and an ATI 3D Rage Pro Turbo AGP video chip, but you can install an additional 4MB of video memory if you need it. The 17-inch Gateway EV700 monitor provides only average display quality for images and text, but adjustments are easy enough to make. Our E-3200 also came with a pair of unexceptional Altec Lansing GCS100 speakers, but multimedia isn't this PC's priority—and for \$30 more you can get the superior Boston Acoustics BA635 sound system.

The Gateway E-3200 400 is backed by a generous three-year parts and labor warranty and 24-hour technical support every day of the week.

### 3 DELL DIMENSION XPS R350

**PRO:** Fastest PII-350 we've tested, DVD-ROM drive, enormous hard disk, Trinitron monitor

**CON:** Pricey, case is difficult to open



The price of Dell's Dimension XPS R350 rises \$80 this month to \$1899, but the system is still less expensive than many of its similarly appointed peers. And its PC WorldBench 98 score of 188 is the highest among all the PII-350 systems we've tested.

The system comes equipped with a cavernous 10GB IBM ATA-33 hard disk—one of the largest available—an Omega



## EXPANDABILITY

## CUSTOMER SUPPORT

CD/DVD-ROM drive speed	Sound board	Case style	Max. RAM (MB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
12X-32X	Sound Blaster PCI128	midtower	384	4	3/0	4	4/4	24	Sat., Sun.	WWW
13X-32X	integrated Crystal PnP	desktop	384	2	1/1	1	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
4.8X DVD-ROM	integrated Crystal PnP	midtower	384	2	3/1	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
2X DVD-ROM	Sound Blaster PCI128	midtower	384	1	3/0	4	4/4	24	Sat., Sun.	WWW
2X DVD-ROM	integrated Yamaha OPL3-Sax	midtower	384	1	3/1	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
4.8X DVD-ROM	Turtle Beach Montego	minitower	384	2	2/1	1	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
4.8X DVD-ROM	Sound Blaster PCI128	midtower	384	2	2/0	4	3/3	24	Sat., Sun.	WWW
12X-32X	Ensoniq AudioPCI	midtower	384	2	2/3	4	3/1	24	Sat., Sun.	BBS, WWW
12X-32X	integrated ESS 1869	desktop	256	1	1/1	3	3/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
14X-32X	Aureal A3D PCI	midtower	384	2	3/1	4	varies <sup>3</sup> /3	24	Sat., Sun.	BBS, WWW
12X-24X	integrated Yamaha OPL3-Sax	minitower	256	1	2/0	2	3/3	24	Sat., Sun.	BBS, WWW
14X-32X	Aureal A3D PCI	midtower	384	2	3/1	4	varies <sup>3</sup> /3	24	Sat., Sun.	BBS, WWW
17X-40X	Sound Blaster AWE64	midtower	768	2	3/2	4	varies <sup>6</sup> /5	24	Sat., Sun.	WWW
12X-32X	Ensoniq AudioPCI	midtower	384	2	3/1	3	3/3	24	Sat., Sun.	WWW
12X-32X	Aureal Vortex PCI	midtower	384	2	3/1	3	3/1	12	none	BBS, WWW
13X-32X	Ensoniq AudioPCI	midtower	512	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
12X-32X	Yamaha OPL3-Sax	desktop	384	2	0/0	3	3/1	24	Sat., Sun.	BBS, WWW
13X-32X	Ensoniq AudioPCI	midtower	384	2	3/1	4	3/3	24	Sat., Sun.	BBS, WWW
12X-32X	Integrated ESS Maestro2 PCI	minitower	384	2	2/0	2	1/1	17	Sat., Sun.	BBS
17X-40X	Aztech PCI 338-A3D	midtower	384	2	3/0	4	varies <sup>3</sup> /1	12	none	WWW

<sup>3</sup> Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.

<sup>4</sup> Downloads only, uploads at 33.6 kbps; uses cross-compatible V.90 standard.

<sup>5</sup> Five years on CPU and RAM, three years on other parts.

<sup>6</sup> Six years on CPU and RAM; three years on other parts.

Zip drive, and one of the new 4.8X DVD-ROM drives. The stunning 17-inch Trinitron monitor, fast STB Velocity 128zx graphics card, and hardware-based MPEG2 decoder team up for blazing graphics and video. The software bundle includes Microsoft Office Small Business Edition, Encarta, and Street Maps.

The Dimension's midtower case is difficult to open. The interior is nicely arranged, however, and includes a fan that blows air directly onto the heat sink.



Dell Dimension XPS R350

Dell's system documentation is helpful, and our readers rate the company's toll-free 24-hour tech support as good.

#### 4 MICRO EXPRESS MICROFLEX C400A

**PRO:** Generous amount of memory, DVD-ROM drive, top technical support policies

**CON:** Difficult-to-remove cover, so-so monitor

If you appreciate predictability, you'll like the newest addition to Micro Express's MicroFlex line. At \$1799, this Pentium II-400 system is a good deal, considering its solid multimedia features, good upgrade potential, and generous warranty and technical support. Just don't expect scintillating extras or an eye-catching design.

The new MicroFlex earned a PC World-Bench score of 204. That's about average for the PC's processor and price class. What's unusual is the 128MB of RAM—twice the memory of most comparably

priced units. The system also comes with such multimedia perks as a 2X DVD-ROM drive, S-Video and RCA cables, and a MIDI port. The 17-inch Impression 7 Plus display is easy to adjust, thanks to straightforward hardware controls and an on-screen menu. Text and graphics generally looked sharp in our tests, but the corners of the screen tended to be fuzzy.



MicroFlex C400A

Unfortunately, putting the computer's cover back on is inconvenient. The MicroFlex C400A comes with numerous manuals, but the owner's guide is outdated: There's a section on Windows 3.1 but nary a word about Windows 98.



## 5 NEC DIRECTION SP E333

**PRO:** Moderate price, 2X DVD-ROM drive, top system reliability score in reader survey

**CON:** Free tech support limited to three years



NEC's Direction line of PCs has impressed us since its launch last year, delivering strong performance, user-friendly designs, and low prices for home office and business buyers alike. The \$1598 Direction SP E333 isn't at the top of its class in any one category, but it has plenty of assets. Its PC

WorldBench score of 169 is slightly below average in its peer group, but the SP E333 comes with a 6.4GB hard disk that's large enough for most general computing applications. A recent upgrade to a 2X DVD-ROM drive is a nice addition. The 17-inch NEC C700 monitor that came with our system produced crisp images in our tests.

The SP E333 reflects the same careful attention to de-

tail found in other Direction computers, including color-coded ports and an easy-to-open case. NEC backs the line with a three-year warranty on parts and labor, plus 24-hour support, though free tech

support is limited to just three years. The quality of NEC's support is generally good, based on our anonymous calls, and our reader surveys rate the vendor's PC reliability as outstanding.



NEC Direction SP E333

## TOP 20 BUDGET DESKTOPS

## TEST REPORT

	SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	PC World-Bench 98 score	Faster	Average of tested Pentium II-350s <sup>1</sup>
1	Micro Express MicroFlex-35A*	AMD K6-2-350	Win 98	64	1024	179		
2	Gateway E-3200 400*	Pentium II-400	Win NT 4.0	64	512	224		
3	Dell Dimension XPS R350*	Pentium II-350	Win 98	64	512	188		
4	Micro Express MicroFlex C400A*	Pentium II-400	Win 98	128	512	204		
5	NEC Direction SP E333*	Pentium II-333	Win 95	64	512	169		
6	Dell Dimension V333c	Celeron-333	Win 98	64	128	170		
7	Axis Systems Orion 100R PII-400	Pentium II-400	Win 98	64	512	201		
8	Quantex QP6/400 SM-3x	Pentium II-400	Win 95	64	512	198		
9	Compaq Deskpro EP C333	Celeron-333	Win 98	64	128	176		
10	MidWest Micro Office Pro 350	Pentium II-350	Win 98	64	512	186		
11	Unicent Avanta E333	Celeron-333	Win 98	64	128	171		
12	MidWest Micro Office Pro 400	Pentium II-400	Win 98	64	512	199		
13	Sys Technology Performance 350K2	AMD K6-2-350	Win 98	64	512	181		
14	Racer Talladega 333PS	Pentium II-333	Win 98	64	512	167		
15	ProGen Atlas X PII-350	Pentium II-350	Win 95	64	512	181		
16	CyberMax Entrepreneur PII-300	Pentium II-300	Win 95	64	512	152		
17	Acma NPower 6333P	Pentium II-333	Win 95	64	512	177		
18	Unicent Avanta L333	Pentium II-333	Win 95	64	512	158		
19	PowerSpec MT 6320 PII-350	Pentium II-350	Win 98	64	512	180		
20	IDot.com Entrepreneur BX450	Pentium II-450	Win 98	64	512	218		

\*Best Buy

Application test times in minutes

Word 97 Word Pro 97 Excel 97 1-2-3 97 Paradox 8.0 Picture Publisher 7.0



**TEST HOW WE TEST** All systems are tested with PC WorldBench 98, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs are tested with Windows 95, Windows 98, or Windows NT 4.0, and video resolution is set to 800 by 600 in 65,536 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench 98 score is a sum of the weighted, normalized result of each script: Word 97 (10 percent), Word Pro 97 (10 percent), Excel 97 (20 percent), 1-2-3 97 (20 percent), Paradox 8.0 (20 percent), and Picture Publisher 7.0 (20 percent). For more details on our benchmark and how we run it, see PC World Online ([www.pcworld.com/testing](http://www.pcworld.com/testing)). <sup>1</sup>Under Windows 95.



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## New This Month

The following systems made our Budget Desktops chart for the first time this month. For original reviews of previously tested PCs on the chart, visit our Web page ([www.pcworld.com/top400](http://www.pcworld.com/top400)).

### 7 AXIS SYSTEMS ORION 100R PII-400

**PRO:** Good value, long warranty, includes DVD-ROM and Iomega Zip drives

**CON:** Difficult access to RAM sockets

If you're looking for a solid value in a small-office/home-office multimedia computer, the \$1999 Orion 100R PII-400 is definitely worth considering. Its

201 PC WorldBench 98 score puts it close to the top of its class of sub-\$2000 Pentium II-400 systems and within 5 percent

Orion 100R PII-400

of the top-scoring Win 9x PII-400s. To sweeten the deal, Axis Systems throws in a superspeedy 4.8X Toshiba DVD-ROM drive, which results in better data transfer and less skipping on DVD video.

Of course, raw performance tells only part of the story. The 17-inch CTX monitor produces good images, especially on DVD video. We also like the sound coming from the wavetable-based Sound Blaster PCI128 sound card and Altec Lansing ACS44 speakers.

Axis also scores major points for its service and support, which includes a warranty of three years for both parts and labor, and one year of on-site service. A comprehensive and easy-to-read system manual accompanies the computer.

### 13 SYS TECHNOLOGY PERFORMANCE 350K2

**PRO:** Solid graphics and audio boards, low price

**CON:** Confusing warranty, lackluster speakers, interior cable clutter

When a PC has the word "performance" in its name, you might think the power of its processor is its best feature. In the case of Sys Technology's Performance 350K2,



Performance 350K2

you'd be wrong. Not that the AMD chip doesn't offer respectable speed. The system earned a PC WorldBench 98 score of 181, which puts it in the same ballpark as the other AMD K6-2-350 and PII-350 systems in this month's lineup. But at \$1699, the Performance 350K2 is all about price, not performance.

Multimedia fans and office users alike will appreciate the system's first-class graphics and audio components, including the Matrox Millennium G200 AGP graphics adapter and a 17-inch Sys Technology monitor. Likewise, it's hard to go wrong with the industry-standard Creative Labs Sound Blaster AWE64 sound card for high-end surround-sound audio.

The 17X-40X CD-ROM drive features a button for skipping to the next music track on an audio CD. But unlike many systems these days, which let you peek under the hood by loosening a single thumbscrew, the Performance 350K2 requires you to undo two screws to gain access to the interior. The side panel came off easily enough, but the two free DIMM memory slots were partially blocked by snaking cables.

Sys Technology's warranty policy is a bit confusing because it covers individual components for different periods of time. The CPU and memory are covered for a generous six years, though, and labor is good for five years. And Sys's tech support staffers were helpful in responses to our recent anonymous calls.

### 19 POWERSPEC MT 6320 PII-350

**PRO:** Inexpensive for its class, good monitor

**CON:** Limited support hours and expandability

The \$1398 PowerSpec MT 6320 PII-350 costs several hundred dollars less than many systems in its class, but its lackluster features and inferior technical support

policies keep it near the bottom of the chart. The mini-tower case sports just two drive bays—a 5.25-inch and a hidden 3.5-inch—and two available card slots. Fortunately, the case opens easily



PowerSpec MT 6320

without tools, which should help make upgrades straightforward. We also liked the clarity of the bundled 17-inch Philips Magnavox monitor.

PowerSpec's Web site provides surprisingly limited support information—nothing at all regarding support hours, for example, and no contact telephone number.

Night owls will be disappointed by the lack of technical support during the graveyard hours between 1 a.m. and 8 a.m.

### 20 IDOT.COM ENTREPRENEUR BX450

**PRO:** Cheap for a PII-450, easy-access interior

**CON:** No track record on service or reliability, limited technical support and labor warranty

If you don't mind buying a PC over the phone or Internet from a new company, this small-business/home unit might be just the ticket. This PII-450 system earned a healthy PC WorldBench score of 218, yet costs a low \$1998.

The BX450 comes ready to work, with its 3Com Fast Ethernet XL network card (you can choose a 56-kbps modem in its place); but it's also ready to play, thanks to the Matrox Millennium G200 AGP graphics adapter's 3D finesse. The nicely illustrated user handbook has plenty of helpful technical information, but technical support hours are limited to 12 hours a day. The Entrepreneur BX450's labor warranty lasts only one year, and IDot.com hasn't been in business long enough for us to get substantive service and reliability feedback from customers.



Entrepreneur BX450

## BEYOND THE TOP 20

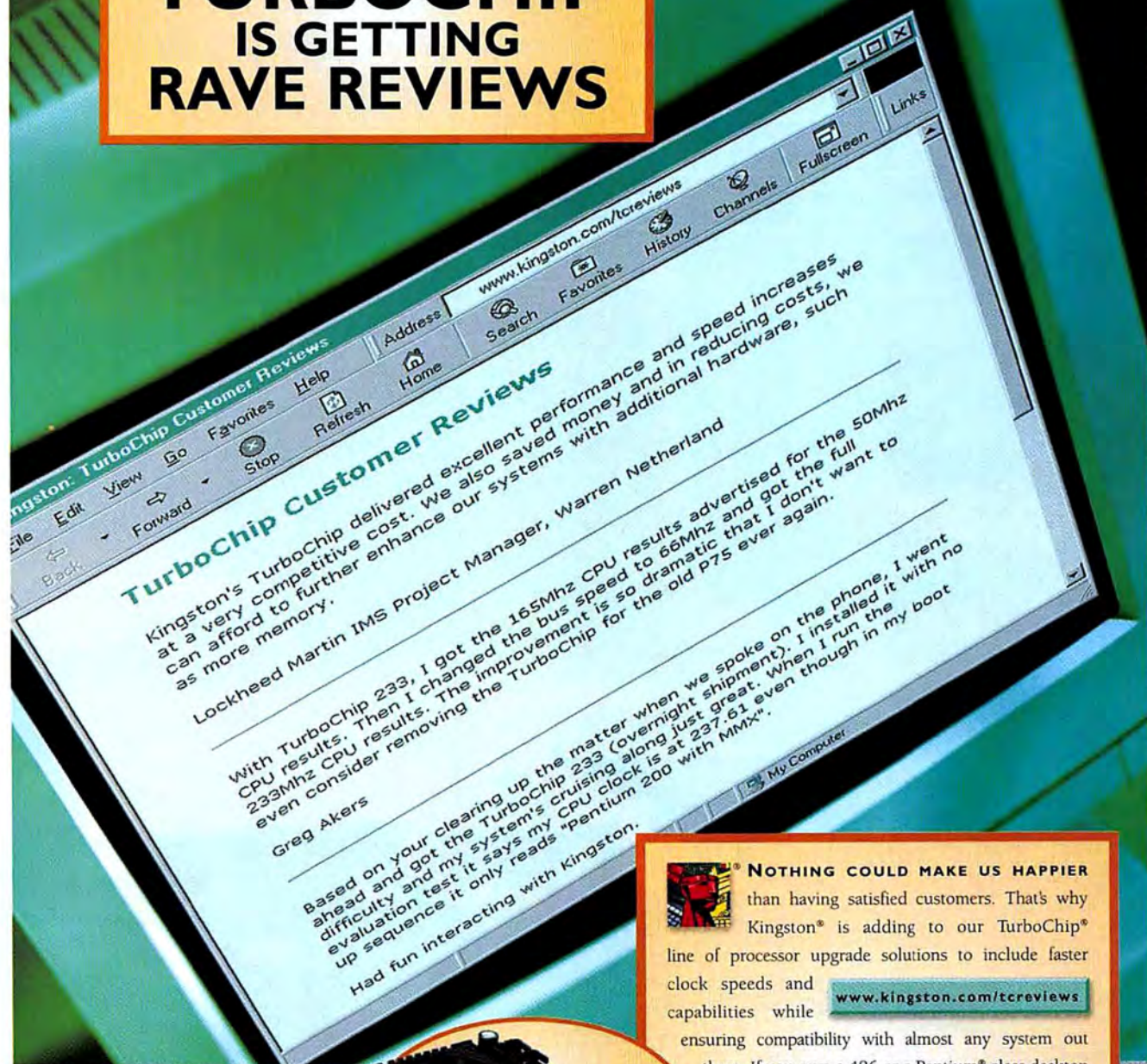


We evaluated the following systems along with the others, but they didn't score high enough to reach the Top 20 Budget Desktops chart. For write-ups, see PC World Online ([www.pcworld.com/t20pcs](http://www.pcworld.com/t20pcs)).

- ◆ IBM PC 300GL
- ◆ IDot.com Business Best Buy 2
- ◆ ProGen Polaris PII-450
- ◆ TigerDirect Tiger Pro 450



# KINGSTON'S TURBOCHIP IS GETTING RAVE REVIEWS



## TurboChip Customer Reviews

Kingston's TurboChip delivered excellent performance and speed increases at a very competitive cost. We also saved money and in reducing costs, we can afford to further enhance our systems with additional hardware, such as more memory.

Lockheed Martin IMS Project Manager, Warren Netherland

With TurboChip 233, I got the 165Mhz CPU results advertised for the 50Mhz CPU results. Then I changed the bus speed to 66Mhz and got the full 233Mhz CPU results. The improvement is so dramatic that I don't want to even consider removing the TurboChip for the old P75 ever again.

Greg Akers

Based on your clearing up the matter when we spoke on the phone, I went ahead and got the TurboChip 233 (overnight shipment). I installed it with no difficulty and my system's cruising along just great. When I run the evaluation test it says my CPU clock is at 237.61 even though in my boot up sequence it only reads "pentium 200 with MMX".

Had fun interacting with Kingston.



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## TOP 10 NOTEBOOK PCs

POWER NOTEBOOK		Last month	Month tested	Street price (10/15/98)	CPU	Comments
1	 <b>Dell Latitude CPl D300XT</b> 800/388-8542 <a href="http://www.dell.com">www.dell.com</a>	1	Nov 98	\$3399	Pentium II-300	Thin, speedy laptop with \$100 price drop is Best Buy for third straight month.
2	<b>Gateway Solo 2500LS</b> 800/846-2000 <a href="http://www.gateway.com">www.gateway.com</a>	2	Nov 98	\$3199	Pentium II-300	Notebook with fixed CD-ROM and floppy drives has strong battery.
3	<b>Dell Inspiron 7000 D300GT</b> 800/388-8542 <a href="http://www.dell.com">www.dell.com</a>	3	Nov 98	\$3549	Pentium II-300	Fast multimedia notebook makes ideal desktop alternative.
4	<b>WinBook XL2</b> 800/965-9349 <a href="http://www.winbook.com">www.winbook.com</a>	n/a	NEW	\$3199	Pentium II-300	New presentation model has huge screen, AGP bus, and SuperDisk drive.
5	<b>Toshiba Tecra 8000</b> 800/867-4422 <a href="http://www.computers.toshiba.com">www.computers.toshiba.com</a>	5	Nov 98	\$3499	Pentium II-266	Durable magnesium case and many optional upgrades extend unit's life span.
BUDGET NOTEBOOK						
1	 <b>Gateway Solo 2500SE</b> 800/846-2000 <a href="http://www.gateway.com">www.gateway.com</a>	1	Sept 98	\$1999	Pentium II-233	Fast, light laptop has built-in media drives and good battery.
2	<b>Gateway Solo 3100SE</b> 800/846-2000 <a href="http://www.gateway.com">www.gateway.com</a>	n/a	NEW	\$2499	Pentium II-233	Very light mainstream notebook is ideal for the busy traveler.
3	<b>Micron GoBook 2 266</b> 888/634-8799 <a href="http://www.micronpc.com">www.micronpc.com</a>	n/a	Nov 98	\$2498	Pentium II-266	Big \$650 price cut moves traveler's notebook from power to budget chart.
4	<b>AMS Tech Roadster 15CTA</b> 800/886-2671 <a href="http://www.amstech.com">www.amstech.com</a>	n/a	NEW	\$1495	AMD K6-2-300	Low-cost portable features bright screen and good performance.
5	<b>WinBook XL 233 DSTN</b> <sup>5</sup> 800/965-9349 <a href="http://www.winbook.com">www.winbook.com</a>	4	Oct 98	\$1299	Pentium MMX-233	Price falls \$184 on bargain unit with fixed CD-ROM and floppy drives.



Best Buy

See features chart, page 216.

n/a = not applicable

<sup>1</sup>Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.<sup>2</sup>For more about products here, select the number on the product information card or visit [www.pcworld.com/infonet](http://www.pcworld.com/infonet).<sup>3</sup>Insufficient data to give a rating.

YOU'RE AT YOUR DESK with your notebook PC, but you can't print a document you desperately need for a meeting that starts in 10 minutes. What do you do? You call the help desk and plead your case. But the IS staffer doesn't come to your desk. Instead, working through your company's network, he adjusts your notebook's settings, and—minutes later—you can print again.

Despite its clunky moniker, this new feature—Desktop Management Interface 2.0—helps IS departments in businesses that deploy many notebooks check system configurations, change settings, and take inventory through a network. All of the notebooks on this month's chart, except for Dell's Inspiron 7000 D300GT and WinBook's XL 233 DSTN, support DMI.

Of the nine new notebooks we tested this month, three hit the chart. On the power side, a new WinBook presentation model, the XL2, has a very large screen, a DVD-ROM drive, and an LS-120 SuperDisk drive—three features that help it capture the number four spot. Debuting on the budget list, meanwhile, are Gateway's

lightweight traveler, the Solo 3100SE, and the amazingly inexpensive AMS Tech Roadster 15CTA.

## This Month's Best Buys

## POWER NOTEBOOKS

## 1 DELL LATITUDE CPl D300XT

PRO: Very fast; excellent keyboard

CON: No modem even at this price



Thanks in part to a \$100 price cut, Dell's corporate-targeted Latitude CPl D300XT hangs on to the top spot on our power chart for the third month in a row. The portable remains a

pleasure to use and is one of the quickest models we've tested, with a PC WorldBench 98 score of 159.

As with its forebear, the nearly identical Latitude CPl D266XT, the D300XT's pleasing charcoal-gray case measures just 1.75 inches thick (compared with the current notebook standard of 2 inches) and includes one modular bay on the side. Weighing 7.4 pounds and with slightly more than 3 hours of battery life, the D300XT is more than adequate for doing work away from the office. You can increase its travel life by buying an optional second battery (\$169) and using two batteries at once. However, the notebook's \$3399 price doesn't include a modem.

The Latitude CPl D300XT comes with a responsive, accurate touchpad and a great keyboard. All the keys are of sufficient size, offer crisp action, and occupy the



Dell's CPl D300XT has an excellent keyboard.



# SCORECARD

★ Overall rating	PC WorldBench 98 score/performance	Price	Vendor's system reliability	Features and design	Vendor's support quality/policies	Battery life (hours:min)/rating	Traveling weight <sup>1</sup>	PC World InfoNet number <sup>2</sup>
89	159/outstanding	average	good	very good	good/good	3:05/good	average	609
88	158/outstanding	average	good	very good	good/fair	4:09/very good	average	610
87	162/outstanding	average	good	very good	good/fair	3:37/good	very heavy	611
87	164/outstanding	average	fair	very good	good/poor	2:22/satisfactory	average	612
85	154/very good	average	good	very good	good/fair	2:42/satisfactory	light	613
<b>Power scorecard weightings</b>	Performance 22 percent	Price 14 percent	Reliability 22 percent	Features 16 percent	Support 10 percent	Battery life 8 percent	Weight 8 percent	
85	125/good	average	good	good	good/fair	3:15/good	light	614
84	138/very good	expensive	good	very good	good/fair	2:47/satisfactory	very light	615
84	144/outstanding	expensive	fair	very good	good/fair	5:44/outstanding	average	616
83	122/good	very inexpensive	3	good	fair */fair	2:35/satisfactory	average	617
82	109/satisfactory	very inexpensive	fair	satisfactory	good/poor	1:33/poor	heavy	618
<b>Budget scorecard weightings</b>	Performance 14 percent	Price 22 percent	Reliability 22 percent	Features 16 percent	Support 10 percent	Battery life 8 percent	Weight 8 percent	All products: 901

\*Due to insufficient data from survey, score was derived from anonymous support-quality calls.

<sup>1</sup>Available via Web site only.

expected positions; adapting from a desktop keyboard to the CPi D300XT's is a snap. And you shouldn't have to worry about upgrading the hard disk any time soon—at 6.4GB, it's among the biggest notebook drives available.

The CPi D300XT's brilliant screen produces a sharp image from edge to edge. We do have one gripe with the casing around the display, though: It's slightly wider at the top of the screen, so when the notebook's lid is closed, it protrudes slightly over the edge of the case. If the notebook should ever fall onto its side, the fragile screen would end up absorbing much of the impact.

As with most notebooks, the D300XT's basic stereo capabilities yield tinny sound. But the included software wavetable synthesizer produces good MIDI music.

Dell earns good service and system reliability marks from PC World readers, and we've seen a reduction in wait times in our anonymous calls to its tech support. The advice we receive continues to be accurate, although some reps seem impatient.

## BUDGET NOTEBOOKS

### 1 GATEWAY SOLO 2500SE

**PRO:** Inexpensive for a PII-233, lightweight

**CON:** Poor speaker placement, flimsy keyboard

The Gateway Solo 2500SE wins the top spot on our budget chart for the third month in a row. At \$1999, it's one of the least expensive Pentium II-233 notebooks we've seen, but its basic features and PC WorldBench score of 125 compare well with those of notebooks costing hundreds of dollars more.

This gray, boxy portable is particularly well suited to the road. At 7.1 pounds, it's among the lightest Pentium II models we've tested—about half a pound lighter than the average laptop. The Solo 2500SE's 3.3-hour battery life is typical for a PII, but it doesn't let you use two batteries at once to extend the time you can work away from an outlet. Nor does the Solo come with a modem, an essential component for

almost any traveler. (You can, however, order one from Gateway for \$100.)

Back at the office, you can connect the Solo 2500SE—even while it's still running—to a docking station for use on your desk. For backup and storage, the floppy drive bay accepts an optional \$125 120MB SuperDisk drive, which can also read and write to standard 3.5-inch floppies. The CD-ROM drive is fixed.

Using the Solo 2500SE is comfortable and easy. It comes with a vibrant active-matrix screen and a Logitech touchpad that incorporates an unusual feature: You can simulate left and right mouse clicks by tapping on the touchpad with one or two fingers, respectively.

The Solo 2500SE's keyboard is run-of-the-mill. Typists who tend to pound on the keys will notice excessive flex under the keyboard. In addition, the speakers are located in the wrist rest, so your hands may muffle the sound when you type. ▶



Gateway's Solo 2500SE



	POWER NOTEBOOK	CPU	Traveling weight (pounds) <sup>1</sup>	RAM (MB)	Hard drive (GB)	Color screen type	Screen diagonal (inches)	Screen resolution	Maximum screen colors	Battery type	Pointing device
1	Dell Latitude CPI D300XT*	Pentium II-300	7.4	64	6.4	active	13.3	1024 x 768	262,144	lithium ion	touchpad
2	Gateway Solo 2500LS	Pentium II-300	8.3	64	4	active	13.3	1024 x 768	65,536	lithium ion	touchpad
3	Dell Inspiron 7000 D300GT	Pentium II-300	9.7	64	8	active	14.1	1024 x 768	16.8 million	lithium ion	touchpad
4	WinBook XL2	Pentium II-300	8	128	6	active	14.1	1024 x 768	16.8 million	lithium ion	touchpad, eraserhead
5	Toshiba Tecra 8000	Pentium II-266	7.2	64	6.1	active	13.3	1024 x 768	262,144	lithium ion	eraserhead
BUDGET NOTEBOOK											
1	Gateway Solo 2500SE*	Pentium II-233	7.1	32	2.1	active	12.1	800 x 600	262,144	lithium ion	touchpad
2	Gateway Solo 3100SE	Pentium II-233	6.1	64	4	active	12.1	800 x 600	16.8 million	lithium ion	eraserhead
3	Micron GoBook 2 266	Pentium II-266	8.3	64	3	active	12.1	800 x 600	16.8 million	lithium ion	touchpad
4	AMS Tech Roadster 15CTA	AMD K6-2-300	7.9	32	2.1	active	12.1	800 x 600	16.8 million	NiMH	touchpad
5	WinBook XL 233 DSTN	Pentium MMX-233	8.7	64	1.6	dual-scan	12.1	800 x 600	262,144	NiMH	touchpad

\*Best Buy ● Yes ○ No <sup>1</sup>Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive. <sup>2</sup>One year on battery.

## New This Month

The following PCs made our power and budget notebook charts for the first time this month. To find original reviews of previously tested notebooks on this month's charts, visit [www.pcworld.com/top400](http://www.pcworld.com/top400).

### POWER NOTEBOOKS

#### 4 WINBOOK XL2

**PRO:** Multimedia features including superb DVD playback and AGP graphics

**CON:** Abysmal speaker sound, too much keyboard flexibility, a tad heavy

If you work in a typical office, you've probably sat through your share of boring presentations, and maybe even nodded off a few times. WinBook's newest notebook, the XL2, could change all that.

What's remarkable is not that WinBook produced a portable with almost every conceivable high-end presentation feature, but that the company did it while keeping the XL2's cost down to a reasonable \$3199.

The WinBook XL2 has a big, crisp 14.1-inch active-matrix screen. You also get an ATI Rage Pro LT graphics chip set with a 2X Accelerated Graphics Port bus, giving

you enough speed to handle video and other sophisticated graphic elements.

The XL2's sound, however, is another matter. Notebook speakers are generally tinny at best, but this laptop produces some of the feeblest audio we've heard.

You can store your presentations on the XL2's LS-120 SuperDisk, a floppy-compatible 120MB removable-media drive that WinBook included in lieu of a floppy drive. And the XL2's DVD-ROM drive delivers sharp, smooth images quite unlike the jagged, jumpy ones we've been seeing on other notebooks.

The WinBook XL2's PC WorldBench score of 164 establishes a new high-water mark for Pentium II-300-based systems. Part of the boost comes from the XL2's whopping 128MB of RAM—twice what the typical PII-300 notebook offers.

Taking your presentations on the road? Better make it a short trip: Tipping the

scales at 8 pounds, the XL2 borders on heavy, and its 2.4-hour battery life won't let you work away from a power outlet for long. And because it lacks a modular bay—all the drives are fixed—you can't use two batteries at once.

While the classy-looking XL2 seems generally well

constructed, there's considerably more flex under the entire keyboard and surrounding case area than we've seen in previous WinBooks. The touchpad and eraserhead respond smoothly, but unlike many notebooks, the XL2 has no applet to tweak pointing-device sensitivity or turn off the touchpad's tap feature.

WinBook's poor support policies keep the XL2 from debuting higher in the chart. The company offers 13 hours of toll-free phone support on weekdays and Saturday, but Sunday remains strictly a day of rest.

### BUDGET NOTEBOOKS

#### 2 GATEWAY SOLO 3100SE

**PRO:** Exceptionally light; very good performance

**CON:** Only one PC Card slot; external floppy drive  
Gateway hits its stride in the travel category with the 3100SE, a new addition to its Solo line of notebooks.

The Solo 3100SE scores high in key frequent-traveler categories such as size and weight. Measuring 11.3 by 8.5 by 1.4 inches, it's a bit smaller than the typical notebook. And weighing just 6.1 pounds (including the AC adapter and 8X-20X CD-ROM drive), the Solo 3100SE is the lightest standard notebook we've tested. Its battery life of nearly 3 hours is tolerable; a bigger battery would increase its



WinBook's XL2: Made for DVD movie watching.



## EXPANDABILITY

## CUSTOMER SUPPORT

CD/DVD-ROM drive speed	Modem speed (kbps)/protocol	Maximum RAM (MB)	Modular expansion bays	Bay for second battery	Optional docking station	Infrared port	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
12X-24X	not included	128	1	●	●	●	3/1	24	Sat., Sun.	BBS, WWW
8X-20X	56/V.90	128	0	○	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
2X DVD	56/K56flex	192	1	●	○	●	3/3	24	Sat., Sun.	BBS, WWW
2X DVD	56/V.90	128	0	○	○	●	1/1	13	Sat.	BBS, WWW
12X-24X	56/K56flex	256	1	○	●	●	3 1/3	24	Sat., Sun.	BBS, CIS, WWW
8X-20X	not included	160	0	○	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
8X-20X	56/K56flex	96	0	○	○	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
10X-24X	56/x2	96	1	●	●	●	varies 1/1	24	Sat., Sun.	BBS, CIS, WWW
10X-24X	56/K56flex	96	0	○	○	●	3/3	11	none	BBS, CIS, WWW
8X-20X	56/V.90	128	0	○	○	●	1/1	13	Sat.	BBS, WWW

<sup>1</sup>Five years on CPU and main RAM, one year on other parts.



Gateway's Solo 3100SE shows off its thin profile.

traveling weight. Too bad you can't have it both ways.

Such great portability will cost you a little extra. At \$2499, the 3100SE occupies the high end of the price scale for PII-233 notebooks. Our other

major complaint is that there's not enough support under the keyboard. As a result, it bounces up and down as you type—a common problem with thin, light models.

Gateway decided to forgo a modular drive bay in the 3100SE. When ordering, you choose between a fixed CD-ROM drive and (for an extra \$200) a DVD-ROM drive. And you have to connect the floppy drive with a cable to the parallel port, which means you can't print while it's attached.

Most frequent travelers, however, wouldn't blink at these drawbacks. All they really want is a notebook that won't leave knots in their backs, and the Solo 3100SE certainly fits that bill.

#### 4 AMS TECH ROADSTER 15CTA

**PRO:** Inexpensive, good performance

**CON:** Not dockable, fixed drives, hard to upgrade  
A far cry from a do-it-all wonder, AMS Tech's Roadster 15CTA offers the basics

for notebook users in pursuit of a bargain.

The \$1495 Roadster isn't a total throwback. It comes with many of the features you'd expect to find in a new notebook, including a Universal Serial Bus port, an active-matrix screen, and a modem. And with accent lines on the case, a molded touchpad, and whimsical spray-shaped speaker vents, it's got more flair than the usual boxy laptops that come through our doors.

Just bear in mind that a price this low mandates a no-nonsense set of features: The floppy and 10X-24X CD-ROM drives are fixed, for instance, so there's no way to swap them out in favor of a DVD-ROM drive or a second battery.

Despite its name, the Roadster isn't the best notebook for travelers. It has a NiMH battery, which won't last as long as the lithium ion variety. The Roadster offers a merely adequate 2.6 hours of battery life, and its 7.9-pound traveling weight is just average. On the other hand, the built-in K56flex modem is convenient on the road: You don't have to remember to bring a separate modem as you rush to the airport.

One of the biggest drawbacks to the Roadster's design is that unlike with most

notebooks, you can't simply pop in a new hard drive or more memory; upgrading entails delving deep into some tender parts of the notebook. AMS Tech can do it for you, but if you think the 2.1GB of hard drive space and 32MB of RAM that come standard won't hold you for very long, do yourself a favor and order more of each up front.

This laptop, powered by an AMD K6-2-300 CPU, fails to reach Pentium II-300 speed levels; it's more on par with a PMMX-266 notebook. But considering its low price, the Roadster fulfills its purpose as an inexpensive alternative to \$3500 PII-300s.



AMS Tech's Roadster 15CTA has plenty of flair.

#### BEYOND THE TOP 10



We evaluated these systems along with the others, but they didn't score high enough to earn a place on the *Top 10 Notebook PCs* chart. For complete write-ups, visit PC World Online ([www.pcworld.com/top400](http://www.pcworld.com/top400)).

- ◆ Acer Extensa 712TE
- ◆ Compaq Armada 3500
- ◆ HP OmniBook 410
- ◆ Micro Express NP9266
- ◆ Quantex T-1411
- ◆ Transmode Vivanté XL 2300



## TOP 10 HOME PCs

	POWER SYSTEM	Last month <sup>1</sup>	Month tested	Street price (10/9/98)	Comments
1	 Dell Dimension XPS R450 800/388-8542 www.dell.com	1 <sup>1</sup>	Dec 98	\$2559	<b>PRO:</b> Great performance, especially for business apps and graphics; \$170 price cut. <b>CON:</b> Limited software package, so-so service rating.
2	Micron Millennia 450 Max 888/634-8799 www.micronpc.com	1 <sup>4</sup>	Dec 98	\$2899	<b>PRO:</b> Fastest home PC to date, hardware extras including joystick and gamepad, 19-inch monitor. <b>CON:</b> Very pricey.
3	Gateway G6-450 800/846-2000 www.gateway.com	2 <sup>4</sup>	Dec 98	\$2743	<b>PRO:</b> Fast; outstanding sound system, rewritable CD-ROM drive. <b>CON:</b> Expensive; mediocre software package.
4	Compaq Presario 5600 800/345-1518 www.compaq.com	3 <sup>4</sup>	Dec 98	\$2699	<b>PRO:</b> Great speed, built-in ethernet, DSL capability, 19-inch monitor, FireWire. <b>CON:</b> Expensive.
5	Sony VAIO PCV-E308DS 888/315-7669 www.sony.com/pc	n/a	<b>NEW</b>	\$2899	<b>PRO:</b> Supereasy setup, lots of digital imaging software, FireWire. <b>CON:</b> Very expensive, poor upgradability.
<b>BUDGET SYSTEM</b>					
1	 Dell Dimension V333c 800/388-8542 www.dell.com	1 <sup>5</sup>	Dec 98	\$1499	<b>PRO:</b> Superfast and easy to use, first-class reliability rating. <b>CON:</b> Fairly expensive for a budget system.
2	Sony VAIO PCV-E204 888/315-7669 www.sony.com/pc	2 <sup>1</sup>	Dec 98	\$1549	<b>PRO:</b> Easy setup and terrific performance. <b>CON:</b> Limited expandability, on the expensive side.
3	Micron Millennia 350 888/634-8799 www.micronpc.com	4 <sup>1</sup>	Dec 98	\$1649	<b>PRO:</b> Fastest budget machine we've tested to date. <b>CON:</b> Most expensive home budget system; limited software package.
4	Gateway G6-333C 800/846-2000 www.gateway.com	n/a	<b>NEW</b>	\$1611	<b>PRO:</b> Very fast for a Celeron PC, great value with Canon color printer. <b>CON:</b> Limited software bundle, more expensive than most in its category.
5	Compaq Presario 2266 800/345-1518 www.compaq.com	n/a	<b>NEW</b>	\$948	<b>PRO:</b> Supercheap system with decent speed for the price. <b>CON:</b> Very slow graphics performance, not suitable for games.
 <b>Best Buy</b> <span style="float: right;">n/a = not applicable</span>					

<sup>1</sup> Last month's rankings based on the different charts in December's review, "Home PCs for the Holidays."<sup>2</sup> For more about products here, select the number on the product information card or visit [www.pcworld.com/infonet](http://www.pcworld.com/infonet).<sup>3</sup> Home office system chart.<sup>4</sup> Gaming system chart.<sup>5</sup> Family system chart.

IF YOU'RE ONE OF THOSE PEOPLE who are still waiting for the next great technology before taking the leap and buying a new machine, you're probably still using an abacus. Over the past 18 months, Universal Serial Bus, DVD-ROM, and now FireWire (also known as IEEE 1394) have joined the elite company of much-hyped technologies that have found their way into actual PCs.

FireWire is touted as a faster, easier-to-use interface for hard drives and multimedia devices. Though you won't find many FireWire hard drives for sale anytime soon, a few digital cameras and video recorders on the market do use FireWire's 200-mbps transfer rates to download images straight into a computer.

Two power systems on this month's chart boast the speedy new interface: Sony's new entertainment dream machine, the VAIO PCV-E308DS, and a home networking solution, Compaq's Presario 5600. But neither could knock the Dell Dimension XPS R450 from

the top spot. For more information on the XPS R450 and Dell's Dimension V333c (our top home budget system), see "Home PCs for the Holidays" ([www.pcworld.com/dec98/homepcs](http://www.pcworld.com/dec98/homepcs)) in our December issue.

## SONY: MAKING PICTURES

DEBUTING AT number five on our power chart, Sony's \$2899 VAIO PCV-E308DS is a system designed for the true imaging



Sony VAIO PCV-E308DS

fanatic: You can load digital video or still photos into the PC via the handy FireWire port—which Sony has named the iLink port—on the right front side of the machine. Finally, someone thought to

put a port on the *front* of a computer. And it works. We transferred high-resolution images from Sony's \$799 DCR-PC10 Digital Video Camera (which is not included with the system) to the PCV-E308DS's hard disk in just a few minutes.

Once you've captured your images, you can use a software editing tool such as Adobe's PhotoDeluxe, or DVgate (Sony's own digital image capture program) to create the next winner at Cannes. The iLink port can also handle Sony's \$399 MiniDisc player for transferring audio to your PC.

Image editing calls for a lot of processing muscle. The VAIO PCV-E308DS's PC WorldBench 98 score of 201 is slightly below par for a Pentium II-450 system with 128MB of RAM. Still, it posted respectable marks on our new graphics test. (Again see last month's "Home PCs for the Holidays" for more details).

## COMPAQ CREATES CONNECTIONS

IF YOU'RE looking for a powerful home office system that won't make you spend the bulk of your online time waiting for



# SCORECARD

★ Overall rating	PC WorldBench 98 score/rating	Price	Setup/ease of use	Graphics	Reliability/support	Features	PC World InfoNet number <sup>2</sup>
85	218/outstanding	moderate	outstanding/outstanding	outstanding	outstanding/fair	Pentium II-450, 128MB of SDRAM, 10GB hard drive, 4.8X DVD-ROM drive, 56-kbps V.90 modem, 17-inch monitor, Turtle Beach Montego sound card.	619
85	221/outstanding	very expensive	good/good	outstanding	fair/good	Pentium II-450, 128MB of SDRAM, 14.4GB hard drive, 2X DVD-ROM drive, 56-kbps modem, 19-inch monitor, Iomega Zip drive, Sidewinder joystick.	620
81	214/outstanding	very expensive	outstanding/good	very good	fair/good	Pentium II-450, 64MB of SDRAM, 10GB hard drive, 2X DVD-ROM drive, Philips CDD3610 CD-R/RW drive, 56-kbps modem, 19-inch monitor.	621
80	216/outstanding	expensive	outstanding/good	good	good/fair	Pentium II-450, 128MB of SDRAM, 12.9GB hard drive, 2X DVD-ROM drive, 56-kbps V.90 modem, 19-inch monitor, built-in ethernet.	622
79	201/good	very expensive	outstanding/good	outstanding	good/good	Pentium II-450, 128MB of SDRAM, 10GB hard disk, 2X DVD-ROM drive, 56-kbps modem, 17-inch monitor.	623
<b>Power scorecard weightings</b>	Performance 20 percent	Price 10 percent	Setup/ease 15 percent	Graphics 15 percent	R & S 25 percent	Features 15 percent	
78	169/outstanding	expensive	fair/outstanding	good	outstanding/fair	Celeron-333, 64MB of SDRAM, 8.4GB hard disk, 17X-40X CD-ROM drive, 56-kbps modem, 17-inch monitor, Harman/Kardon HK195 speakers.	624
77	167/outstanding	expensive	outstanding/good	very good	good/good	Pentium II-333, 64MB of SDRAM, 5.1GB hard disk, 4X DVD-ROM drive, 56-kbps modem, 15-inch monitor.	625
75	178/outstanding	expensive	very good/good	good	good/good	Pentium II-350, 64MB of SDRAM, 10GB hard drive, 24X-32X CD-ROM drive, 56-kbps modem, 17-inch monitor.	626
74	174/outstanding	expensive	outstanding/good	fair	fair/good	Celeron-333, 64MB of SDRAM, 6.4GB hard drive, 2X DVD-ROM drive, 56-kbps modem, 17-inch monitor, Canon BJC-4300 printer.	627
74	130/good	very inexpensive	good/fair	poor	fair/fair	IBM 6x86MX-PR300, 64MB of SDRAM, 3GB hard drive, 12X-32X CD-ROM drive, 56-kbps modem, 15-inch monitor.	628
<b>Budget scorecard weightings</b>	Performance 15 percent	Price 20 percent	Setup/ease 15 percent	Graphics 5 percent	R & S 40 percent	Features 5 percent	All products: 902

downloads, Compaq's Presario 5600, which captures fourth place in our home power system rankings, may be a solution. Besides having a FireWire port on the front of its case, the \$2699 system comes with built-in ethernet capability.



Gateway G6-333C

An ethernet connection is not only a first step in creating a home network, it's essential in high-speed Internet access technologies like ADSL and cable, as a place to attach your external modem. If you're considering ADSL, you can kill two birds with one modem by ordering your Presario 5600 with a dual ADSL/analog internal modem (this feature wasn't available on the unit we tested).

Order, you say? A system from Compaq? That's right. Traditionally, the company has sold its machines exclusively through retail channels, but the Presario 5600 is a configure-to-order system you can purchase by telephone, online from Compaq's Web site, or in person at participating retail outlets such as Circuit City.

The 5600 is fairly expensive but extremely fast and well equipped. Its 450-MHz Pentium II CPU, large 12.9GB hard drive, 19-inch monitor, and Diamond Monster 3D-II accelerator card make it a

great choice for the gamer, online content developer, or serious home office user.

## BUDGET SUPER DEALS

IF YOU'RE a budget buyer seeking a capable low-cost system, take a look at Gateway's latest PC-printer bundle, the fourth-place G6-333C. Its Celeron CPU offers the equivalent of PII-333 performance for handling just about any home-office or family oriented task. Throw in Canon's BJC-4300 color bubble jet printer (rated third on August's *Top 10 Printers* chart, [www.pcworld.com/aug98/t10printers](http://www.pcworld.com/aug98/t10printers)), and you've got a pretty good deal at \$1611.

And vise-fingered penny-pinchers or anyone looking for a cheap second PC will like the \$948 price tag on Compaq's fifth-place Presario 2266. You can knock an

additional \$100 off the total by signing up for Compaq's "no-commitment" ISP trial program with GTE. The catch? That tempting price gets you a 15-inch monitor, one free expansion slot, and PII-233-level performance using IBM's 6x86MX-PR300 CPU. But for activities like word processing, e-mail, and Web surfing, the Presario will do the trick.

Kirk Steers is a contributing editor for PC World. Testing was performed by Ulrike Diehlmann of the PC World Test Center. ■

## BEYOND THE TOP 10



We evaluated the following systems this month, too, but they didn't score high enough to make the *Top 10 Home PCs* chart. For write-ups, see PC World Online ([www.pcworld.com/t10homepcs](http://www.pcworld.com/t10homepcs)).

- ◆ Axis Terra MK8
- ◆ Kingdom Education MM Station
- ◆ LEK Speed Pro 4000
- ◆ Micron Millennia C300
- ◆ Tagram Thunderbolt H2630



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## TOP 10 PRINTERS

	SMALL-BUSINESS/HOME MONOCHROME	Month tested	Street price (10/5/98)	Overall rating	Speed for plain text (ppm)	Speed for full-page graphics (ppm)	Comments	PC World InfoNet number
1	 <b>Okidata OkiPage 6e</b> 800/654-3282 www.okidata.com	retested this month	\$249	85	5.2	3.2	 <b>FEATURES:</b> LED, rated 6 ppm. Standard 2MB of RAM, 1200-by-300-dpi maximum resolution, 100 sheets input and output. <b>SUMMARY:</b> Good print quality, a modest footprint, a simple and functional control panel design, and a \$50 price drop help this unit gain the top small-business ranking despite slow printing.	687
2	<b>Minolta PageWorks 8L</b> 888/264-6658 www.minoltaprinters.com	NEW	\$379	84	6.5	3.4	 <b>FEATURES:</b> Laser, rated 8 ppm. Standard 2MB of RAM, 1200-by-1200-dpi maximum resolution, 150 sheets input, 100 output. <b>SUMMARY:</b> This quiet, easy-to-use monochrome model has great documentation, but it's priced a bit on the expensive side in view of its somewhat pedestrian printing speed.	688
3	<b>Brother HL-1040</b> 800/276-7746 www.brother.com	NEW	\$300	82	8.4	3.5	<b>FEATURES:</b> Laser, rated 10 ppm. Standard 2MB of RAM, 600-by-600-dpi maximum resolution, 200 sheets input, 100 output. <b>SUMMARY:</b> With impressive text and graphics speeds, this inexpensive unit offers good text printing and a convenient design. But graphics are dark, and the printer's paper trays are flimsy.	689
4	<b>Okidata OkiPage 10i</b> 800/654-3282 www.okidata.com	retested this month	\$499	82	8.5	3.4	 <b>FEATURES:</b> LED, rated 10 ppm. Standard 2MB of RAM, 1200-by-600-dpi maximum resolution, 150 sheets input, 150 output. <b>SUMMARY:</b> The fastest small-business model at printing text pages produces handsome text and holds a lot of paper. Gray-scale graphics are too dark, though.	690
5	<b>NEC SuperScript 870</b> 800/632-4636 www.nec.com	retested this month	\$349	82	6.6	3.4	 <b>FEATURES:</b> Laser, rated 8 ppm. Standard 2MB of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. <b>SUMMARY:</b> Speeds dropped in our new tests, causing this former Best Buy to plummet. It's still a good all-around printer, though, with good text quality and a user-friendly design.	691
CORPORATE MONOCHROME								
1	 <b>Xerox DocuPrint P12</b> 800/832-6979 www.xerox.com	retested this month	\$699	87	9.2	3.9	 <b>FEATURES:</b> Laser, rated 12 ppm. Standard 2MB of RAM, 600-by-600-dpi maximum resolution, 330 sheets input, 250 output. <b>SUMMARY:</b> Inexpensive corporate model comes with a three-year warranty and prints outstanding text, but its page production rate might be too slow for a large workgroup.	692
2	<b>Lexmark Optra S 1625</b> 800/539-6275 www.lexmark.com	retested this month	\$999	86	11.6	2.5	 <b>FEATURES:</b> Laser, rated 16 ppm. Standard 4MB of RAM, 1200-by-1200-dpi maximum resolution, 350 sheets input, 250 output. <b>SUMMARY:</b> Low price for its class, strong performance, and good print quality get it on the chart. Except for print speed, specifications are identical to Lexmark's third-place 1855.	693
3	<b>Lexmark Optra S 1855</b> 800/539-6275 www.lexmark.com	retested this month	\$1129	86	13.8	4.1	 <b>FEATURES:</b> Laser, rated 18 ppm. Standard 4MB of RAM, 1200-by-1200-dpi maximum resolution, 350 sheets input, 250 output. <b>SUMMARY:</b> Fastest text printing on the chart and extensive paper-handling options; but the print quality can be spotty, especially with gray-scale graphics.	694
4	<b>HP LaserJet 4000</b> 800/752-0900 www.hp.com	retested this month	\$1099	84	12.4	4.4	<b>FEATURES:</b> Laser, rated 17 ppm. Standard 8MB of RAM, 1200-by-600-dpi maximum resolution, 600 sheets input, 300 output. <b>SUMMARY:</b> Fast text and graphics printing, outstanding text quality, and extensive features, but you need special settings to achieve best graphics quality. We tested the cheaper base model this month.	695
5	<b>Lexmark Optra K 1220</b> 800/539-6275 www.lexmark.com	NEW	\$749	83	9.5	3.2	 <b>FEATURES:</b> Laser, rated 12 ppm. Standard 2MB of RAM, 1200-by-600-dpi maximum resolution, 200 sheets input, 220 output. <b>SUMMARY:</b> Entry-level corporate model offers minimal features and moderate speeds for a reasonably low price. Print quality is adequate but not stellar.	696
 <b>Best Buy</b>  <b>Windows 95-certified Plug and Play</b> <b>All products:</b> 907								



**HOW WE TEST** The overall rating for both monochrome small-business/home printers 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.



LIKE MANY PEOPLE, you may have contemplated the death of monochrome printing, given the low cost and fine quality of color ink jets. But monochrome printers still make a lot of sense:

They're faster than ink jets; they usually hold more paper; their consumables cost less; and laser text quality remains superior.

Printer makers seem far from entertaining death-of-monochrome thoughts: This month they deluged us with new ►



small-office models. We tested four, all priced at under \$400: Brother's HL-1040, HP's LaserJet 1100, Minolta's PageWorks 8L, and Xerox's DocuPrint P8. The Brother and Minolta models land on the small-business/home section of our revamped chart, which covers monochrome printers for businesses of every size, from one-person shops to large corporations. One new corporate printer makes the chart: Lexmark's inexpensive Optra K 1220 debuts at number five. We also retested older models with a new test suite and revised the criteria and weightings to differentiate corporate models from small-business printers; you will see some significant changes in chart order from past months.

### SMALL OFFICE, SMALL PRINTER

MINOLTA'S PAGEWORKS 8L, our new number two, mixes a little bad with a lot of good. Priced at a relatively high \$379, this model produces great text, especially at small font sizes. During our testing, the 8L produced adequate, though dark, gray-scale graphics. An average performer for its class, the PageWorks prints text at 6.5 pages per minute and graphics at 3.4 ppm. The 8L proved exceptionally friendly to set up and use. For example, it not only alerted us via a pop-up dialog box to a parallel port problem, but also told us how to fix it. Minolta sells an extra 500-sheet input tray for \$150; this add-on would come in handy for a busy office. The com-

pany did skimp in one area, however: You need an extra output tray to catch labels and transparencies sent through the straight paper path. Luckily, this attachment costs only \$15.

One notch below the Minolta on our chart, Brother's new HL-1040 costs just \$300 and, at 8.4 ppm on text, offers the second-best performance on the small-business/home chart. It also prints clean, smooth text; distinct, fine lines; and dark but satisfactory graphics. We like how the paper output tray folds out of the way for downtime. Unfortunately, the HL-1040's auxiliary paper feeder holds just one sheet at a time, and all of the printer's stubby paper trays have flimsy wire extenders.

Unimpressive print quality at large type size and a painful, confusing installation kept Xerox's new DocuPrint P8 off the chart. Still, it does have some notable strengths. The P8 prints slightly faster than the Minolta and costs \$50 less. It includes two parallel ports, so two PCs can share it without a network. The printer's tiny size makes it ideal for close quarters. And the P8 comes with a three-year warranty, a rare bonus for a low-cost printer.

Another near-miss—HP's \$399 LaserJet 1100—produces clean, crisp text and accurate lines but generates blocky gray-scale images and costs more than it should. Printing text pages at 7.2 ppm, it's almost 15 percent slower than the Bro-



**OUR NUMBER three for small businesses,** the \$300 Brother HL-1040 offers quick performance and detailed text printing.

er HL-1040. An inadequate printed manual (the online manual is much better) and cramped, 125-sheet paper tray also cut into the 1100's usefulness. A \$150 optional attachment adds scanning and copying functions (untested by us) to its repertoire.

One other chart change deserves mention: The NEC SuperScript 870, our October Best Buy, rates only fifth this month. Though it's still a good all-around printer, it's not as strong as the distinguished newcomers. It also turned in slower speed results under our new test suite.

### LEXMARK'S BROAD LINE

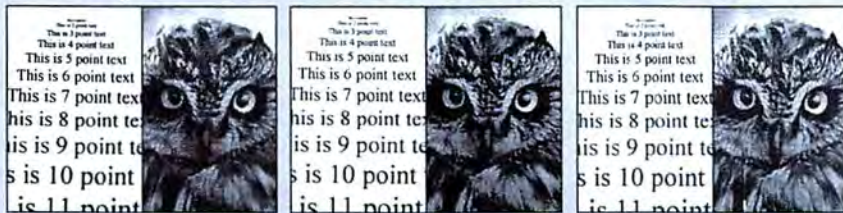
LEXMARK'S OPTRA K 1220 fills a niche in the company's lineup of heavy-duty networkable printers. When we looked at the similar Optra S 1255 in November, we remarked that its \$950 street price was too steep. Lexmark must have agreed; its new offering prints text at the identical 9.5 ppm (graphics print a bit slower than on the S 1255, at 3.2 ppm) but costs only \$749.

Unfortunately, limited expandability might make the K 1220 impractical for a large office: It supports a single 450-sheet paper input tray option (\$249), a 90-sheet multipurpose feeder (\$199), and no additional paper output trays. Its competent output displays a hint of roughness on big characters, and detailed, though flat, grays. Like all Lexmark Optra models, the K 1220 comes with superb documentation and useful software features such as overlays and manual duplexing.

—Dan Littman

### PRINT QUALITY SAMPLES

## Superior Text With New Xerox Printer



#### BROTHER HL-1040

The Brother excels at small-type printing, showing details of even the tiniest letters well. Unfortunately, its dark gray-scale images display some banding.

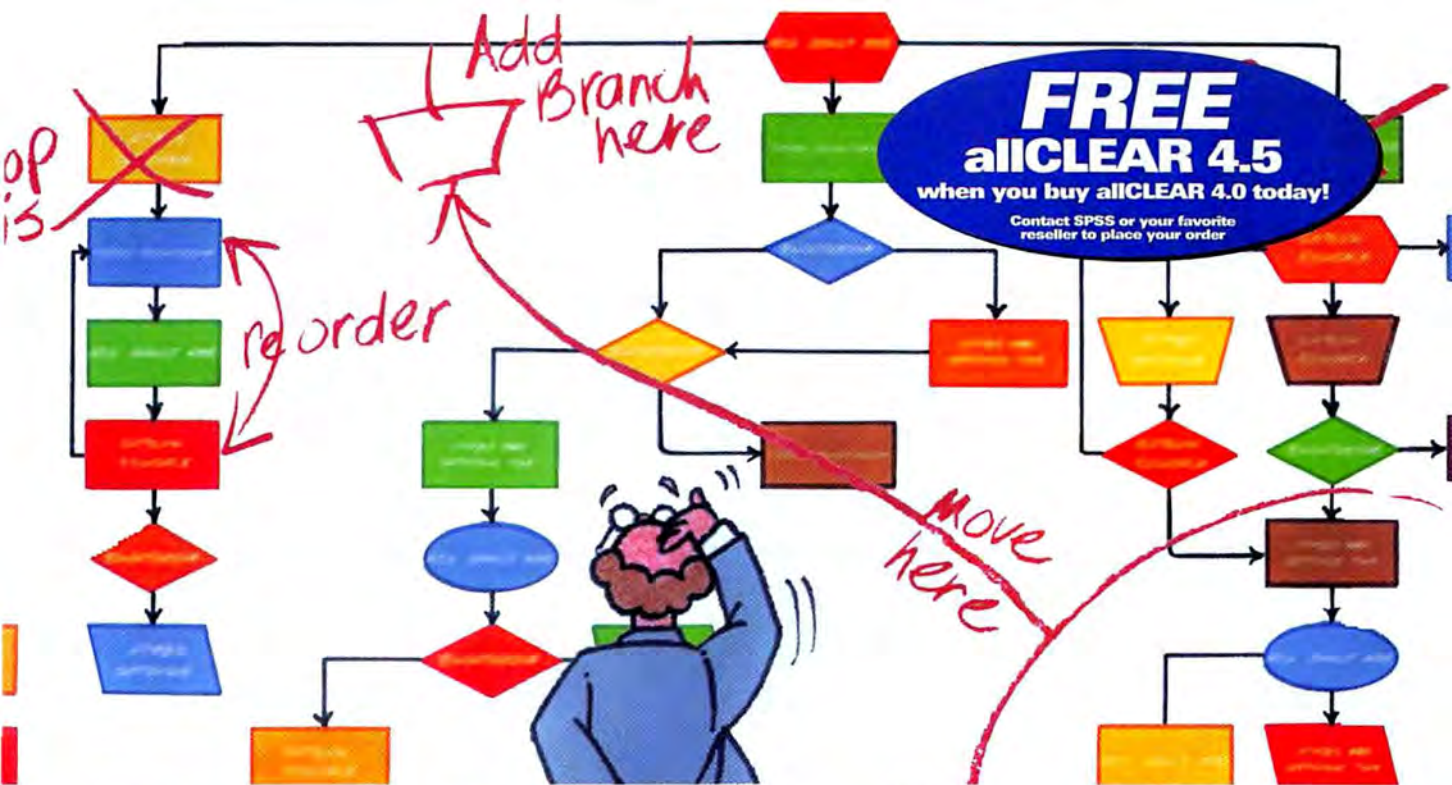
#### MINOLTA PAGEWORKS 8L

Similar to the Brother, the PageWorks 8L produces crisp text, especially on small type. Its gray-scale output proved a bit dark for our tastes, however.

#### XEROX DOCUPRINT P12

Our Best Buy monochrome printer for corporations produces detailed, realistic graphics at a reasonable speed and generates the best-quality text we've seen.





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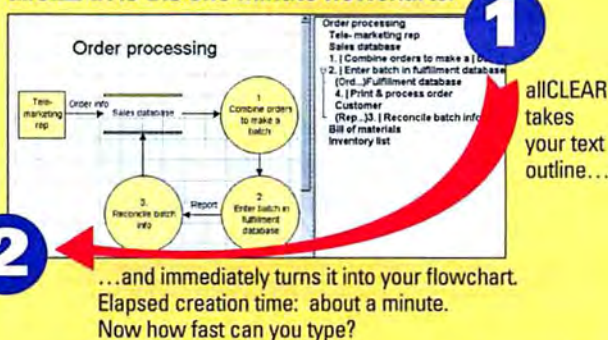
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#### 3D WinBench '98\*

<b>VELOCITY 4400</b>	<b>1150</b>
<b>VIPER V550</b>	<b>1080</b>
<b>Graphics Blaster</b>	<b>1020</b>
<b>G-200</b>	<b>563</b>

#### High End WinMark '98\*\*

<b>VELOCITY 4400</b>	<b>298</b>
<b>VIPER V550</b>	<b>286</b>
<b>Graphics Blaster</b>	<b>279</b>
<b>Millennium G-200</b>	<b>273</b>

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Circle 200 on card or go to [www.pcworld.com/infonet](http://www.pcworld.com/infonet)



## TOP 10 MONITORS

	17-INCH MONITOR	Month tested	Street price (10/15/98)	Overall rating	Quality of text/graphics	Comments	PC World InfoNet number
1	 <b>IBM P72</b> 800/426-7255 ext. 4753 www.pc.ibm.com/us/accessories/monitors	Oct 98	\$549	89	excellent/ excellent	<b>FEATURES:</b> 15.7-inch viewable area, .25mm stripe pitch Trinitron tube, up to 85-Hz refresh rate, Plug and Play ready, TCO'95 compliant, three-year warranty, 24-hour toll-free support. <b>SUMMARY:</b> Still pricier than most 17-inch models, this jet-black monitor renders gorgeous colors and has a wide array of on-screen controls.	-
2	 <b>Mitsubishi Diamond Pro 87TXM</b> 800/843-2515 www.mitsubishi-display.com	Oct 98	\$539	88	very good/ very good	<b>FEATURES:</b> 15.7-inch viewable area, .25mm stripe pitch Diamond-tron tube, up to 107-Hz refresh rate, Plug and Play ready, TCO'95 compliant, three-year warranty, 12-hour weekday toll-free support. <b>SUMMARY:</b> Longtime Best Buy maintains ranking with finely focused picture and elegant control panel; a bit pricey.	678
3	<b>Samsung SyncMaster 700p plus</b> 800/933-4110 www.sosimple.com	Oct 98	\$449	88	very good/ very good	<b>FEATURES:</b> 15.6-inch viewable area, .26mm dot pitch tube, up to 120-Hz refresh rate, Plug and Play ready, TCO'95 compliant, three-year warranty, 24-hour toll-free support. <b>SUMMARY:</b> Bright colors and very high refresh rate distinguish this handsome, well-priced model; on-screen controls have cryptic icons.	679
4	<b>AcerView 79g</b> 800/369-6736 www.acerperipherals.com	Oct 98	\$429	86	very good/ excellent	<b>FEATURES:</b> 15.5-inch viewable area, .25mm stripe pitch Diamond-tron tube, up to 110-Hz refresh rate, Plug and Play ready, TCO'95 compliant, three-year warranty, 24-hour toll-free support. <b>SUMMARY:</b> Sharp, clean graphics compensate for smallest viewable area here and crude on-screen controls; refresh drops from 118 Hz to 110 Hz.	680
5	<b>Iiyama VisionMaster Pro 400</b> 800/394-4335 www.iiyama.com	Oct 98	\$498	86	very good/ very good	<b>FEATURES:</b> 15.7-inch viewable area, .25mm stripe pitch Diamond-tron tube, up to 115-Hz refresh rate, Plug and Play ready, TCO'95 compliant, three-year warranty, 12-hour daily toll-free support. <b>SUMMARY:</b> Fine picture and color-correction utilities outweigh generic design and hard-to-master on-screen controls.	681
6	<b>ViewSonic PT775</b> 800/888-8583 www.viewsonic.com	Oct 98	\$649	86	very good/ excellent	<b>FEATURES:</b> 15.9-inch viewable area, .25mm stripe pitch Diamond-tron tube, up to 117-Hz refresh rate, Plug and Play ready, TCO'95 compliant, three-year warranty, 12-hour daily toll-free support. <b>SUMMARY:</b> Stunning graphics and crisp text plus high refresh rate overcome a very high price and short support hours.	682
7	<b>Dell UltraScan 1000HS</b> 800/838-8542 www.dell.com	Oct 98	\$429	83	very good/ excellent	<b>FEATURES:</b> 15.7-inch viewable area, .25mm stripe pitch Trinitron tube, up to 105-Hz refresh rate, Plug and Play ready, TCO'95 compliant, one-year warranty, 24-hour toll-free support. <b>SUMMARY:</b> A good price and vibrant colors highlight this unit. The warranty extends to three years if monitor is purchased with a Dell system.	683
8	<b>Mitsubishi DiamondScan 70M</b> 800/843-2515 www.mitsubishi-display.com	Oct 98	\$419	83	good/ good	<b>FEATURES:</b> 15.9-inch viewable area, .28mm dot pitch microfilter tube, up to 85-Hz refresh rate, Plug and Play ready, TCO'95 compliant, three-year warranty, 12-hour daily toll-free support. <b>SUMMARY:</b> Economical monitor has compact design and integrated speakers, but image quality lags and on-screen controls aren't intuitive.	684
9	<b>Philips 107MB</b> 800/835-3506 www.philipsmonitors.com	Dec 98	\$419	82	good/ good	<b>FEATURES:</b> 15.9-inch viewable area, .26mm dot pitch tube, up to 108-Hz refresh rate, Plug and Play ready, TCO'95 compliant, three-year warranty, 15-hour daily toll-free support. <b>SUMMARY:</b> Low price and integrated speakers earn it a spot, but inaccessible power switch and unremarkable text quality keep it down.	685
10	<b>Nokia 447Xs</b> www.nokia.com/americas 800/296-6542	NEW	\$489	82	good/ very good	<b>FEATURES:</b> 15.6-inch viewable area, .25mm stripe pitch Trinitron tube, up to 114 Hz refresh rate, Plug and Play ready, three-year warranty, 12-hour weekday toll-free support. <b>SUMMARY:</b> Ergonomic design complements fine graphics quality and easy-to-use on-screen controls. One complaint: No weekend support.	686



Best Buy

For reviews of products that didn't make the chart, visit [www.pcworld.com/t10monitors](http://www.pcworld.com/t10monitors).

All products: 906



**HOW WE TEST** Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on price (20 percent), features and ease of use (25 percent), text and graphics quality (25 percent each), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

<sup>1</sup>Highest refresh rate at 1024 by 768 resolution. <sup>2</sup>Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play.



TWO MONITORS SLIDE onto the chart this month. At number ten, Nokia's 447Xs has great on-screen controls, with buttons conveniently set on the monitor's side instead of its bottom. Phil-

ips' 107MB earns ninth place due to a modest price cut and built-in speakers. IBM's P72 and Mitsubishi's Diamond Pro 87TXM repeat as Best Buys. New monitors from Amptorn, IBM, LG, Mitsubishi, Proton, and ViewSonic failed to make the chart.



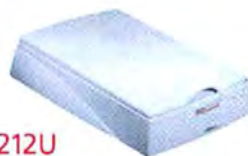
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## TOP 10 GRAPHICS BOARDS

	PCI BOARD	Month tested	Street price (11/5/98)	Overall rating	Mixed-media business rating	3D rating	Features rating	Comments	PC World InfoNet number
1	 <b>Diamond Monster Fusion PCI</b> 800/468-5846 www.diamondmm.com	NEW	\$150	85	good	excellent	average	<b>FEATURES:</b> 16MB of SDRAM, 250-MHz RAMDAC, 3Dfx Voodoo Banshee chip, bundled 3D games. <b>SUMMARY:</b> Splendid all-around performance, especially in 3D; a top pick for gaming and standard graphics jobs. AGP \$160 sibling is a nice upgrade, too.	668
2	<b>Guillemot Maxi Gamer Phoenix</b> 877/484-5536 www.guillemot.com	NEW	\$110	83	good	excellent	average	<b>FEATURES:</b> 16MB of SGRAM, 250-MHz RAMDAC, 3Dfx Voodoo Banshee chip, bundled 3D games. <b>SUMMARY:</b> This new board's a terrific value for users who dabble in basic graphics applications and play 3D games after hours.	669
3	<b>Diamond Viper V550</b> 800/468-5846 www.diamondmm.com	Dec 98	\$200	83	good	excellent	good	<b>FEATURES:</b> 16MB of SDRAM; 250-MHz RAMDAC; NVIDIA RIVA TNT chip; bundled 3D games, graphics plug-ins, and tools for VRML authoring and photo editing. <b>SUMMARY:</b> Great overall performance and software bundle partially compensate for high price.	670
4	<b>STB Velocity 128</b> 800/234-4334 www.stb.com	Aug 98	\$79	83	average	average	good	<b>FEATURES:</b> 4MB of SGRAM, 230-MHz RAMDAC, NVIDIA RIVA 128 chip, bundled 3D games and 3D modeling program. <b>SUMMARY:</b> The lowest-priced option here, thanks to a \$20 price drop. The \$99 Velocity 128zx AGP version is also a good buy.	671
5	<b>Real 3D StarFighter PCI</b> 800/393-7730 www.real3d.com	Aug 98	\$130	82	average	excellent	average	<b>FEATURES:</b> 24MB of SGRAM (includes 16MB of dedicated texture RAM), 220-MHz RAMDAC, Intel i740 chip, bundled 3D modeling app and games. <b>SUMMARY:</b> Terrific 3D performance and a \$19 price cut outweigh sparse features. AGP version costs \$79.	672
AGP BOARD									
1	 <b>Matrox Millennium G200</b> 800/361-1408 www.matrox.com/mga	Oct 98	\$129	93	excellent	excellent	excellent	<b>FEATURES:</b> 8MB of SGRAM, 250-MHz RAMDAC, MGA-G200 chip, bundled 3D modeling and image editing tools. <b>SUMMARY:</b> Fast board costs \$20 less. To view games on a TV, consider the \$129 Mystique G200 or the feature-rich \$299 Marvel G200-TV.	673
2	<b>STB Velocity 4400</b> 800/234-4334 www.stb.com	Dec 98	\$199	92	good	excellent	excellent	<b>FEATURES:</b> 16MB of SDRAM; 250-MHz RAMDAC; NVIDIA RIVA TNT chip; bundled 3D games, video editing tool, and graphics plug-ins. <b>SUMMARY:</b> Top 3D speed suits it for gaming and graphics tasks. GlyderMax-2, \$99, uses 3Dlabs' Permedia 2 chip.	674
3	<b>Hercules Terminator Beast</b> 800/532-0600 www.hercules.com	Dec 98	\$110	89	good	excellent	average	<b>FEATURES:</b> 8MB of SDRAM, 250-MHz RAMDAC, S3 Savage3D chip, no bundled software. <b>SUMMARY:</b> Excellent 3D performance makes the card a nice upgrade for gaming fanatics, and it costs \$10 less this month. However, it's short on features and support.	675
4	<b>Canopus Spectra 2500</b> 888/868-2533 www.canopuscorp.com	NEW	\$200	88	excellent	excellent	good	<b>FEATURES:</b> 16MB of SDRAM, 250-MHz RAMDAC, NVIDIA RIVA TNT chip, no bundled software. <b>SUMMARY:</b> A fine choice for most graphics chores, especially 3D. But its high price and limited phone support (8 hours on weekdays) hold it back.	676
5	<b>Number Nine Revolution IV</b> 800/438-6463 www.nine.com	NEW	\$122	85	excellent	good	excellent	<b>FEATURES:</b> 16MB of SDRAM, 250-MHz RAMDAC, Number Nine Ticket to Ride IV chip, bundled 3D game. <b>SUMMARY:</b> An affordable option for the office and for occasional 3D gaming, but a tad slower in 3D than other AGP boards here.	677
 <b>Best Buy</b>  For reviews of products that didn't make the chart, visit <a href="http://www.pcworld.com/t10graphics">www.pcworld.com/t10graphics</a> . All products: 905									

**TEST HOW WE TEST** We test boards under Windows 95. Business tests include PC WorldBench 98, a PowerPoint test, and a Macromedia Director script. Our 3D score is based on four games, each evaluated on frame rate and image quality. For AGP cards we add a texturing test using Caligari's TrueSpace3. PCI boards were tested in a Micron Millennia Mme with a Pentium MMX-233 and 32MB of RAM. AGP boards were tested in an NEC Direction 333 with a PII-333 and 64MB of RAM. Overall rating is based on performance (PCI 50 percent, AGP 55 percent), features (25 percent), price (PCI 15 percent, AGP 10 percent), and support policies (10 percent). For all scores, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.



**DITCH YOUR 3D GLASSES.** Diamond's Monster Fusion PCI, which earns a Best Buy for excellent 3D performance, and Guillemot's Maxi Gamer Phoenix, in second place, do a wonderful job at 3D

tasks. In the AGP zone, Matrox's fast, reasonably priced Millennium G200 stays on top. AGP newcomers include Canopus's pricey Spectra 2500 and Number Nine's Revolution IV. Both perform well in graphics-intensive applications and 3D games. ■





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*"Disk fragmentation can cause performance problems. You should consider running a defragmentation program on a regular basis."*

— Microsoft Windows NT Server Resource Guide\*



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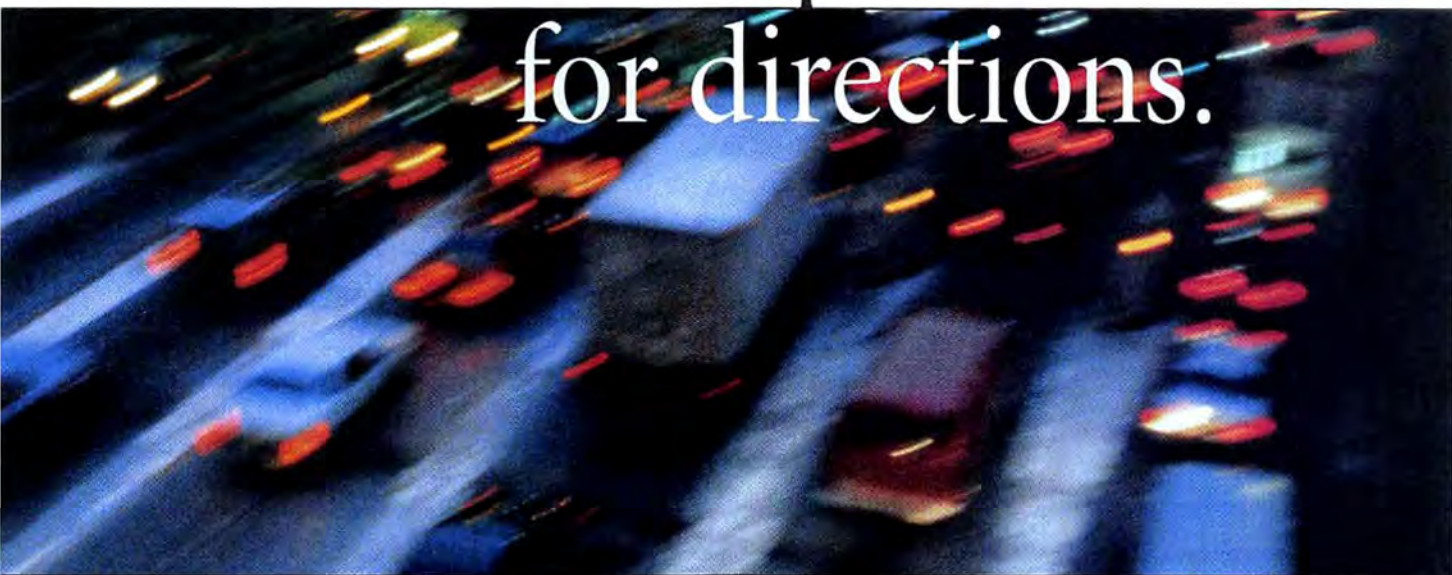
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# HERE'S HOW



## WINDOWS TIPS

SCOTT DUNN

# Take System Cleanup Into Your Own Hands



THE DISK CLEANUP UTILITY that comes with Windows

98 is intended as a quick and safe way to free up disk space.

Unfortunately, it has its own idea of how much free space you should have (which varies with the size of your drive). It also keeps prompting you to clean up disks you may not have used in weeks. And then there's that occasional nag screen that pops up to suggest you purge

an already empty Recycle Bin or other empty folder (see **FIGURE 1**).

If these quirks bother you, here are some simple steps you can take to control your disk-cleaning chores, while retaining Disk Cleanup's one-stop deletion of routine rubbish. First, get rid of those intrusive prompts: Choose *Start•Programs•*

*Accessories•System Tools•Disk Cleanup*, select a disk drive, and click OK. Click the *Settings* tab and then uncheck *If this drive runs low on disk space, automatically run Disk Cleanup*. Click OK and then *Yes* to confirm any deletions indicated on the Disk Cleanup tab. Don't worry—if you run out of disk space, you'll still get a prompt

and the opportunity to run Disk Cleanup.

Next, create a shortcut that runs Disk Cleanup for the drive of your choice. This eliminates the troublesome step of designating a drive each time you start Disk Cleanup. It also gives you a quick way to delete from the Recycle Bin only the files on a particular drive, without manually selecting those files.

Here's what to do: Right-click the *Start* button, choose *Open*, double-click the *Programs* folder, and navigate to the folder whose corresponding menu you'll use for this shortcut. (You can also create a shortcut on the desktop and then drag it to the menu of your choice.) Next, right-click an empty area of the folder and choose *New•Shortcut*. In the Command Line field of the Create Shortcut Wizard, type `c:\windows\cleanmgr.exe /dx`, where *x* is the letter of the disk drive you want this shortcut to clean. Click *Next* and type a name for your shortcut; then click *Finish*. Repeat these steps for as many drives as needed. To test your new shortcut, choose it from the appropriate menu on the Start menu (see **FIGURE 2**). From now on, you'll determine when your system gets cleaned up and which disk gets the treatment.

Finally, if you don't want to do your cleanup chores manually, open the Scheduled Tasks utility (double-click *My Computer*, and double-click *Scheduled Tasks*). Then, either double-click the *Add Scheduled Task* icon, to have the wizard help you set up automated use of Disk Cleanup, or (if it's already scheduled) double-click the *Maintenance-Disk cleanup* icon if you want to adjust its schedule or settings.

## MODE ABOUT YOU



YOUR SOFTWARE MAY be slowing down your hardware without your knowledge. A slowdown can occur in Windows 95 and 98 when the operating system has to use real mode (an





FIGURE 1: DISK CLEANUP sometimes asks you to empty an already empty Recycle Bin.

older memory scheme associated with DOS) to run 16-bit drivers or other system software instead of using protected mode (a 32-bit memory scheme that can isolate programs in memory to prevent conflicts).

To find out if your system is dropping into real mode, right-click *My Computer* and choose *Properties*. Then click the *Performance* tab. If you see the line 'Your system is configured for optimal performance', then you're running everything in protected mode. If your system has one or more devices running in real mode, they'll be listed—in a box on the same screen—as using MS-DOS compatibility mode (see FIGURE 3). If you don't see any mention of MS-DOS compatibility, you can rest easy. Otherwise, pay attention. The nitty-gritty of MS-DOS compatibility can be complex, but here are a few tips to get you started on troubleshooting and performance-tuning in this situation.



FIGURE 2: CUSTOMIZE DRIVE cleanups by adding a command line for each shortcut.

**Diagnose it, part 1:** The Performance tab is your first line of defense in discovering the cause. Often a Details button is present, but clicking it usually provides minimal or vague information. More helpful is the actual list of items using compatibility mode. If you see the problem driver file name listed, you're halfway home—unless you don't know where the driver came from. Sometimes you can guess which device it's associated with by opening the driver in a file viewer or word processor and looking for a manufacturer's name amid the gobbledygook (don't save the file when you're done looking).

**Diagnose it, part 2:** On the other hand, if a device is listed but its driver isn't, click the *Device Manager* tab and look for the device (or for any adapter it may be connected to) in the list. If you find it listed with a yellow exclamation point, double-click it to see its properties, which should provide information on the problem. If the problem is a resource conflict, find IRQ or DMA settings that don't conflict with other devices, and consult the device documentation for help. For help with other problems, keep reading.

**Troubleshoot it:** MS-DOS compatibility mode (and yellow exclamation points in Device Manager) can crop up if someone deliberately turns off protected mode support for your disk drives (for example—paradoxically enough—while you're troubleshooting). With System Properties' Performance tab still visible, click *File System* and then click the *Troubleshooting* tab. If 'Disable all 32-bit protected-mode disk drivers' is checked, you may have solved the mystery. But before unchecking this option, ask around to see who in your office or home checked it (it's off by default); the setting may have been necessary to get your system working.

**Update it:** If the problem stems from a driver, make sure you have its latest version, which is normally available on the manufacturer's Web site.

**Unplug it:** In many cases, the software causing Windows to use real mode is launched from your *autoexec.bat* or *config.sys* files. If the list in the System Properties' Performance tab doesn't give you enough information, you can make back-

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ups of *autoexec.bat* and *config.sys* and then analyze them in a text editor like Notepad. As long as the device in



FIGURE 3: CHECK System Properties for the less-than-optimal DOS compatibility mode.



question isn't the disk drive you boot from or some other vital instrument, you can safely type **rem** (followed by a space) in front of the line you think is launching the problem software. Then save the file and restart your computer. (Always keep a bootable floppy nearby in case you have problems starting your system.)

Return to the System Properties dialog box to see whether Windows is still in MS-DOS compatibility mode. If the performance tab says your computer is configured for optimal performance, you've found the culprit. If everything else on your system is functioning well, it probably means that Windows Setup failed to disable the "legacy" line in config.sys or autoexec.bat—just disable that line yourself. In theory, Setup should remove from these two files the lines that call drivers for which there are new, protected-mode ones. However, if a device (such as a CD-ROM drive or SCSI device) ceases to be visible or to function, go to the next tip.

**Add it:** If the device listed on the Performance tab is missing from the Device Manager tab (or if a drive is missing in Explorer as a result of the previous tip), and wasn't detected by Windows when you rebooted, choose *Start>Settings>Control Panel* and double-click the *Add New Hardware Wizard* to reinstall the device with the proper drivers.

**Sterilize it:** If the System Properties' Performance tab cites 'mbrint13.sys' as the problem driver and you're not using disk-management software (see the "Update it" tip on previous page), you may have a boot-sector virus. Get an antivirus program capable of detecting and killing such

beasties. Our recommendation: Symantec's Norton AntiVirus, downloadable from FileWorld.

**Live with it:** A few devices actually work better in real mode. For instance, some disk drivers support encryption only in this mode. If you need such functionality, find the corresponding devices listed in the System Properties' Performance tab.

## RECYCLE BIN EXPOSED



WHEN YOU LOOK at the different partitions on your hard drive (C:, D:, E:, and so on), Explorer shows a Recycle Bin on each. But if you use Explorer to peek inside, you see the same files from all drives listed in each Recycle Bin (see

FIGURE 4). What's going on? Is Windows wasting space by copying every file you delete to every hard drive on your system? Or is this just recycling voodoo, where is the real Recycle Bin?

The Recycle Bin is a real (albeit hidden) folder, residing on each hard disk or partition. However, each Recycled folder (as it is named) stores only files deleted from the current disk or partition. You can see for yourself: Open a DOS window, and type **cd\recycled**. Then type **dir** and press **<Enter>** to see the files that are there. You'll notice that only the files for that disk appear in the directory listing. The names differ, but if you compare this list to what appears in the Recycle Bin, you'll observe that the

number and size of the files in any given Recycled folder correspond to the files listed for that disk.

What's happening here? When you move a file to the Recycle Bin, Windows moves the file to that drive's Recycled folder and then renames it using a scheme that reflects its original disk and deletion sequence. (Only the extension remains unchanged.) A

## WINDOWS TOOLBOX

### TrayDay Keeps You Up to Date

**QUICK-WHAT'S TODAY'S DATE?** If you can't remember, you can always hold your mouse over the clock in the Windows system tray on the right side of the taskbar until the date appears. But if you want to check the date



at a glance, download TrayDay from MJM-Soft Design (at [www.mjmsoft.com](http://www.mjmsoft.com)) or from PC World Online. The registration fee is \$15. TrayDay displays the date as a tray icon, so

you don't have to grab the mouse and wait. It also lets you insert the date into a document by choosing one of several date formats from its customizable menu.

hidden file, Info (found in each Recycled folder), stores the original name and path for each file. When you restore a file, Windows consults the Info file so it can return the deleted file to its original location. So if you ever root around at a DOS prompt, take care not to delete this file.

### A GHOST IN THE FLOPPY DRIVE



I PERFORMED SOME maintenance on my Windows system a while ago. Now my computer aggressively tries to access the A: drive. What should I do?

*Peter White, Edmonds, Washington*  
**RELAX.** Chances are you installed some antivirus software, which checks the floppy drives on start-up or shutdown to make sure you don't boot up with a potentially virus-infected floppy disk the next time you start your system. Although you can shut this feature off, leaving it on is good insurance.



Find more Windows tips on PC World Online at [www.pcworld.com/heres\\_how](http://www.pcworld.com/heres_how), and find files mentioned in this article at [www.fileworld.com/magazine](http://www.fileworld.com/magazine). Windows Tips welcomes tips and questions and pays \$50 for published items. PC World Contributing Editor Scott Dunn is a principal author of *The PC Bible*, 2nd Edition (Peachpit Press, 1995). See page 14 for contact information.

The Here's How section continues with Windows NT tips on page 243. ►

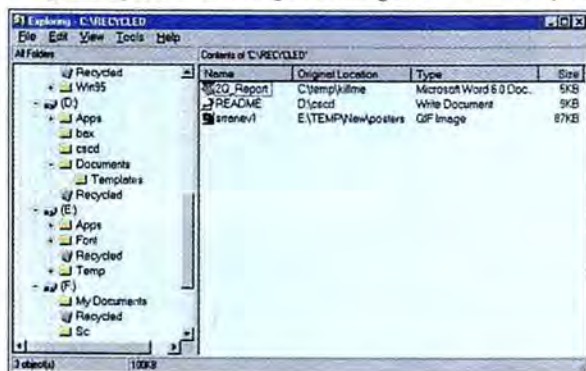


FIGURE 4: WILL THE REAL trash can please stand up? Each file you delete seems to show up in every drive's Recycle Bin.



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# WINDOWS NT WORLD

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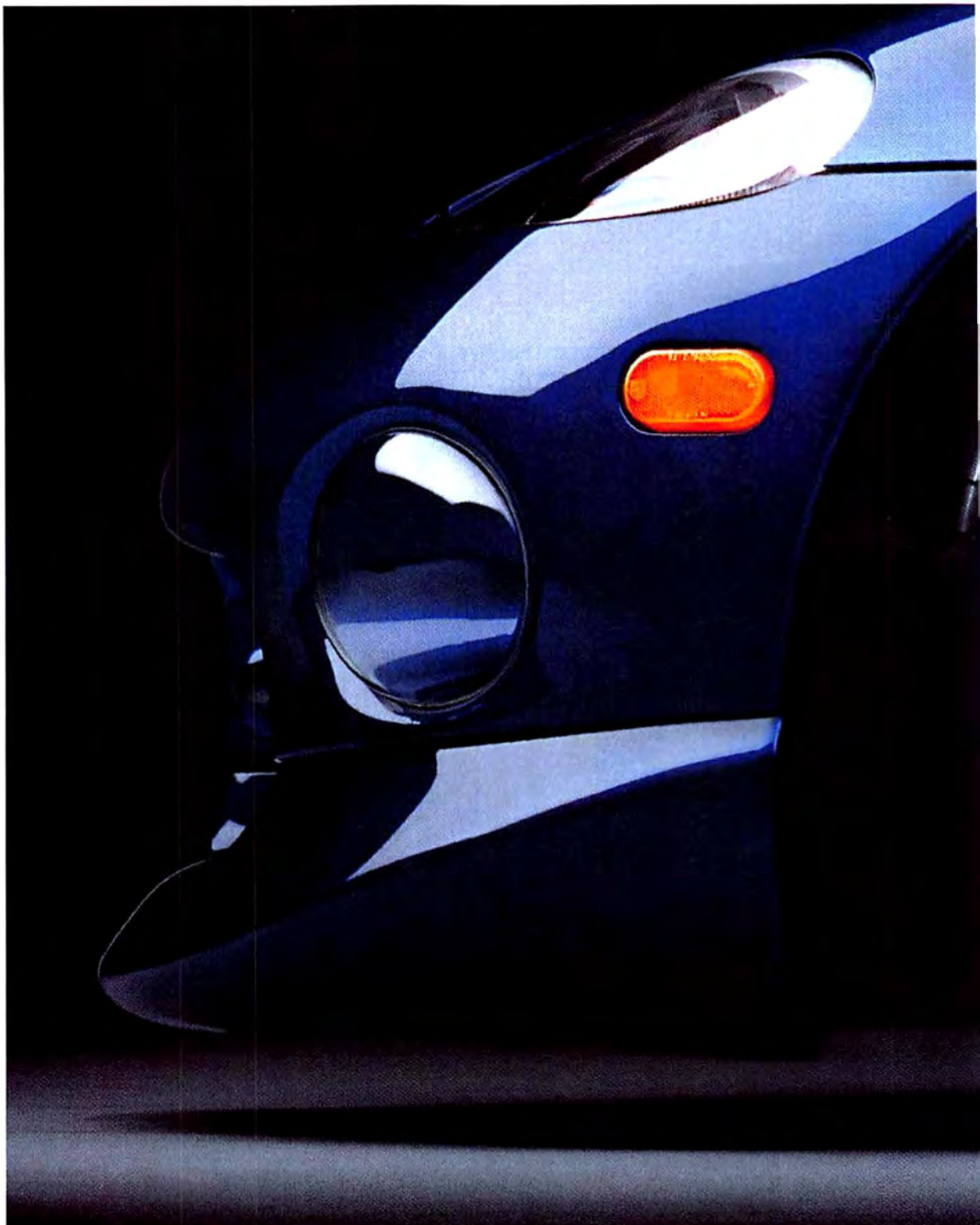
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## From the Editors

### Welcome to Windows NT World

**B**ECAUSE WE RECOGNIZE THAT Windows NT is becoming a growing force in organizations large and small, the editors at IDG are banding together to bring you a concise, complete source of NT-related information. This special report, which will reach over 2.2 million readers, is the result of an unprecedented collaborative effort among eight of IDG's foremost publications: CIO, Computerworld, civic.com, Federal Computer Week, InfoWorld, Network World, PC World, and Solutions Integrator.

The content in Windows NT World stems from the experience of editors, writers, and analysts at each of these publications. Our goal is to separate reality from marketing and hype to help you figure out what this operating system means to you and your organization. We hope to aid you in sorting

through if, how, why, and where you should use NT, and to lay out issues such as upgrading, integration, management, training, and security.

These issues are bound to become more complex. With NT 5.0 due sometime in 1999, Microsoft's biggest challenge lies ahead. Having shifted emphasis from Windows 9x to NT Workstation as the business client operating system of choice, Microsoft needs to give users good reason for upgrading to NT Workstation 4.0 now, and upgrading again to NT 5.0 in 1999. As the article "NT 5.0 Workstation Is Worth the Wait" on p. 6 illustrates, such an upgrade strategy may not be worth it. On the server end, Microsoft must convince large enterprises that NT can handle their loads and NT 5.0 will have to clear a number of technical hurdles to compete with Unix, minicomputer, and mainframe operating systems. And as our cover story "NT Server and Your Network: A Match Made in Heaven or Integration Hell?" on p. 18 points out, NT must integrate well with other operating systems in order to make it in the enterprise world.



TERRY ALLEN

We hope you enjoy this Special Report.  
—The Editors



## Nasdaq Puts Windows NT to the Test

*But observers are skeptical about the operating system's prospects in the high-volume trading sector.* By Marc Ferranti

**M**ICROSOFT HOPES Nasdaq's decision to base the new version of its trading surveillance application on Windows NT will help make the operating system a credible choice for such high-end applications. But the historic lack of Microsoft products in mission-critical financial trading settings has industry insiders skeptical.

The new application, called MarketWatch, will analyze daily trading on the Nasdaq stock market and is slated to be up and running in 2000. Initially it will have only 25 users, but it must be capable of analyzing over 1,000 transactions per second (tps) — more than current NT applications can handle, according to Nasdaq and Microsoft officials.

MarketWatch "is a kind of 'proof of concept' for NT."

— Gregor Bailer, Nasdaq

While Nasdaq's trading system itself won't be running on NT, the new version of MarketWatch "is a kind of 'proof of concept' for NT, that it will be able to keep up with our high-volume, mission-critical system," says Nasdaq Executive Vice President Gregor Bailer.

The NT-based MarketWatch will have to "shadow" the exchange, keeping pace as it



performs crucial market surveillance duties, according to Bailer. Nasdaq expects in the near future to trade up to 2 billion shares in one day, so MarketWatch will have to run 800 to 1,200 tps to keep up.

In order to handle such a hefty load, NT and other Microsoft products that MarketWatch will rely on need upgrading, according to Daniel Kusnetzky, analyst with International Data Corp., in Framingham, Massachusetts. This means Nasdaq will be dependent on these new versions being timely and stable.

"I say 'Show me,'" says Kus-

netzky. "I wish them well, but if this system isn't going to be finished for another year and a half or more... they're going to depend on Microsoft coming out with new versions of NT, SQL Server, and Transaction Server."

One financial institution that already uses NT hasn't considered basing its mission-critical applications on Microsoft's operating system.

"We have productivity applications running on NT, but not mission-critical applications, like our treasury system," says Joe Veghelyi, manager of system architecture at the Bank of Montreal, which uses a mix of Unix and NT systems.

The current MarketWatch application runs on Tandem servers and Sun Microsystems' workstations. The new NT system will run on Unisys Aquantitas, typically four-processor machines incorporating 400-MHz Intel processors, Bailer says. The pilot system that is currently being tested uses NT Server 4.0 and beta versions of NT 5.0's "security components," as well as Microsoft's SQL Server and Transaction Server. ☼

MARC FERRANTI IS NEW YORK BUREAU CHIEF OF THE IDG NEWS SERVICE.

### NT 4.0 FUSS

For an operating system that's soon to be labeled obsolete, Windows NT Workstation 4.0 has gotten a lot of marketing attention from Microsoft lately. In addition to sporadic full-page ads in the Wall Street Journal touting it as the upgrade path to NT 5.0, the company this summer reduced NT 4.0 upgrade costs by 20 percent. In August it introduced a licensing scheme designed to give small businesses upgrades to NT for the next two years for \$38. It also released tools to help users move from other versions of Windows to NT Workstation 4.0, and a kit that packages NT Workstation 4.0 with Service Pack 3, third-party software discounts and deployment tips. Turning its attention to NT 4.0 Server, the company recently touted results from Mindcraft labs that showed NT Server 4.0 outperformed Novell's Netware 5.0 by 25 percent. But by the time NT 5.0 is delivered in 1999, the fuss over 4.0 will likely be forgotten, as Microsoft's attention turns to pushing its "next generation" operating system.

### SURVEY SHOWS NT'S WEB PROGRESS

In an August InfoWorld Web server platform survey of 100 companies, 79 percent of the respondents said they were "moving towards Windows NT as a platform." 16 percent said they were exploring alternative commercial operating systems, and 11 percent said they were looking at "open source or 'freeware' technologies."



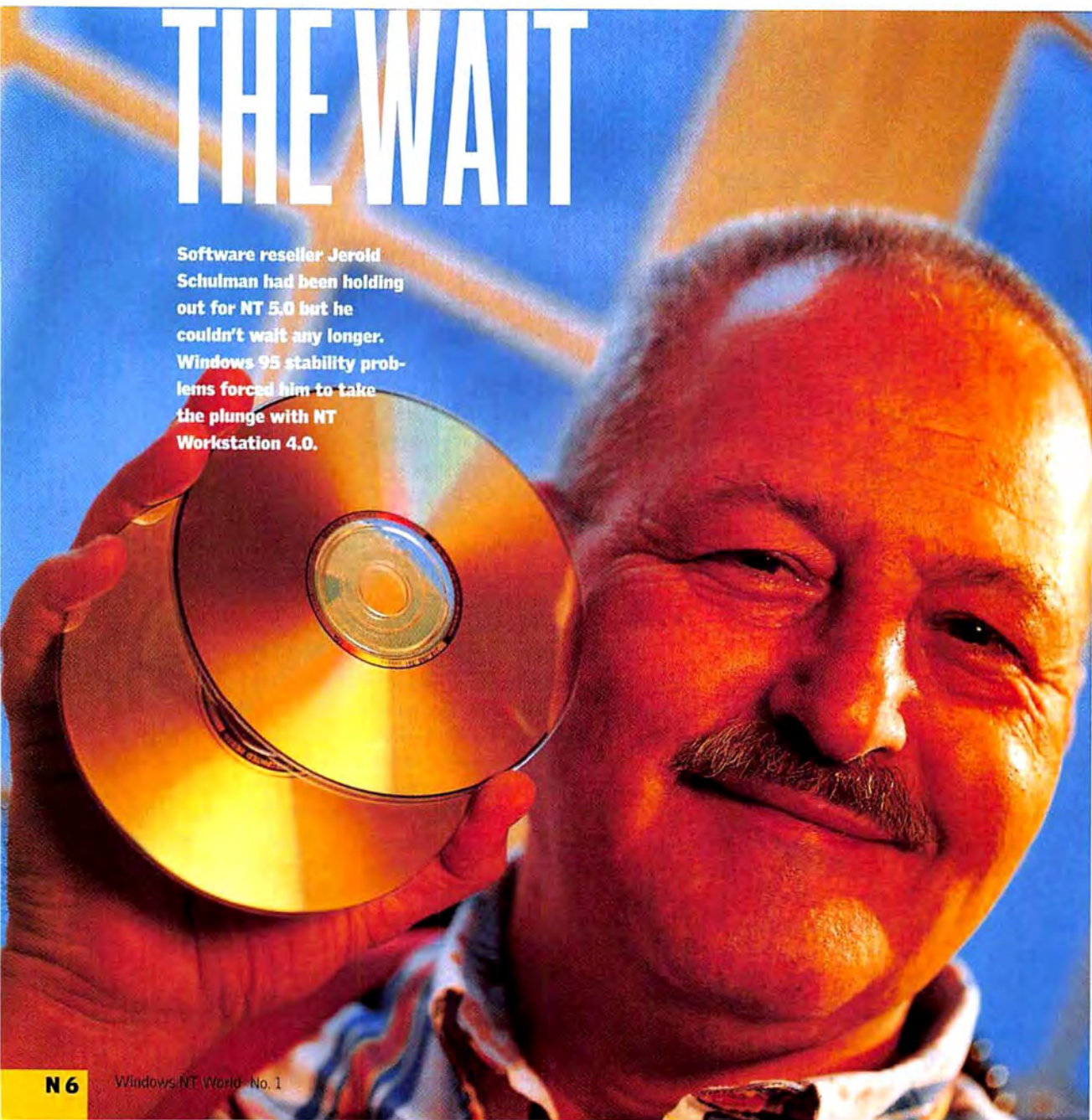
NT on WORKSTATIONS

# NT WORKSTATION 5.0 IS WORTH

NT 5.0 is touted as the operating system of the future. But should you install NT 4.0 first? **By Michael Desmond**

## THE WAIT

Software reseller Jerold Schulman had been holding out for NT 5.0 but he couldn't wait any longer. Windows 95 stability problems forced him to take the plunge with NT Workstation 4.0.





**S**OMEDAY, Jerold Schulman may reap the expected benefits of Windows NT 5.0. But by last March, he'd grown tired of waiting. That's when he broke down and upgraded his three office PCs to NT Workstation 4.0. His network server already was running NT, but the Alpharetta, Georgia-based software reseller kept two Windows 95 machines and one Windows 3.1 system to troubleshoot problems for customers using those operating systems. But enough, Schulman decided, was enough.

"Stability was a driving factor. I'd have to reboot at least once a day under Windows 95," says Schulman. "Assuming you've got the appropriate hardware, I'd think you have to be crazy to be running a loosey-goosey Windows 95/98 operating system."

Schulman was lucky. The Pentium systems on his small network were beefy enough to handle NT's hardware demands, and his 16-bit applications still worked despite NT's many software restrictions.

The vast majority of businesses, however, will face hardware upgrades and new software purchases on the road to NT. The expected arrival of NT 5.0 in 1999 raises a yet more daunting question: Does it make sense to upgrade to NT 4.0 now if you'll

be upgrading Windows 3.1 and Windows 95 to NT 4.0. "Probably the biggest reason for the move to NT was for conformity across all the workstations," says Braun. "So support cost was one reason to do that."

Moving to NT 4.0, however, will probably strain your IT department and your hardware budget, too. Microsoft optimistically says that any Pentium system with 16MB of RAM can run NT 4.0. But realistically you need at least a 100-MHz Pentium with 32MB of RAM. And your hardware must be compatible with NT. (See Microsoft's web site at [www.microsoft.com/windows/networkstation/info/hcl.htm](http://www.microsoft.com/windows/networkstation/info/hcl.htm).)

Even if you have the right stuff, some experts recommend buying new hardware.

"When you look at the cost of a new piece of hardware with NT fresh on it and you look at upgrading an existing system with

NT, it's hard to say that buying a new system is not the way to go," says Chris Le Tocq, a software analyst with research firm Dataquest in San Jose, California. "As easy as Microsoft has tried to make it, the risk associated with an in-place OS upgrade is pretty substantial."

Blame NT 4.0's registry, for starters. Its lack of compatibility with the Windows 95 and Windows 98 registries means that you must reinstall applications after the upgrade. Likewise, personalized settings such as application defaults and desktop shortcuts often must be rebuilt. What's more, NT 4.0 lacks Plug and Play and the hardware detection wizard found in Windows 95, making maintenance more complicated.

"The risk associated with an in-place OS upgrade is pretty substantial."  
—Chris Le Tocq, Dataquest

have to upgrade again in about 12 months? Many say that it doesn't. It's no surprise that only a handful of businesses have migrated to NT 4.0, and you should have a compelling reason if you wish to join them.

#### NT'S CRASH CONTROL

If your Windows 95 systems fall down once or twice a day, an interim stop at the more stable and secure NT 4.0 should provide some relief. Adopting NT 4.0 also might make sense if your business has a hodgepodge of Windows systems, spanning 3.1, 95, and 98. Jeff Braun, a practice leader of information technology engineering at Whittman-Hart in Chicago, says he helped an engineering firm with 45 desktops run-

#### TIPS FOR THE TRIP TO NT

**S**o you want to migrate to Windows NT? Whittman-Hart technology consultant Jeff Braun has three words of advice: plan, plan, plan.

**Take inventory:** Check your hardware against Microsoft's Hardware Compatibility List at [www.microsoft.com/windows/networkstation/info/hcl.htm](http://www.microsoft.com/windows/networkstation/info/hcl.htm). You might have to replace older devices before you install NT.

**Say goodbye to some software:** If you have 16-bit DOS and Windows 3.x applications, test them on a stand-alone NT 4.0 workstation. They may simply refuse to run under NT.

**Assemble drivers:** Before you start upgrading, acquire the latest NT-compatible drivers for all the various devices on your PC.

**Back it up:** Plan to back up and restore data on all your workstations.

**Launch a pilot:** Select a group of representative systems to test-drive NT for a couple of weeks prior to the big upgrade.

**Segment the network:** If installing over a network, upgrade a manageable number of systems on their own segment of the network to quarantine the upgrade traffic. This will help ease troubleshooting.

**Take your time:** Don't expect a 50-seat upgrade to happen overnight. It could take several days or longer.

**Train your staff:** Despite the Windows 95-like interface, NT has some unfamiliar features.



There are other gotchas. NT 4.0 doesn't work with the FAT-32 file system—a burden if you want to upgrade a Windows 95 or Windows 98 PC that uses FAT-32. And while almost all productivity software for Windows 95 will work under NT, many multimedia titles and games that depend on DirectX — multimedia APIs found in Windows 9x — will not run. The same goes for many DOS-based applications that want direct control over memory and hardware—something that NT's strict protection scheme does not allow.

Considering the limitations of NT 4.0, Braun offers a warning about installing that software: "I would say that you have to do your homework and make sure you are



**"Don't do it because you expect magical things to happen. Because usually it won't", Whitman-Hart technology consultant Jeff Braun on migrating to Windows NT 4.0.**

doing it for the right reasons," he says. "Don't do it because you expect it to make magical things happen. Because usually it won't."

## A BAD IDEA

Many consultants say that if your current operating systems and hardware are doing the job, moving to NT 4.0 is a bad idea, particularly with NT 5.0 coming down the pike. Large businesses will want to hold out for 5.0's management features, which

provide a centralized structure for keeping tabs on user addresses and identities and which ease everything from e-mail management to network security. Additionally, Microsoft's so-called IntelliMirror technology will allow users to access data and configuration profiles over the network, while the integrated Terminal Server Edition software lets IS managers deploy diskless workstations and other thin clients on the existing network.

NT 5.0 also adopts popular tricks from Windows 95, such as Plug and Play and hardware detection, for those upgrading without the assistance of an IS staff. It offers support for USB peripherals, DVD-ROM drives, and FAT-32. Add DirectX technology, and NT finally matches Windows 95's device and application support.

This heady combination of features promises to make NT 5.0 the best operating system for both the 1,000-seat corporate network and the single-PC home office. The big remaining question for users is, What's the best road to NT 5.0?

Microsoft still touts NT 4.0 as the way to go, noting that applications won't have to be converted or reinstalled as they must when moving from Windows 9x or 3.x. Some analysts just aren't buying it, however. They say the migration to NT 5.0 should not be any more difficult than a move to NT 4.0.

"My recommendation is that if you have your eyes set on NT 5.0, you should be thinking about deferral," Le Tocq says. "Because what you don't want to do is install NT 4.0 and then install NT 5.0 on top." ❄

MICHAEL DESMOND IS A CONTRIBUTING EDITOR TO PC WORLD.

## NT AND 98: TWO BOOTS ARE BETTER THAN ONE

NOT LONG AGO I GAVE my 300-MHz Pentium II PC a split personality. Tired of late-night operating system crashes, I installed Windows NT Workstation 4.0 to run my office applications in a reliable environment. Yet I kept Windows 98 on the PC so I could buzz bad guys in an F-18 Hornet when I needed a break from work.

Ironically, my schizophrenic PC has never been so stable.

Dual booting is not just for home office types like me with a penchant for game play. Software developers, help-desk representatives, and IT managers will find dual booting helpful for troubleshooting, user inquiries, telecommuting, and cross-operating-system testing.

You'll need 260MB of disk space to run NT and Windows 98. And if you have an older system or run DOS or Windows 3.x software, NT may not work with your current system. Otherwise, adding NT to your operating system mix can be a relatively simple, two-hour task, provided you plan for it. Here's how:

**Assess your system:** You should have at least a 100-MHz Pentium and 32MB of RAM, and even then NT might not work on your hardware. Consult the Microsoft Hardware Compatibility List at [www.microsoft.com/windows/networkstation/info/hcl.htm](http://www.microsoft.com/windows/networkstation/info/hcl.htm) to see if your components are supported.

**Get the drivers:** Round up device drivers for your components before you get started so you have them when NT trips over an unrecognized device. And it goes without saying that you should back up your hard disk.

**Always install NT last:** The NT Boot Loader utility won't recognize multiple operating systems unless NT is installed after Windows 9x.

**Set up your disk:** Partition your disk drive into at least two drive letters, one for Windows 9x and one for NT. This allows you to use different file systems for each operating system.


**Pick FAT-16:** Windows 98 recognizes FAT-16 and FAT-32, but NT sees FAT-16 and NTFS (the NT file system). If you want NT to share disk partitions and application code with your other operating system, you'll have to adopt the lowest common denominator: FAT-16. Although you'll lose some disk space, the compromise ensures that all your operating systems can see all your files.

— Michael Desmond



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# U.S. NAVY BRINGS COMMAND & CONTROL TO NT

Armed with extra security measures, the USS Blue Ridge takes NT on board. **By Bob Brewin**

**I**N THE EVENT OF A CRISIS, the commander of the U.S. Seventh Fleet doesn't need to leave the stateroom of his ship sailing off the coast of South Korea to determine the location of U.S., allied, or foreign forces in his area of operations. Instead, on board the USS Blue Ridge, Vice Adm. Walter Doran sits down at his workstation hooked into the ship's Secret Local Area Network, pops open the C2PC (Command and Control PC) application, and views a smart map. This gives him near real-time tracking data of friendly and potentially enemy ships, aircraft, and troops in the immediate area of the Korean peninsula.

Doran's NT workstation is one of the 350 clients installed on the Blue Ridge this year as part of a Navy-wide plan to outfit all its major ships and bases worldwide with NT clients, networked to a mix of NT and Unix servers. The Navy plans to use this global NT network to run its mission-critical command and control system, installing the new architecture on far-flung vessels such as the Blue Ridge and the USS Kitty Hawk carrier battle group and the USS Belleau Wood amphibious ready group, all of which have their home port in Japan.



The Navy is taking part in a departmentwide migration of its applications from Unix to NT. The Defense Department two years ago approved NT as part of its Defense Information Infrastructure Common Operating Environment (COE), which defines the standard software platform for command and control applications. COE originally was a Unix-only platform.

"With this network, we are now compliant with command and control systems being used throughout the Department of Defense," says Doran. "It gives us a tremendous boost in our ability to work with other services."

Cost, training, and ease of use lie behind the Navy's de-



cision to migrate its worldwide network architecture to NT, according to Rear Adm. John Gauss, commander of the San Diego-based Space and Naval Warfare Systems Command (SPAWAR), which developed Global Command and Control System-Maritime (GCCS-M), the Navy version of the Defense Department's new command and control system, and which manages its Navy-wide deployment.

The Navy can buy a 200MHz PC for far less than a Unix workstation, says Gauss. Capt. Roger Hull, the SPAWAR command and control system program manager before he retired earlier this year, estimated that by moving to NT, the Navy could cut its costs to be from one-tenth to one-quarter that of Unix workstations, with overall savings to the Navy in the \$20 million range.

Training sailors to use and maintain PC-based systems is "much easier" than doing so in Unix, according to Gauss, since even casual users now have familiarity with the Win-

dows NT-based environment. Andrew Cox, a SPAWAR systems engineer, says, "we are probably seeing a better return on our investment for user training on NT [than Unix] ... When you go over to NT, users are just more familiar with it, reducing the time we spend training them."

The Blue Ridge had a similar experience with its staff users after the NT network went on line. "On the user side, it is a lot easier for someone to sit down and start using different applications [because of the Windows interface]," says Cmdr. Pat Cole, the Seventh Fleet's information systems officer, "reducing the amount of training and dedicated support we have to provide to the staff." But, Cole added, the ship has had to deal with a "not-too-steep learning curve" for its systems administrators. "We're still in the early stages of training our techies ... and that's a little more problematic."

While some commercial and even government users have taken a cautious approach to rolling out NT because of security and stability concerns, the Navy has no such fears. Before deploying GCCS-M on NT to operational users such as the Seventh Fleet, Gauss says, the Navy put the system through an exercise of "epic proportions" to test its stability and reliability. Bryan Scurry, the SPAWAR test director, says that during the test the NT-based GCCS-M ran "for more than 1,000 hours, and it passed with an operational availability of over 95 percent. In a couple of instances, that availability hit 98 percent."

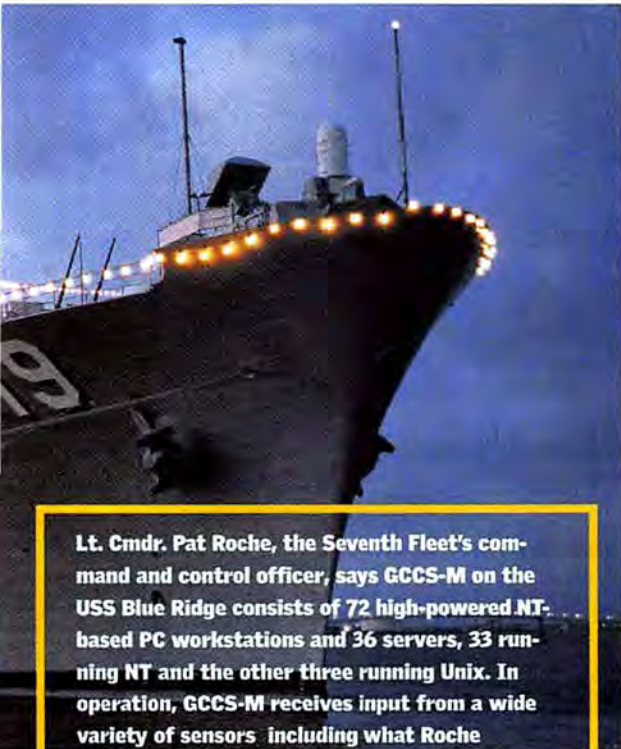
While professing faith in the security of NT, SPAWAR found out that it takes a lot of work to properly configure the operating system for the truly secure environment required to protect real-world national security information.

"NT right out of the box is inherently insecure, so we made sure all the 'hot fixes' are loaded. We've taken a defense-in-depth concept to make sure it is locked down," SPAWAR's Cox says. This approach includes immediately disabling the notoriously weak Posix software that comes with NT, controlling access to routers, and putting in firewalls, he says.

Anyone migrating to NT, Cox says, needs to "recognize that NT is not a secure system up front and then engineer a secure environment. We have a seven meg[abyte] document that describes all the things" needed to ensure that NT systems throughout the Navy have the fixes and patches needed to operate in one of the most mission-critical environments in the world.

Two months into the NT shakedown cruise, the Seventh Fleet's Cole says the problems that the Navy has encountered are "what happens when you install any new, complex system. I do know that our users are better off than they were under the old system ... and already my systems administrators are impressed on how much easier it is to administer [NT] than our previous system." ❄

BOB BREWIN IS AN EDITOR-AT-LARGE FOR FEDERAL COMPUTER WEEK.



NAVY CORNELIUS STAN

**Lt. Cmdr. Pat Roche, the Seventh Fleet's command and control officer, says GCCS-M on the USS Blue Ridge consists of 72 high-powered NT-based PC workstations and 36 servers, 33 running NT and the other three running Unix. In operation, GCCS-M receives input from a wide variety of sensors including what Roche described as "national assets," meaning spy satellites and electronic eavesdropping aircraft. It also receives tactical tracking data generated by friendly aircraft and ships that automatically report their positions by a secure radio data link. Roche says that the Blue Ridge has experienced some hiccups with its GCCS-M clients, but the lower cost of the units permits the staff to keep more workstations on board and makes swapping out machines easier — a luxury the Fleet staff did not have in the days it ran on a smaller number of Unix clients.**



By Brooks Talley

# GROWING

YOUR  
WEB SITE  
ON AN NT  
PLATFORM

USING MICROSOFT's Internet Information Server (IIS) and several of its accompanying products and technologies, businesses can operate everything from the smallest Web site running on Windows NT Workstation up to mission-critical Internet commerce sites on huge farms of NT Servers. However, IIS' ability to serve such a wide range of roles can be both a blessing and a curse.

In general, Web sites can be broken down into roughly three levels of complexity: a static site, a site with dynamic content, and a site with complex business applications. While IIS is suitable for these types of sites, the more complex a site becomes, the more IIS buckles under the strain.

## BASIC SITES

For organizations that are just starting to put a Web site together or that plan to place relatively meager demands on their site, IIS is a good place to start. The software's appeal for basic, low-volume Web sites revolves around two key points: a low price and the ease of use and administration for novice Web developers and server administrators alike.



PHILIP ANDERSON

An IIS server can be as simple as a low-end NT workstation, and IIS itself doesn't cost anything extra because it comes with the operating system.

Another key attraction for novice users is IIS' built-in support for FrontPage Extensions — a technology that more closely integrates Web servers with content design programs. FrontPage Extensions work in conjunction with Microsoft's FrontPage Web editor to greatly simplify site design. It is eminently possible for someone with no experience

running a Web server or designing Web pages to use IIS with FrontPage to put up a respectable Web page in no time at all.

FrontPage quickly loses its luster, however, as users become more experienced. In order to get things just right, you will need finer control over page layout than FrontPage allows. FrontPage also is well known for scrambling page formatting (especially scripts), so designers who want to be able to work directly with HTML will quickly tire of having the spacing of their scripts ad-

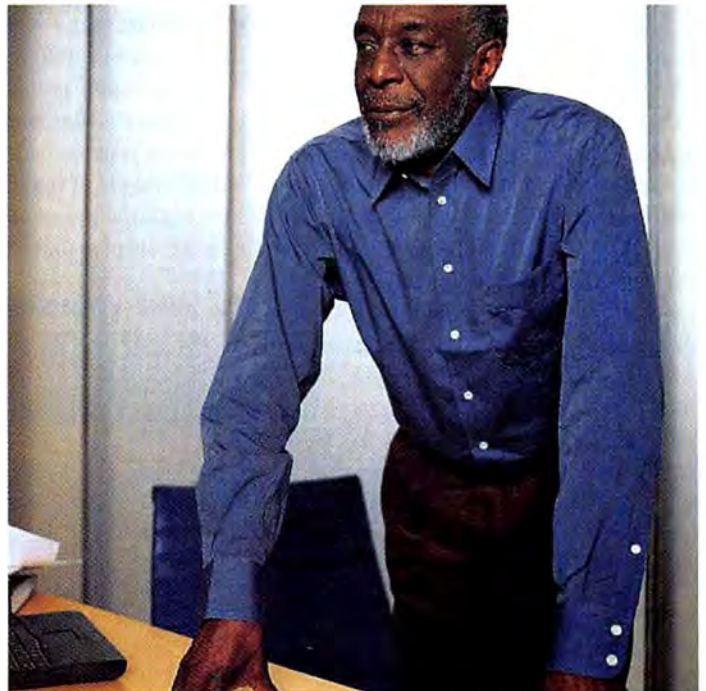


**Instinct may lead you to the right server OS. Or, you can always fall back on data, reason, and logic.**

Microsoft® Windows NT® Server 4.0 was released two years ago. Today, 61% of networked companies in the U.S. are using it. And, Windows NT Server 4.0 currently outsells all other server operating systems. Why?

First, it covers the basics. Many companies choose Windows NT Server for great file and print. In fact, LAN administrators pick it 3 to 1 over NetWare for their basic LAN OS. But many companies also rely on Windows NT Server for much more than file and print. That's why it's called a multipurpose server OS, and why research shows that more companies choose it for their intranet platforms and commercial Internet platforms.

As you make your server OS decision, know that companies are choosing Windows NT Server because it handles basic networking and the ever-changing needs of today's business environment.





justed for them.

In addition, FrontPage Extensions are notoriously insecure, and a novice administrator may be lulled into a false sense of security after just tossing up an IIS server with the extensions on it. Also, novice administrator probably won't be aware of the need to install the various "hot fixes" for NT's security problems.

## DYNAMIC WEB CONTENT

After setting up a basic, static Web site, the next natural step is to add some interactivity and dynamic content to the mix. It's time to work with either Visual Interdev, Microsoft's higher-end site development tool, or something like Allaire's Homesite.

## IIS runs 22.5% of Web sites compared to Apache's 51.8%.

Source: Netcraft [www.netcraft.com/survey/](http://www.netcraft.com/survey/)

Both are code-oriented, rather than graphical, and both are more appropriate for serious Web development because they don't try to do too much for the developer.

Of course, these sophisticated tools go hand in hand with using some of the more advanced features of IIS. Probably the first thing you will start doing at this stage is using Active Server Pages (ASPs) to add some dynamic content to a site. Dynamic content can be simple at first — adding a page counter or customizing a greeting — and eventually it can be more complicated, such as using calendars or dynamically generated JavaScript. ASPs are also ideal for processing forms. They work by embedding a scripting language into what was previously a pure HTML file. They support VBScript and Jscript, Microsoft's implementation of JavaScript, out of the box.

## COMPLEX BUSINESS APPLICATIONS

IIS really becomes a ready-to-run platform for line-of-business applications when you use it as a front end to a database. Connecting a Web site to a database opens up a world of possibilities such as order

tracking, data entry, and electronic commerce. ASPs are well suited for this connection, and VBScript has a wide array of data access tools that are both flexible and powerful. Basic operations, such as looking up records in a database, are an absolute breeze to write using Visual Basic, and even inexperienced coders should be able to get along with the help of the sample files that come with IIS. What's more, Visual Interdev has several tools that help make it easier to program database front ends. However, these tools are best suited to simple queries and data presentation — if you're going to do something truly complex, you'll have to code by hand.

Initially, ASPs work well with Microsoft

Access as a database, but Access isn't really meant for multiuser applications such as a busy Web site. By avoiding Access altogether, you won't

have to wonder whether the problems you encounter during development are your own fault or a symptom of Access' limited capabilities. Starting out with Microsoft's more robust SQL Server is a better idea, though it does add to the initial cost.

If your organization is like others that have discovered the benefits of establishing a Web site, you may have a monster on your hands because of the inevitable way Web sites organically grow and because you didn't centrally plan for the final design. Lack

of attention to code reusability and proper programming structure can make it a nightmare to maintain code — all because you started with the dynamic content limited to "Good evening, [username]" and let it grow from there. At this stage, most IIS applications go through something between a rewrite and a major housekeeping effort. Commonly used code needs to be isolated into "include" files that are reused, and likewise with constants that may appear in more than one place.

In addition, you may have learned that VBScript, while powerful, simply isn't fast enough for some processing. That limitation can be overcome by moving business logic into SQL stored procedures and moving slower code into stand-alone ActiveX components. Those components are compiled binary files that act something like Windows DLLs: They include a bunch of logic and an interface for getting to it. ActiveX controls simplify application design by tightly grouping related functions together, as well as performing faster than VBScript.

## TRANSACTION SERVER

All of that work leads onto the next step on the slippery slope: using Microsoft Transaction Server (MTS) to further compartmentalize transactions. At first glance, the name suggests something database-centric, but in this context, a "transaction" is everything from creating an ActiveX com-

## Where your Web site can go with Microsoft's IIS

	BASIC WEB SITE	BASIC DYNAMIC SITE USING ACTIVE SERVER PAGES (ASP)	ADVANCED APPLICATIONS	BUSINESS APPLICATIONS	LINE OF BUSINESS APPLICATIONS	ENTERPRISE APPLICATIONS
Code Used	HTML	HTML/ASP	HTML/ASP	ASP/HTML	ASP/HTML	ASP/HTML
Editor Used	FrontPage	FrontPage/ Visual Interdev	Visual Interdev	Visual Interdev	Visual Interdev/ Notepad	Visual Interdev/ Notepad
ActiveX Controls	None	None	Intrinsic	Intrinsic + 3rd party	Intrinsic + 3rd party + custom	Intrinsic + 3rd party + custom
Stateful*	No	No	Yes	Yes	Yes	Yes
Database Used	None	None	None	Access/ SQL Server	SQL Server	SQL Server
Microsoft Transaction Server	No	No	No	No	Maybe	Yes
Suitability to task	Excellent	Excellent	Excellent	Very Good	Good	Satisfactory

\*STATEFUL WEB SITES KEEP TRACK OF INDIVIDUAL USER SESSIONS



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ponent to a page load on an MTS-enabled site. MTS provides a saner framework for using ActiveX components, treating each component as an object that can be created, checked out, and ultimately reused. It also allows "packaging" of multiple components to further organize things. However, MTS is a relatively new product, and everyone knows Microsoft's record with new products. In my experience, adding MTS to a site greatly helps organization, but it can result in performance and stability problems.

If you've come to this point, you've ba-

**Sash Communications' Vip Patel decided against implementing Microsoft's Web technology.**



JANE BLANKENBERG

sically pushed IIS to its limit, and you may be wondering why you started down this path in the first place. IIS is a great Web platform and has a lot to recommend it, but if you take it to the extreme, the experience can be harrowing. Contending with the complexity introduced by using NT, IIS, ASPs, ActiveX, SQL, and MTS all at the same time can make troubleshooting a real nightmare. You may even have second thoughts about using IIS and fantasize about moving to some sort of Unix-based application Web server. However, these too have their own quirks and issues. Once you've taken the time and effort to come this far, there's a lot to be said for sticking with the devil you know. ❖

**BROOKS TALLEY IS TEST MANAGER AT INFOWORLD'S TEST CENTER.**

## FREE WEB SERVER! YOU GET WHAT YOU PAY FOR

By Lynda Radosevich and Dana Gardner

Some users applaud Microsoft's move to include Internet Information Server (IIS) with Windows NT Server at no additional charge because it makes launching a Web site both cheap and easy. But others feel that, free software or not, the elbow grease required to make IIS a stable platform for more sophisticated Web sites is just not worth it.

Proponents say IIS is a great platform on which to build intranets, particularly when you're trying to keep within a budget.

"[IIS] is the best thing available for intranet development because of the integration with technology like Active Server Pages. And it's free," says Justin Renquist of Renquist Consulting Group in San Francisco, a designer of networks with such clients as clothing maker Levi Strauss.

But while it may be great for Intranet development, IIS can be troublesome for companies running heavy-duty electronic commerce sites, which often require links to payment services and fulfillment systems. Microsoft offers Transaction Server 2.0 to handle such transactions, but some users find it is too difficult to make NT, IIS, and MTS perform adequately.

At Sash Communications in Sunnyvale, California, Microsoft's offerings didn't make the grade. The company makes turnkey systems for health insurance companies that sell over the Internet. It needed foundation Web and transaction server technology and was attracted by the price tags on IIS and Transaction Server.

"We were tempted from a business model to go with what was free," says Vip Patel, president and chief executive officer of Sash Communications. But after speaking to IT directors at several companies with well-known electronic commerce sites, the company rejected Microsoft's technology as immature, and purchased Netscape's Application Server instead.

"If you're betting millions of dollars worth of business on it, thousands of dollars for the underlying middleware doesn't make a difference," he says.

TheProShop.com, a golf equipment retail site based in Ft. Myers, Florida, also faced scalability problems with IIS. The shop's Web site receives an average of 44,000 hits per day. Webmaster Greg Parker tried to move from an Apache Web server to IIS 3.0 on NT 4.0 for easier management, but the Microsoft technology stalled and crashed after he loaded 40 of the 50 domains needed. So Parker offloaded e-mail processing to a Linux server and reverted to running Apache on Sun Microsystems' Solaris 2.6.

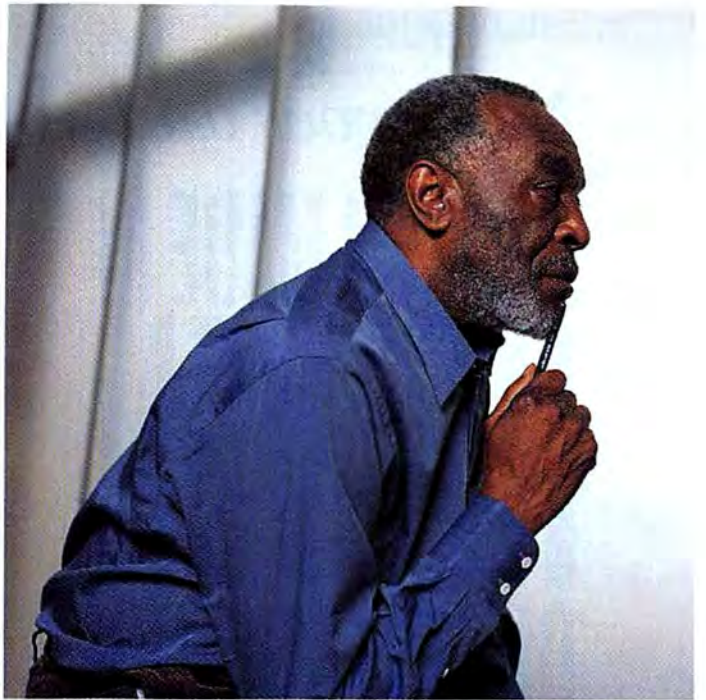
"IIS was too slow to use, a big resource hog, and required too much RAM and resources to run the Web site," says Parker. "I was disappointed."

Still, some professionals say that companies can use IIS to handle high volumes of transactions and visitors. Ernst & Young Consulting successfully uses IIS to build heavy-duty transactional sites for its clients, says John Parkinson, a chief technologist in Ernst & Young's Dallas office. The trick, he says, is understanding how to hand off transaction processing to another server.

"If you understand how to build the architecture, you can scale as big as you want to go," Parkinson says.

—Lynda Radosevich is a Senior Editor and Dana Gardner is an Editor at Large at InfoWorld.





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As you take the time to make your server OS decision, you may want more detailed information. We've assembled some new resources for you at the Web address below.



[www.microsoft.com/go/WindowsNTServer/](http://www.microsoft.com/go/WindowsNTServer/)

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Sources: US networked use and sales run rate: Sofres Intersearch Network Operating System Share Study, 1998. LAN administrator preference: ZD Market Intelligence, September, 1998. Most popular commercial Internet platform for self-hosted companies: Netcraft Web Server Survey, 10/98. Most popular intranet platform: Zona Research, Inc., "Internet and Intranet: 1998 Markets, Opportunities, and Trends."

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## *NT Server and Your Network*

# A MATCH MADE IN HEAVEN OR INTEGRATION HELL?

While NT Server has proven itself useful in key areas, getting it to work with other environments can be frustrating and costly. Planning, third-party software, and outside help can ease the burden. **By Christine Burns**

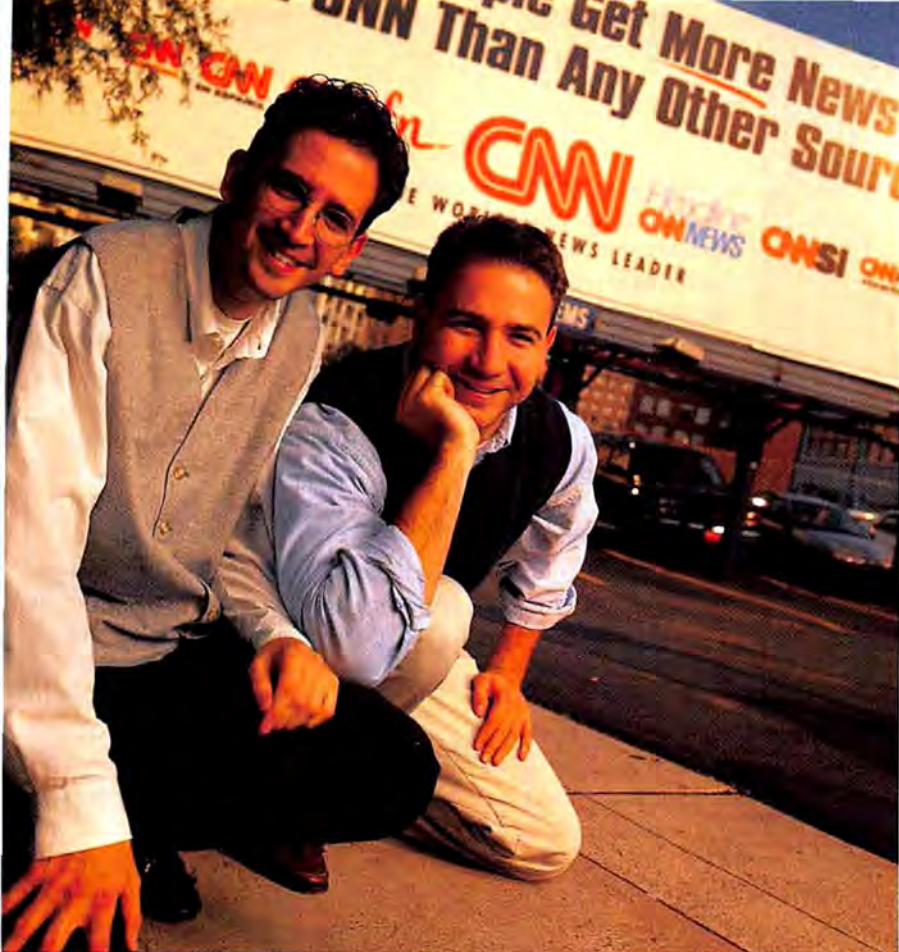
**T**HERE ARE AS many reasons to force a marriage between your existing network and Windows NT Server as there are integration hoops you'll have to jump through to make that union work.

Consider the case of the Drooker brothers. In 1993, Andrew and Matthew Drooker, both IS directors at Turner Broadcasting Sales Inc. in Atlanta, took the plunge with NT Server. Andrew, in charge of network implementation, needed to deploy Microsoft's then brand-new server operating system to anchor a distributed SQL Server database application, developed by brother Matthew to track worldwide advertising revenue for the parent company, Turner Broadcasting. Today, more than 60 percent of Turner Broadcasting's annual income is tracked via this NT application, and the sales department has swapped out its old Digital Pathworks network in favor of 125 NT servers. Despite this successful NT implementation, the honeymoon ended quickly: The Drookers need to continuously come up with new and creative ways to keep the sales force connected to the IBM mainframes at Turner Broadcasting headquarters, also in Atlanta, which has yet to take the NT plunge in any organized fashion.

Or consider Rick Shope, NationsBanc-DPFX's manager of PC technology, who four-and-a-half years ago wanted to wed the 800 high-end desktop PCs at the bank's Chicago-based trading arm to NT Workstation. He had hoped to give the traders a more robust, reliable platform for running office automation and financial applications. But in order to reap the full benefits of that union, he had to make room in his predominantly Hewlett-Packard Unix-based network for NT Workstation's overbearing mother-in-law, NT Server, as the primary network operating system.

And in New York two years ago, soon after the merge of Chase Manhattan Bank and Chemical Bank, the technology infrastructure division of the combined company was on the receiving end of some parental "direction" from upper manage-





ment to make a full-scale commitment to Microsoft's NT Server, in the name of operating system standardization. But a wholesale rip-and-replace of the bank's existing Netware network was not cost-effective, so dealing with dueling operating systems has become a daily struggle for Chase Manhattan.

These examples illustrate perhaps the biggest issue facing organizations that have decided to go with NT Server — once you've decided that there's a place in your company for the operating system, how do you get it to play nice with what's already running?

## THE NT CHALLENGE

Regardless of how Microsoft's foot got in the door of corporate America, the Gartner Group predicts that by the end of 1999, NT Server will have made its way into 95 percent of large enterprise networks — defined by Microsoft as networks with more than 1,000 desktop PCs attached. But NT Server hardly ever stands alone in an enterprise network, says Neil MacDonald, a senior research analyst at Gartner.

"One of the biggest challenges in IT to-

Gartner Group predicts that by the end of 1999, NT will have made its way into 95 percent of large enterprise networks.

day is making NT [Server] work peacefully in your environment," says MacDonald.

For smaller companies, NT integration is not much of an issue, since the tendency is to use one operating system throughout. In fact, due to historical questions of scalability and manageability, NT Server traditionally has held its strongest market position in small companies where there are fewer than 150 users, says Daniel Kusnetzky, program director for client and server environments at Framingham, Massachusetts-based International Data Corp.

"It is less painful for smaller shops to standardize on NT Server than it is to use either Netware or Unix and deal with the hurdles to get them to work together," he says.

But for those large companies that need to go the mixed-environment route, deploying NT Server with existing systems is not something that happens quickly — nor cheaply. Before embarking on this task,

take some practical advice from users who have gone before you. Know what you want from NT. Understand exactly where it will — and won't — mesh with what you've already got. And don't go it alone.

## WHAT'S IT GOOD FOR?

While Microsoft would have you believe that NT is an all-purpose operating system, you have to narrow down what exactly you want NT to do for you. Experienced users say NT works well as a database, messaging, and Web platform. But for large-scale network operating system deployment or mission-critical applications requiring a stable, scalable operating system, they say you should look elsewhere.

"It's not an all-or-nothing game at this point," says Kathy Cruz, chief information officer at Aspect Telecommunications, a computer-telephony integration firm based in San Jose, California. "You have the luxury of putting [NT] where it works and sticking with something else where it does-

n't. We are lucky enough to be able to buy an application based on what it does for us rather than what [operating system] it runs

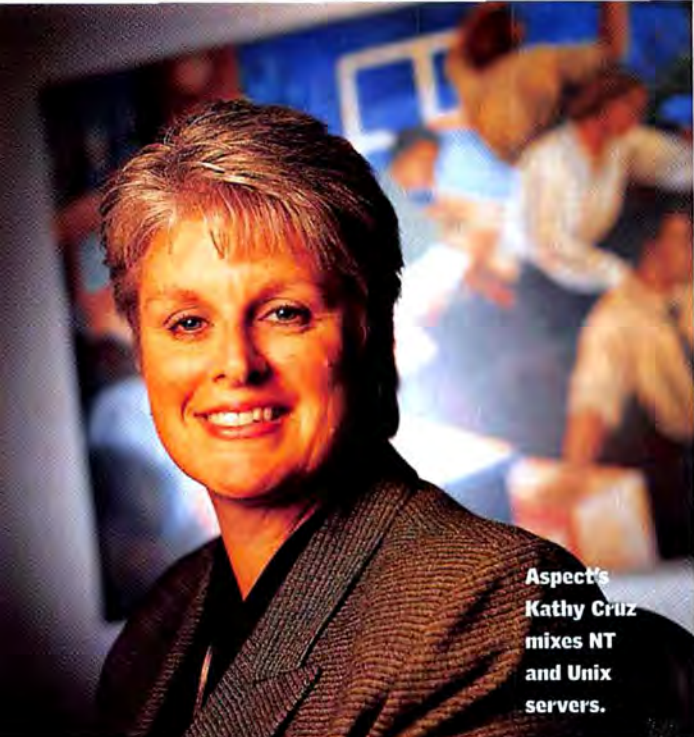
on." NT Server first made its way into Aspect's network two years ago when the company swapped out Lotus' cc:Mail for Microsoft's Exchange. From there, it made sense for Cruz to replace the company's Netware file and print servers with NT Server to cut in half the number of servers she maintains.

## MAKING IT WORK

Once you've decided where NT Server best fits into your organization, you need to think of integrating it into your network on several levels, including giving users access to data stored on disparate hosts, maintaining multiple underlying security architectures, and performing cross-platform systems management.

For simple file-level access across NT and Unix servers, you will need to deploy software that makes one server impersonate the other. Products like Advanced Server for Unix, which AT&T supplies to sev-





**Aspect's  
Kathy Cruz  
mixes NT  
and Unix  
servers.**

ERIC MILETTE

eral Unix vendors, sit on top of a Unix server and make data residing there as readily available to users as if it were sitting on another NT server. In the reverse, Unix vendors now offer Network File System server software that gives users of predominantly Unix-based networks access to data residing on an NT server. For Netware integration, both Microsoft and Novell offer add-on software that allows an NT server to store files in a Netware environment and vice versa. Accessing data on mainframe and minicomputer systems can be done via Microsoft's BackOffice component, SNA Server.

Andrew Drooker said emerging NT Server technologies — like Active Server Pages — help him provide even more accessible connections to Turner's host systems. An ActiveX control sitting on the SNA Server machines in Atlanta allows end users in Turner Sales' London, Paris, and Tokyo offices to establish terminal sessions inside their browsers over the Web.

But while data access in a mixed environment seems to be under control, managing NT's underlying network architecture with Unix- or Netware-based ones is a major obstacle to full NT integration. This is because NT Server's access rights are defined by network resource groupings called domains, which, when layered on top of user access rights already in place for Netware or Unix, become redundant and costly.

For Lynn Houseknecht, senior vice president of Chase Manhattan's distributed

computing services division, the trick is getting a network of 400 NT servers to run parallel to the company's 700-server Netware file and print network. Because of the complexity of NT domains, Chase chose to administer the two environments separately. Although Microsoft intends to remedy its domain problems with a full-blown directory service in NT 5.0 sometime next year, Chase Manhattan can't wait that long. Yan-

ny Hecht, vice president in charge of architecture within Chase Manhattan's distributed computing services group, says that by year's end the company will move to centralized administration using Novell's Directory Services for NT.

Cross-platform systems management is another area that these experienced NT users label a concern. This task may be getting easier — within the last year, system management platforms like IBM's Tivoli, Computer Associates' Unicenter, and HP's OpenView have gained NT support. But if you run a mixed Unix and NT network and haven't invested heavily in one of these expensive management platforms, your op-

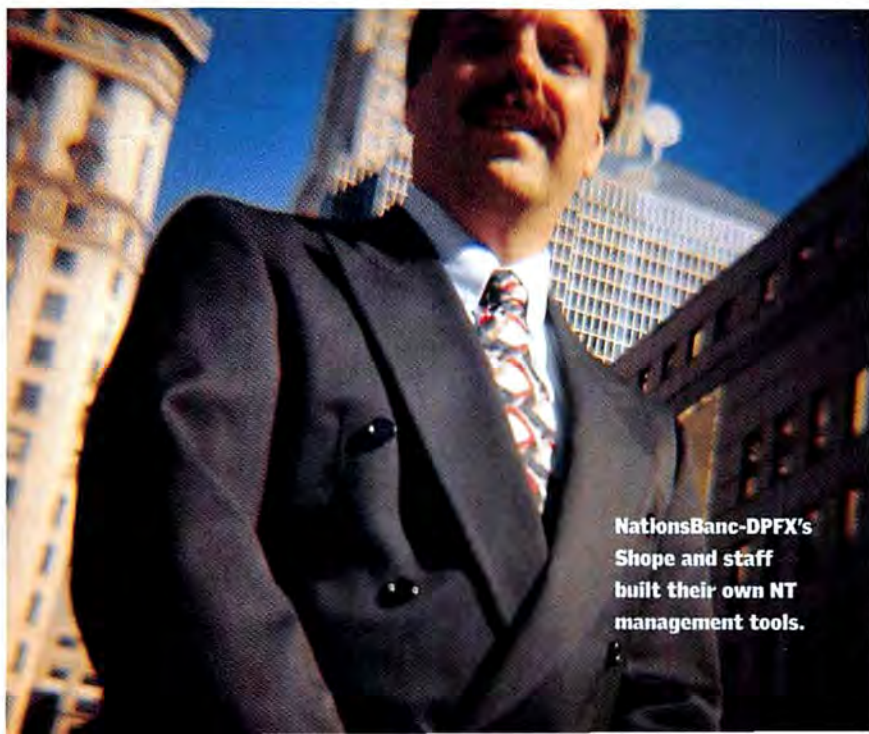
tions are limited. To get unified server management tools across NationsBanc's HP-UX and NT boxes, Shope had to build his own by porting a homegrown set of Unix management tools to NT. For mixed Netware and NT environments, users can turn to Novell's ManageWise desktop and server management software or to third-party products like Intel's LANDesk or Compaq's Insight Manager.

## **YOU NEED HELP**

With the proliferation of NT in corporate America, experienced NT professionals willing to work in-house are at a premium. Chase Manhattan had to raise its salary bar significantly to attract — and keep — people who can work with both the Novell and the NT systems. Aspect's Cruz offers a tuition reimbursement program for employees pursuing Microsoft certification. "But even then, you're only guaranteed that person knows NT. It's very rare to find someone who has a real deep understanding of multiple [operating systems]," says Cruz, who payrolls separate NT and Unix staffs.

By 2000, when Gartner estimates the market for NT services will exceed \$10 billion annually, "getting outside help will be a way of life for anyone looking to put NT Server into the mix," says MacDonald. ☼

CHRISTINE BURNS IS A SENIOR EDITOR AT NETWORK WORLD.



**NationsBanc-DPFX's  
Shope and staff  
built their own NT  
management tools.**

CHRIS WILK



# Developing NT Expertise

Companies take varying paths to acquire NT know-how **By Leslie Goff**

**N**ONE OF THE MEMBERS of the networking staff at the American Cyanamid Agricultural Research Center are Windows NT-certified. They haven't attended any formal training, nor have they sought the guidance of consultants. Instead, when networking manager Kim Takayama's staff plunged into migrating a 1,000-user DEC Pathworks environment to NT five years ago, they grew their own expertise.

With 10 to 15 years of systems experience each, the staff members found that NT's ease of use and their own understanding of basic systems principles were enough, says Takayama.

"We tried a little training here and there to see what we liked, and we found that with the group of people we have here, we prefer doing it on our own," Takayama says.

Takayama's staff is an exception to the rule: Most organizations looking to build internal expertise in Microsoft's Windows NT are turning to external consulting, mentoring, and training to help bring NT know-how in-house and keep it there. Larger companies tend to favor long-term consulting arrangements, supplemented by intensive classroom training. Smaller firms usually go a more economical route, working with one consultant for a few days and then getting more information from the Internet, books, or maybe the local community college.

Mentoring ensures a bigger bang for your NT buck. However, those who have experienced it say you shouldn't just bring in outside help to advise you on NT configuration and performance. It's better to have specialists work side by side with permanent team members to explain what is being done and why.



"My background has taught me that mentoring — having someone watch you do the work and correct you — is better than a class, which is not real-world," says Christopher Smith, a certified Microsoft professional, certified Novell engineer, and network manager at Innova, a manufacturer of wireless telecommunications equipment in Seattle. A seven-day consulting and mentoring arrangement ate up about 20 percent of Innova's \$350,000 consulting and training budget, Smith said.

At publisher Lippincott Williams & Wilkins, the support of a technology-savvy CEO opened up the training cash flow. Because management understood the business drivers for moving from four different operating systems to NT, vice president and chief information officer Marion Mullauer was empowered to do whatever it took to acquire the expertise Lippincott needed.

She hired two new team members who are "NT-conversant," brought in consultants to make recommendations, established mentoring relationships, and is sending 10 staff members through the full cycle of NT Server and

NT Workstation training. Mullauer won't reveal the dollar amount she has spent on NT training and consulting, but says it accounts for 15 percent of her IT budget.

Organizations that lack Lippincott's resources have sought more economical paths to developing internal NT expertise. A small credit union in Columbus, Ohio, for example, is skimping on NT expenses so it can allocate the majority of its

\$30,000 IT training budget for 1998 to conferences and seminars on disaster recovery, electronic commerce, and Internet technologies.

"For what we are doing, we could find a better use for the \$2,000 an NT class would cost. That's the thing that's

Many companies choose mentoring, pairing staff with experienced NT consultants.

so nice about NT — it's all pretty basic and self-explanatory, really," says Steve Sims, information technology manager at Telhio Credit Union.

Still, in August the company paid between \$300 and \$400 to bring in a consultant for a day to evaluate system setup and optimization, and to teach Sims' two Unix administrators how to create new user accounts, change passwords, and perform other administrative basics.

"Now that we have NT up and running, we want someone to come in and make sure our i's are dotted and t's are crossed," Sims said. ☼

LESLIE GOFF IS A FREQUENT CONTRIBUTOR TO COMPUTERWORLD.



# The State of NT Security

Is Windows NT secure enough to protect your data? **By Peter Ruber**

**W**HEN IT COMES TO security, Windows NT reviews are mixed. Some praise NT for having good security underpinnings, citing a consistent interface with which administrators can control access and manage users. But others question the value of deploying Microsoft's Windows NT for business-critical enterprise applications and especially for Internet commerce.

For every praiseworthy security feature, there seems to be a dark side. "NT is unbelievably complex to secure," says Sidney Feit, an analyst with Standish Group International, in Dennis, Massachusetts, "because Microsoft hasn't clearly documented all its security procedures." He claims that a side effect of NT's code being so large and immature is that it's riddled with holes and bugs, making it a tempting target for hacker attacks.

As it frequently does for its operating systems, Microsoft has responded with patches and "hot fixes" for many well-publicized problems. That's disconcerting for network managers and chief information officers expecting robust software out of the box, say critics, adding that Microsoft should deliver better-tested products instead of relying on customers to find the problems. "Microsoft is spending too much time cleaning up after the horse has left the barn," complains Jim Hurley, industry analyst for the Aberdeen Group, in Cambridge, Massachusetts.

## INTERNET VULNERABILITY

Even more disconcerting is NT's vulnerability over the Internet. Problems with authentication and application-level security plague Microsoft's

Internet Information Server (IIS), say critics. To secure NT Server, administrators have to turn off network broadcasting services (the services that let devices communicate with each other), which could lobotomize the system if administrators go too far, says John McCown, technical director of networks for the International Computer Security Association (ISCA), in Carlisle, Pennsylvania.

H. Morrow Long, Yale University information security officer, believes it is possible to make NT secure with relative ease. "If you keep your wits about you, you can build a secure NT network," he says. "If you're running NETBIOS over TCP/IP, where each machine is broadcasting information about itself, there are ways of turning these off on an Internet-accessible server. But a lot of administrators don't know how to do that."

As a security precaution, Long recommends migrating all users and servers to NT 4.0, turning off all Microsoft services in the NT Web server

and never connecting a Web server to an internal NT domain. "There shouldn't be any file sharing or file mounting between the two," he recommends. For better security, access to back-end systems should be handled only through SQLNET or other database protocols. Finally, he strongly advises installing Microsoft's Windows NT Service Packs and all hot fixes posted on Microsoft's security Web site since then and getting on the Computer Emergency Response Team (CERT) and NTBUGTRAQ mailing lists.

Will NT 5.0 be more secure? No one's betting their bankroll. Some users and analysts fear NT 5.0's larger code base will open even more black holes, touching off another round of endless hot fixes and further delaying its chances for enterprise deployment. Microsoft's challenge is to successfully integrate stronger security features into the heart of NT 5.0. \*

PETER RUBER IS A FREQUENT CONTRIBUTOR TO CIO.



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# Before You Upgrade: Pre-NT Housekeeping

SO YOU'RE READY to upgrade to NT (if you're not sure, check out *Windows NT*, December, at [www.pcworld.com/dec98/nttips](http://www.pcworld.com/dec98/nttips)). Before you start, save yourself future heartache and lost productivity by verifying that your hardware will work under the new operating system. Micro-

Microsoft's NT qualification process, though products without the logo may also work successfully. Most Win-



dows 9x apps should work under NT, but system utilities and many games are suspect. If your software is not NT compliant, you may need to purchase an NT version.

Once you've assessed your system, rounded up device drivers, and checked the software, you need to gather your applications. Upgrading to NT is a greater leap than moving from Windows 95 to 98, or even from Windows 3.1 to 95. You must reinstall all your programs from the original CDs and reestablish all your custom tweaks and preferences.

Back up all your data before you begin the upgrade. Keep in mind that the backup platform you use—say, a tape drive—must be compatible with NT; otherwise you won't have a convenient way to get the data back onto the upgraded system.

## AUTOMATIC LOG-ON



I RUN NT in my home office and don't need the boot-up dialog box to secure my PC. Can I bypass it?

*Jim Decklan, Cleveland*

THAT PROMPT serves a critical function, ensuring that only authorized people gain access to your system. But if you're like many home-based users, that dialog box is unnecessary. You can eliminate it by tweaking the NT Registry, as follows:

1. Select **Start**•**Run** and type **regedit** in the Open text box. Click **OK**.
2. Next, make your way to the key **HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon**. You should then see the following items (among others) in the right pane of this key: **DefaultDomainName**, **Default-**

## Kill an App in Windows NT

WHEN AN APPLICATION locks up in Windows 9x, you hit **Ctrl**•**Alt**•**Delete** to bring up Task Manager and close the program. Do that in NT, and you get the Windows NT Security dialog box, where you could accidentally log off or shut down the system. To close inoperative apps in NT, right-click the taskbar and click **Task Manager** (see **FIGURE 2**). Then click the **Applications** tab and select the hung-up program from the list of running tasks. Click the **End Task** button to put the app out of its misery.

Password, and **DefaultUserName**.

3. If the **DefaultPassword** item is missing, you'll need to add it. Right-click an empty portion of the right pane and select **New**•**String Value**. Enter **DefaultPassword** as the name of the item. Double-click the new icon, and enter your password into the 'Value data' text box.

4. Right-click the right pane, pick **New**•**String Value**, and type **AutoAdminLogon**.

5. Set the value of the **AutoAdminLogon** item to 1 by double-clicking the item and entering 1 into the 'Value data' text box. Click **OK** and exit the Registry Editor.



**FIGURE 2: KILL FROZEN apps with Task Manager.**

6. Restart the system. Windows NT will boot directly to the working desktop.

If you want to log on as a different user, just hold down **Shift** as you log off. The log-in dialog box will appear the next time you start up.

Contributing Editor Michael Desmond is a freelance writer and consultant. See page 14 for contact information. Send questions and tips via [www.michaeldesmond.com/nt.htm](http://www.michaeldesmond.com/nt.htm). We pay \$50 for published items. ■



**FIGURE 1: VISIT THIS MICROSOFT SITE to make sure your hardware and software are supported.**

soft keeps a searchable index of NT-compatible hardware at [www.microsoft.com/hwtest/hcl](http://www.microsoft.com/hwtest/hcl) (see **FIGURE 1**). Once you get there, click the **Advanced** tab. To minimize the number of search results, check only the **Logo (NT)** and **Compatible** entries under the **Logo Level** heading, and **Windows NT 4.0 (X86)** under the **Operating System** heading. Also, use the **Product Category** and **Company Name** drop-down lists to narrow your search.

If your hardware is listed among the compatible entries, look for a disk icon that will take you to a downloadable Microsoft-approved NT driver. If your hardware is not listed, you may need to replace components to ensure that NT installs and functions properly.

Next, go to [www.microsoft.com/windows/thirdparty/winlogo/default.htm](http://www.microsoft.com/windows/thirdparty/winlogo/default.htm) to see if your key apps carry an NT logo. This logo ensures that a product has passed





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- Internet Easy Access Buttons
- JBL Pro Audio System with Bass Reflex
- Microsoft Windows98
- 12.1" TFT Active Matrix Display

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**YOUR QUESTIONS ON:** Bypassing the splash screen ♦ Creating Outlook templates

# Reinstall Windows 98 Onto a Reformatted Drive

## Delete Nested Folders

IN THE JULY 1998 and September 1998 issues, I discussed using batch files to delete the contents of a folder. Those solutions are fine if the folder in question doesn't contain other folders.

Joseph Kiser of Carthage, North Carolina, suggests a batch file that cleans out a folder named Temp of all its contents:

```
Deltree /y C:\Temp
cls
```

Note: Be careful not to press <Enter> after the last line.

## SKIP THE LOGO

HOW DO I LOAD Win 95 without getting that annoying logo screen?

Gary Cone, Las Vegas

FOLLOW THESE STEPS to eliminate the so-called Windows splash screen:

1. Open My Computer and go to (c:). Select View>Options (in Windows 98, View>Folder Options). On the View tab, select Show all files, and then click OK.
2. Right-click Msdos.sys and select Properties. Uncheck Read-only, and click OK.
3. Go to the Start menu and select Run. Type notepad c:\msdos.sys and press <Enter>.
4. In Notepad, look for the line that reads '[Options]' (see FIGURE 1). Create a blank line beneath that one and enter Logo=0 there. Do not make any other changes in that file. Close and save.
5. Reboot and make sure there's no logo.
6. Back in Windows, turn the Msdos.sys Read-only option back on, and—if you wish—turn off the Show all files option.



I RECENTLY HAD TO reformat my hard drive and reinstall Windows 98 and my applications from scratch. But my Windows 98 CD-ROM is an upgrade that requires an older version of Windows, and so is my Windows 95 CD. Is there a way I can reinstall Windows 98 without first installing DOS, then Windows 3.1, and then Windows 95?

Victor Heimur, Rutherford, New Jersey

WIPING OUT WINDOWS—either by deleting the Windows folder or by formatting the hard disk—is scary and time-consuming. Unfortunately, because every application messes up your system in its own special way, reinstalling Windows is sometimes necessary. For detailed directions on different approaches to this job, see "Fix Intolerable Problems by Reformating Your Drive" (*Hardware Tips*, July 1998, [www.pcworld.com/jul98/hwtips](http://www.pcworld.com/jul98/hwtips)) and "How Do I Reinstall Windows 95?" (*Answer Line*, September 1997, [www.pcworld.com/sept97/answers](http://www.pcworld.com/sept97/answers)).

In one area Windows 98 has made reinstallation easier: Its emergency start-up disk can read most CD-ROM drives, eliminating the need to create your own CD-ROM-reading floppy.

If you don't have a start-up disk, select Start>Settings>Control Panel. Double-click the Add/Remove Programs icon. Then put a floppy disk—one that doesn't have any vital data on it—and your Windows 98 CD-ROM into their respective drives, and

click the Install button. When you boot using that floppy and have your Windows CD-ROM in the drive, you

will be able to start the installation process with the command `d:\setup`, where d: is your CD-ROM drive.

Which brings us back to your question.

Neither Windows 95 nor Windows 98 requires you to have all those old environments installed. You just need to provide proof that you own an older version of Windows. When no version of Windows is installed on the system, you get the Upgrade Compliance Check dialog box. What you do next hinges on what media your old version of Windows is running on.

If you have Windows 3.x or 95 on floppies, place disk 1 into the floppy drive. Type `a:` and press <Enter>. You'll be asked to put in other floppies from the collection before the installation program is satisfied.

If you have Windows 95 on CD-ROM, remove the Windows 98 CD from the drive and insert the Windows 95 disc in its place. Click Browse, find your CD-ROM drive (it may not be the letter you think it is), and click OK. Back at the Upgrade Compliance Check dialog box, click Next. You will be prompted to reinsert the Windows 98 CD-ROM and proceed with the installation.

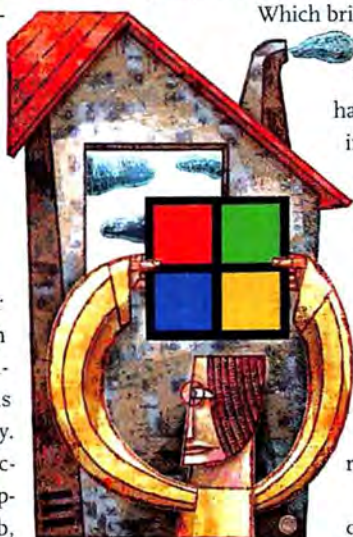


FIGURE 1: DON'T LIKE WINDOWS' LOGO? You can turn it off by adding a line to a hidden file.



## BYPASS THE PASSWORD

BACK IN SEPTEMBER, I provided some incomplete advice on making Windows 95 stop asking for passwords at every boot (see "Pass Over the Password," [www.pcworld.com/sept98/answers](http://www.pcworld.com/sept98/answers)). My advice was to select **Start•Settings•Control Panel**, double-click the **Passwords** icon, click the **User Profiles** tab, and then select **All users of this PC use the same preferences and desktop settings**. A barrage of reader letters informed me that this solution doesn't always work. Here are some additional tricks to stop Windows from asking you to prove your identity:

First, get rid of your password. While you're in **Control Panel's Passwords** ap-

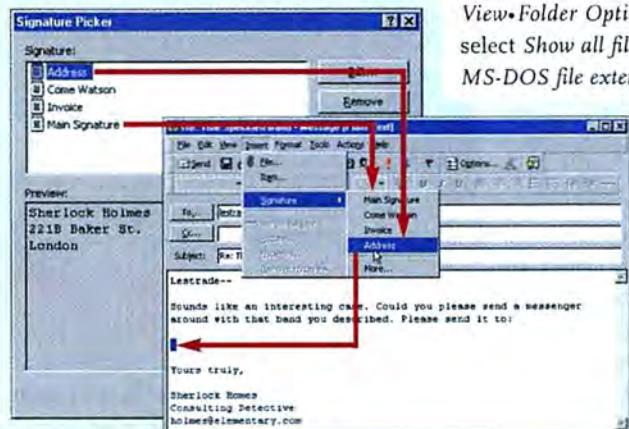
## Quick Outlook 98 Boilerplate

OUTLOOK 98'S MULTIPLE signature feature can do more than signatures. It's a useful tool for any boilerplate text you find yourself retyping too often—like your mailing address.

To set up boilerplate text in Outlook 98, select **Tools•Options**. Click the **Mail Format** tab. In the lower-right corner, click **Signature Picker**. In the **Signature Picker** dialog box, click **New**. Type in a name for the new signature (for instance, **Mailing Address**) and press **<Enter>**. Type in your mailing address or other boilerplate text, click **Finish**, and then **OK**.

Back in the **Options** dialog box, your new signature is now the default—Outlook will stick it on the end of every message. If you don't want that to happen, select something else (perhaps **<None>**) from the 'Use this signature by default' pulldown menu.

To insert your mailing address into a message, position the cursor where you want the text to go and select **Insert•Signature•Address**.



plet, click the **Change Passwords** tab, and then the **Change Windows Password** button. In the 'Old password' field, enter your password. Then leave the other two fields blank and click **OK**.

If that doesn't work, double-click **Control Panel's Network** icon. Select **Windows Logon** as the **Primary Network Logon**, and click **OK**. Windows will then need to reboot. When it does, you will not be prompted for a password.

Finally, you can use **Tweak UI**, part of Microsoft's free **PowerToys** collection, to automate password entry. If you're using Win 95, you can download **Tweak UI** from PC World Online's **FileWorld**. If you have Win 98, it's in your CD-ROM's **\tools\reskit\powertoy** folder. Once **Tweak UI** is installed, load it from **Control Panel** and click the **Network** tab. Click **Log on automatically at system startup**, enter your user name and—if you have one—your password. Then press **<Enter>** (see **FIGURE 2**).

## BOOT TO ZIP



HOW CAN I make an emergency boot disk that will see a Zip drive?

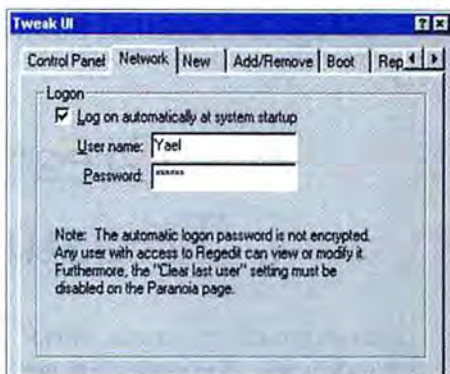
Deborah Norling, *Internet*

FIRST, MAKE A bootable disk: Put a floppy in drive A:, open **My Computer**, right-click your floppy drive, and select **Format**. Check **Copy system file**, and click **OK**.

Now you have to copy the right files to that floppy. You'll find them in the **lomega** folder on your hard drive (probably **c:\tools\_95**), or on the installation floppy that came with the Zip drive. But first, make sure that you can see all of the files and their extensions: In any open folder, select **View•Options** (in Windows 98, **View•Folder Options**). On the **View** tab, select **Show all files**. Then uncheck **Hide MS-DOS file extensions for file types that are registered**.

Copy the following files to the disk: **guest.exe**, **guest.ini**, **Nibble.ilm**, **Nibble2.ilm**.

Also, you need to copy all the files with the extension **.sys** from the **lome-**



**FIGURE 2: THE EASIEST way to bypass your log-on password is with the free Tweak UI from Microsoft.**

ga folder to your floppy. This global approach not only is easier than trying to figure out which of the files you need, but it also gives you a floppy that will work on other computers.

Once you have copied the files, create an **autoexec.bat** file for your floppy. Launch **Notepad** and type the word **guest**. Select **File•Save**. Under 'Save as type', select **All Files (\*.\*)**. For the file name, enter **a:autoexec.bat**, and press **<Enter>**.

One caveat: If your Zip drive is running off a SCSI card that **lomega** doesn't officially support, you have to figure out what your SCSI drivers are and then copy them to the floppy. Look in your **c:\config.sys** file for a line containing a reference to SCSI. The line will say something similar to **device = c:\somepath\somescsi.sys /a /b /c**.

Copy the file that the line refers to (**c:\somepath\somescsi.sys** in my example) to drive A:. Also, copy **config.sys** to A:, delete all the lines in **config.sys** except the one calling the SCSI driver, and remove the file path from the remaining line. In my example, the resulting line would read **device = somescsi.sys /a /b /c**.

Now boot and look for your Zip drive. Remember: You won't see any long file names until you boot to Windows.



Find files mentioned in this article on PC World Online at [www.fileworld.com/magazine](http://www.fileworld.com/magazine). Answer Line welcomes your questions and pays \$50 for published items. Humor columnist **Lincoln Spector** is a contributing editor for PC World. See page 14 for contact information.



Safeguard against hackers ♦ Convert Favorites to Bookmarks ♦ Play gumshoe

# The Great Microsoft Treasure Hunt

FINDING WHAT YOU want on Microsoft's site is easy. Type [www.microsoft.com](http://www.microsoft.com) into your browser, click the *Search* tab, and type a file name or search word—and the free program you've been looking for starts downloading. Yeah, right.

A likelier scenario: Your friend says you can get a new Windows 98 utility free from Microsoft's site; but after 20 minutes of thrashing around, you can't find it. Or you hear about a patch to fix a nasty bug in Outlook, but 30 minutes after typing *Outlook* and *bug* into Microsoft's search tool, you've found no trace of it.

Microsoft's Search tool (accessible from [search.microsoft.com](http://search.microsoft.com)) is too limiting. It doesn't search the Knowledge Base (the database of technical discussions), nor is it good at locating freebie utilities. It does uncover product information well. And Microsoft's site contains great technical discussions and useful software. Here are some tips for finding what you want:



- Items you were unable to locate elsewhere: Try going to [www.microsoft.com/msdownload](http://www.microsoft.com/msdownload).

- Drivers, FAQs, and subject-specific support newsgroups: Go to [support.microsoft.com/support](http://support.microsoft.com/support). On your first visit, you'll be asked for your name and e-mail address. Don't

forget to click each of the four check boxes that begin 'I do not wish to receive unsolicited...'. You can search the site in either of two ways: Basic and Advanced. Head to the Advanced search, type your question in natural language (for example, *How can I hide the Start button?*), and the search engine will return what it considers likely answers. Unfortunately, I have yet to obtain the information I was searching for by this means. Similarly, I've never found any driver or other free Microsoft software by typing its file name. So here are a few tips (see **FIGURE 1**) for increasing your chances of getting the desired results:

## THE NECESSARY GOODS

- **POWERTOYS** (an essential collection of utilities), Kernel Toys (a favorite among system gurus), service packs, updates, resource kits, administrative tools, and Win 95/98 shareware: Go to [www.microsoft.com/windows95](http://www.microsoft.com/windows95) and click *Downloads*.
- Internet Explorer software, service packs, and add-ons: Go to [www.microsoft.com/ie/download](http://www.microsoft.com/ie/download) or [www.microsoft.com/ie/download/windows.htm](http://www.microsoft.com/ie/download/windows.htm).
- Service packs for Internet Explorer 3.x or 4.x, Exchange Server, Office 97, and Windows NT 4.0: Go to [support.microsoft.com/support/downloads](http://support.microsoft.com/support/downloads).



## Stifle a Squawking Modem

IF YOUR OFFICEMATES have taken to complaining about the screeching sounds your modem makes, don't just offer them aspirin: Do something about the noise. In My Computer, select *Dial-Up Networking*. Right-click the icon for the connection for which the modem's noise is a problem, and click *Properties*. Then head to the General tab, and under 'Connect using:' click the *Configure* button. On the General tab you'll find a slide bar; use it to pump up or lower the volume. Click *OK* twice when you're done.

then typing the keywords *address book*. Under More Options, select *Full text*. Select *Titles with excerpts* to get a better idea of what an article is about.

## TELNET WITH CONFIDENCE

WHEN HACKERS BREAK into a computer over the Internet, they most often employ Telnet, a UNIX tool that enables a user to tap into remote computers to run applications and issue commands. When personnel at a major university's computing center discovered that a hacker was using code ingeniously disguised as Oracle routines to intercept Telnet packets and sniff out user passwords, they advised staff to stop using Telnet. To replace it, they installed SSH (or secure shell) on their servers and distributed copies of a product called SecureCRT to all users.

Like Telnet, SSH is a protocol for ▶



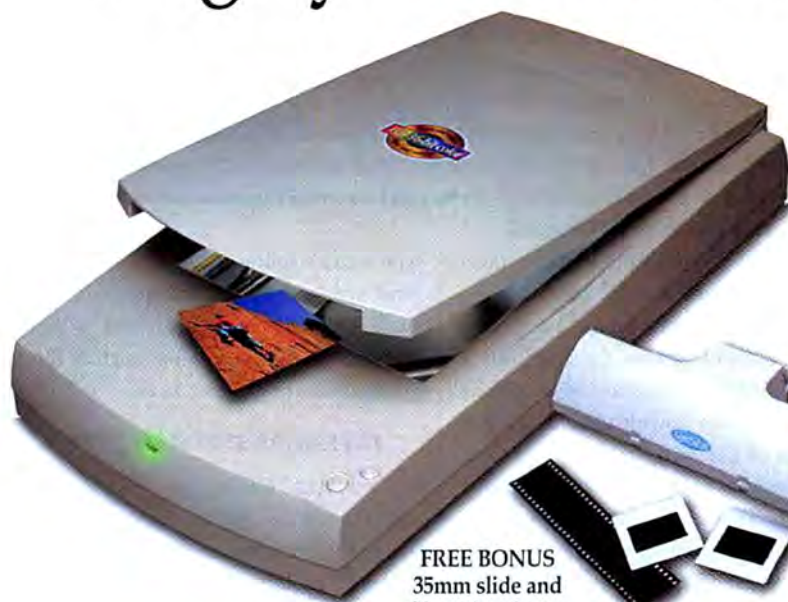
**FIGURE 1: IT'S A FREE STUFF free-for-all at Microsoft's site. You just have to know where—and how—to look.**



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The ScanMaker X6EL's new push-button design calls up Microtek's new ScanSuite<sup>™</sup> utility. ScanSuite's presets let you quickly scan photos or documents and route them to your printer for a quick copy, your fax or email software, or directly to Adobe Photoshop LE (included), Caere OmniPage Limited Edition OCR (included), or any favorite application you have on your computer. To access even more image controls and effects, ScanSuite also lets you call up Microtek's award-winning ScanWizard<sup>™</sup> Twain-compliant scanning software.

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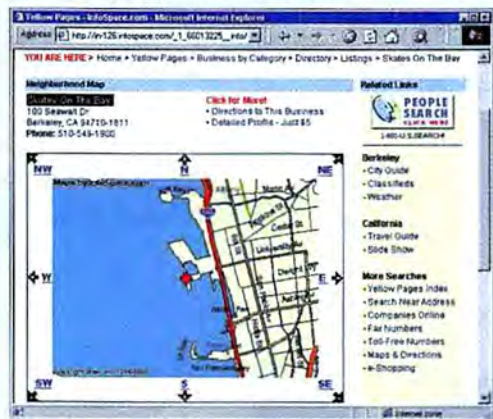
logging in to other computers on a network to run applications remotely or to issue commands. But unlike Telnet, which passes data in ASCII streams that outsiders can eavesdrop on, SSH relies on encryption and prevents Telnet hackers from gaining network access by impersonating a legitimate computer's IP address or another network service.

SSH is being adopted by a growing number of corporate, government, and university computer systems, as well as by some Internet service providers for their servers. It can offer you and your company these advantages:

- If you regularly log in to your work computer from your home PC via the Internet, you use a dial-up ISP. With SSH running on your company's server, you can use SSH software like SecureCRT to communicate with your work computer via an encrypted link—even if the ISP doesn't support SSH.
- If you want to be able to check your office computer's e-mail by tapping into the office network through the Internet from your laptop or home PC, SSH supports port forwarding. This allows you to use your regular mail program to retrieve mail through an encrypted link.

## Web Sleuthing

ARE YOU A BUDDING private eye? Have a phone number but not the person's name and address? Go to [www.555-1212.com](http://www.555-1212.com) or [www.infospace.com](http://www.infospace.com). The "reverse lookup" option at these sites lets you use listed phone numbers to obtain addresses, names, maps, and directions. The flip side? If your number is listed, anybody can track you down.



- If your ISP supports SSH, you can get e-mail and transmit files for your Web site through encrypted links.

FTP is highly insecure because it sends passwords to an FTP host in a single unencrypted packet. But new SSH 2.0 server and client software incorporating secure FTP should be available by the time you read this.

The SSH 2.0-compliant SecureCRT program enables users to work over their office LAN or communicate via an SSH link with an ISP that supports SSH. It also gives users who don't want to risk using FTP the ability to run encrypted Zmodem file transfers for those who'd rather not risk using FTP. And if you work behind a corporate firewall but want to avoid the slowdown of an encrypted link, SecureCRT supports Telnet. You can download a 30-day trial version of the \$99 product from Van Dyke Technologies ([www.vandyke.com](http://www.vandyke.com)).

For additional information about SSH, check out the newsgroup devoted to it ([comp.security.ssh](http://comp.security.ssh)) or the SSH home page ([www.cs.hut.fi/ssh](http://www.cs.hut.fi/ssh)).

## DIFFERENT BROWSERS FOR DIFFERENT URLS

IN RESPONSE to "Peaceful Coexistence for Communicator and IE 4.0" (September, [www.pcworld.com/sept98/internet\\_tips](http://www.pcworld.com/sept98/internet_tips)), Jack Perry sent me an e-mail with an additional suggestion. His tip lets Windows 9x users launch different browsers for different sites (to get the most from Web sites specifically optimized for Navigator or IE). The trick is to create appropriate desktop shortcuts. Right-click the desktop and select **New>Shortcut**. When prompted for a Command line (see **FIGURE 2**), type (in quotation marks) the location of the executable file of the browser you wish to use. In the case of Internet Explorer, that might be "`c:\program files\internet explorer\iexplore.exe`"; whereas for Netscape, you might instead employ "`c:\program files\netscape\communicator\program\netscape.exe`". Check your hard disk for the exact folders. Next,



**FIGURE 2: FOR AN OPTIMIZED view of a Web site, create a shortcut to open the site with a particular browser.**

type a space followed by the URL. Click **Next**, type a name for the shortcut, and click **Finish**. The only drawback is that shell extensions to shortcuts, such as IE's **Subscribe** feature, won't work.

## FAVEMARKS? BOOKRITES?

MEANWHILE, Neil Murphy of Atkinson, New Hampshire, writes that Favtool—a free utility from Microsoft—can turn one browser's bookmarks into another's more easily than any of the methods I recommended back in September. Download Favtool and place it in any folder; then double-click the favtool.exe icon, and a pop-up box will offer you two buttons to choose from: **Import Bookmarks into Favorites**, and **Save Favorites as Bookmarks**. Click one of these buttons, select a file, and your bookmarks will cross the great divide. You can download Favtool from PC World Online's FileWorld.



Find files mentioned in this article at [www.fileworld.com/magazine](http://www.fileworld.com/magazine).

Internet Tips welcomes your questions and tips and pays \$50 for published items. Judy Heim is a contributing editor for PC World and coauthor of *The Quilter's Computer Companion: Hundreds of Easy Ways to Turn the Cyber-Revolution Into Your Artistic Revolution* (No Starch Press, 1997). See page 14 for contact information.

## SecureCRT

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Pack light — there's nothing worse than a carry-on that leaves divots in your shoulder, which is why the TREK<sup>2</sup> is as thin as 1.7".

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—William Goins, III

**1**  
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**TREK² 233**



**TREK² 266**



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Model Name	TREK² 233	TREK² 233	TREK² 266	TREK² 300
Processor	Intel® Pentium® II processor 233MHz	Intel Pentium II processor 233MHz	Intel Pentium II processor 266MHz	Intel Pentium II processor 300MHz
Cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache
RAM	32MB EDO DRAM	64MB SDRAM	64MB SDRAM	64MB SDRAM
Hard Drive	3.2GB hard drive (removable)*	3.2GB hard drive (removable)*	3.2GB hard drive (removable)*	3.2GB hard drive (removable)*
Monitor	12.1" SVGA TFT display	13.3" XGA TFT display	14.1" XGA TFT display	14.1" XGA TFT display
Extra Storage	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)
DVD/CD-ROM	24X CD-ROM drive (dedicated bay)	24X CD-ROM drive (dedicated bay)	24X CD-ROM drive (dedicated bay)	DVD-ROM drive (dedicated bay)
Graphics	4MB AGP graphics accelerator	4MB AGP graphics accelerator	4MB AGP graphics accelerator	4MB AGP graphics accelerator
Sound System	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone
Warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty
Scholarship	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online
Software Included	Microsoft® Windows® 98 System Wizard Mobile Client™™™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™™™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™™™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™™™ Norton AntiVirus
Also Includes:	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports
Price	<b>\$1,799</b> \$63/mo. TechRefresh Bus. Lease, 36 mos.**	<b>\$2,299</b> \$80/mo. TechRefresh Bus. Lease, 36 mos.**	<b>\$2,599</b> \$91/mo. TechRefresh Bus. Lease, 36 mos.**	<b>\$2,899</b> \$101/mo. TechRefresh Bus. Lease, 36 mos.**

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Planes that cost millions of dollars have "mechanical

failure." Two airport hotdogs is too many. I played 18

holes between spreadsheets. I wonder where they're all

going? When you say it over and over again, "delay" starts

to sound funny. Lying down would be good. Three dollars



DELAYED



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is a lot for water. Solitaire is actually pretty fun for about a

minute. That person looks like somebody I know. I'm actually

excited about the prospect of getting on a plane. Why isn't my

cell phone working? That kid keeps staring at my GoBook. This

is better than being in the office, I guess. What's that smell?

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GoBook<sup>2</sup> 266



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Model Name	GoBook™ 233	GoBook <sup>2</sup> 266	GoBook <sup>2</sup> 300
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Cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache
RAM	64MB EDO DRAM	32MB EDO DRAM	32MB EDO DRAM
Hard Drive	3.2GB hard drive*	3.2GB hard drive*	3.2GB hard drive*
Monitor	12.1" SVGA TFT display	12.1" SVGA TFT display	12.1" SVGA TFT display
CD-ROM	24X CD-ROM drive	24X CD-ROM drive	24X modular CD-ROM drive
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Sound System	16-bit stereo/Wavetable sound	16-bit stereo/Wavetable sound	16-bit stereo/Wavetable sound
Warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty
Scholarship	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online	1-year free* tuition to Micron U online
Software Included	Microsoft® Windows® 98 System Wizard Mobile Client™™™ Norton AntiVirus	Microsoft Windows 98 System Wizard Mobile Client™™™ Norton AntiVirus	Microsoft Windows 98 System Wizard Mobile Client™™™ Norton AntiVirus
Also Includes:	GoBook Wedge battery 5.2lbs (w/wedge battery & floppy drive) 6.7lbs (w/opt./base battery & floppy) USB, parallel, serial, VGA, PS/2, NTSC/S-Video ports MPEG compatible CardBus/Zoomed Video ready Microphone, stereo line-in/out jacks 2 Type II/1 Type III PCMCIA slots 2-way Infrared port Touchpad pointing device 3.5" modular floppy drive * Add SuperBase Battery for \$299	GoBook Wedge battery 5.2lbs (w/wedge battery & floppy drive) 6.7lbs (w/opt./base battery & floppy) USB, parallel, serial, VGA, PS/2, NTSC/S-Video ports MPEG compatible CardBus/Zoomed Video ready Microphone, stereo line-in/out jacks 2 Type II/1 Type III PCMCIA slots 2-way Infrared port Touchpad pointing device 3.5" modular floppy drive * Add SuperBase Battery for \$299	GoBook Wedge battery 5.2lbs (w/wedge battery & floppy drive) 6.7lbs (w/opt./base battery & floppy) USB, parallel, serial, VGA, PS/2, NTSC/S-Video ports MPEG compatible CardBus/Zoomed Video ready Microphone, stereo line-in/out jacks 2 Type II/1 Type III PCMCIA slots 2-way Infrared port Touchpad pointing device 3.5" modular floppy drive * Add SuperBase Battery for \$299
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FontList macro ♦ Vary bulleted and numbered lists ♦ Hot Word add-on

# Easy Labels Without Mail-Merging

NEED TO PRINT name badges for the company meeting, but dread the convoluted process involved in creating a mail-merge file? Your word processor's handy label tool can help. Here's how to create labels without mail-merging in Word, WordPerfect, and Word Pro. Start with a blank document in all three programs.

## Word 6.0 and later:

1. Open a blank document. Select **Tools • Envelopes and Labels**. Click the **Labels** tab in the Envelopes and Labels dialog box; then click **Options**.
2. In the Label Options dialog box, select your label type from both the 'Label products' and 'Product number' lists; then click **OK** (see **FIGURE 1**).
3. Back in the Envelopes and Labels dialog box, don't enter anything in the Address area. Make sure the **Full page of the**

same label option is checked, and then click **New Document**.

4. Word will immediately open a new document that contains a table laid out in the format of your label sheet. If you don't see the grid lines, select **Table • Gridlines** (Word 6 and 7) or **Table • Show Gridlines** (Word 97).
5. To simplify label formatting, select all the cells in the table—before you enter any text—by clicking in the first cell and dragging down and across (don't use **Table • Select Table**). Use the Formatting Toolbar to select a font name and size for your labels, as well as a text alignment.
6. Type text for each label in the cells, adding other formatting or graphics elements as necessary. Notice that the spaces between the labels are also table cells; be careful not to enter text in those spaces.

When you're done, put your label sheets into the printer and print as you normally would. If you think you'll need this set of labels again, save it (it's a normal document—see **FIGURE 2**).

## WordPerfect 6.1 and later:

1. With a new blank document loaded, select **Format • Labels**.
2. From the Labels list in the Labels dialog box, select the format that fits your label stock; then click **Select**.
3. WordPerfect will display a single label in the document window. Enter the desired text in this label, which will print in the upper left corner of your label sheet. Format the text as you wish, using standard Word-

## Indent Text in Table Cells

HAVE YOU EVER tried to tab-indent text inside a table? If so, you've probably noticed that pressing the <Tab> key in a table doesn't produce the same result it does elsewhere in a document—your cursor just jumps to the next cell. Some sly users press the space bar several times to create the illusion of a tab. But here's a more elegant solution: In all versions of Word and WordPerfect, press <Ctrl>-<Tab> to indent text to the next tab location. In all versions of Word Pro, press <Ctrl>-<Shift>-<Tab> to achieve the same effect.

Perfect tools. When you finish the first label, move the cursor to the end of the text, then press <Ctrl>-<Enter> to go to the next label. Most text formatting, such as alignment and font settings, automatically carries over from one label to the next.

**Hint:** To center text vertically across all labels, select **Format • Page • Center** while editing the first label. Select **Current and subsequent pages** in the Center Page(s) dialog box, and click **OK**. Continue to make labels, letting WordPerfect create new pages as needed. When you're finished, print as usual. If you expect to use the same labels again, save the new document. **Note:** To edit a label after you've moved on to another one, click inside it.

## Word Pro (all versions):

1. Select **File • New Document**, and click the **Create from any SmartMaster** tab in the New Document dialog box. In succession, choose the **Select a type of SmartMaster** list, and select **Label** in it; choose the **Select a look list**, and select **label.mwp** in it; and then click **OK**. In the Create Labels dialog box, choose the label type that matches your label stock; then click **Create**. Word Pro will create a table with cells representing the individual labels. Before you start to type, hold down <Shift> and use the arrow keys to highlight all the cells of the table. Then display the Formatting info box by pressing <Alt>-<Enter>.

First set the font size and text alignment in the Text Properties info box; then select **Table Cell** in the 'Properties for:' field, and choose vertical alignment and other ▶

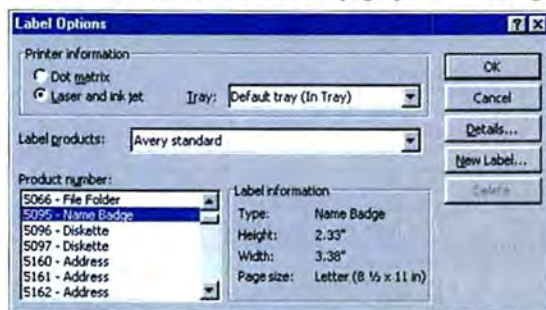


FIGURE 1: FIND COMMON label stock under Label Options.

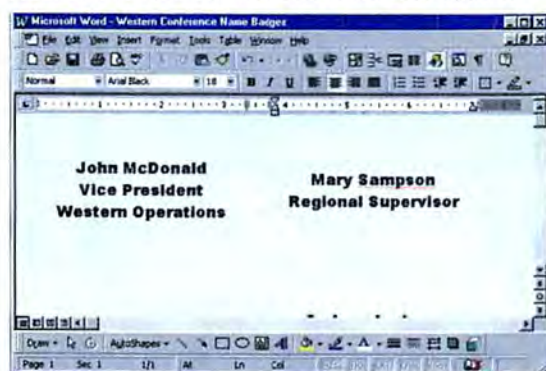


FIGURE 2: LABELS ARE created in a normal Word document.





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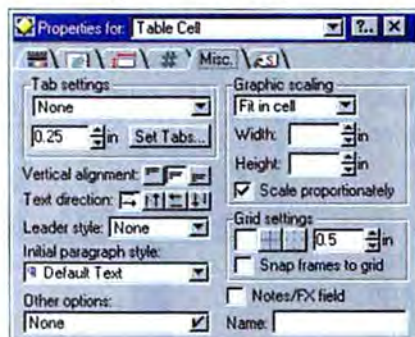
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relevant settings as needed. (see **FIGURE 3**).  
2. Type the desired text in the table cells, pressing **<Tab>** to move from one cell to the next. When you've entered text for all the labels, select them all, format them to your liking, and print as you normally would. If you think you'll need the same labels again, save the file as a normal Word Pro document.

### VIEW AND PRINT YOUR FONTS (WORD 6 AND WORD 95)

IN MY SEPTEMBER column, I published a Word 97 macro that creates a document showing samples of all installed fonts. But because the macro language in Word 6 and Word 95 differs so greatly from Word



**FIGURE 3:** FORMAT WORD PRO labels by specifying settings within the Table Info Box.

97's Visual Basic, the Word 97 macro doesn't work with these earlier versions. Here's a WordBasic macro that creates a similar font sampler in Word 6 and 95:

1. Select **Tools>Macro**.
2. Type **FontList** in the MacroName field of the Macro dialog box, and click **Create**.
3. In the new window that opens, type the lines shown in the box at the upper right of this page, between the Sub Main and End Sub lines of text. Punctuate as shown and don't make any changes. **Note:** This macro is also available on PC World Online ([www.fileworld.com/magazine](http://www.fileworld.com/magazine)).
4. Click the **Start** button on the Macro toolbar to test the macro. If it is working correctly, it will open a new document and build a list of available fonts. If you get an error message instead, check your typing and then try again.
5. Once the macro is running properly, select **File>Close**. Click **Yes** when prompted to keep the changes.

6. Whenever you wish to run that macro, just select **Tools>Macro**, choose **FontList** from the list box, and click **Run**. You may want to print a copy for permanent reference.

**Note:** If the document won't print completely on your laser printer, enable **Print TrueType Fonts as Graphics** in the printer's Setup dialog box.

### PARTIAL CELL SELECTION

WHEN WORKING with tables in Word 6.x or later, you may be unable to select only part of the text in a cell, because Word insists on selecting the entire cell. This inflexibility can be a problem, especially when you use tables to create parallel columns of text, or if you have placed multiple paragraphs of text in one cell. When you click to the left of the first character of any line, Word automatically selects the entire cell rather than moving the cursor to that character.

To avoid this pitfall, carefully position the mouse pointer over the first character in the selection rather than to the left of it; then click and drag to select the desired text.

### UNMARKED LINES IN SPECIAL LISTS

IT'S EASY to create a bulleted or numbered list in all word processors. A problem may arise, though, if you want to put more than one paragraph within a bulleted or numbered item, because pressing **<Enter>** creates a new number or bullet. To insert an unmarked paragraph, press **<Shift>-<Enter>** and type the next line. To resume the bullets or numbering, press **<Enter>**. This tip works in all versions of Word and Word Pro.

### WOPR: HAVE IT YOUR WAY

SOME PEOPLE SAY WORD is too feature rich. Others point to tasks this popular app handles poorly. One of my favorite Word

### WordBasic Macro for Making a Font Sampler

ScreenUpdating 0

FileNew

For numfont = 1 To CountFonts()

CurrFont\$ = Font\$(numfont)

Font "Arial", 12

Insert CurrFont\$ + Chr\$(11)

Font CurrFont\$, 12

Insert "ABCDEFGHJKLMNOPQRSTUVWXYZ" + Chr\$(11)

Insert "abcdefghijklmnopqrstuvwxyz" + Chr\$(11)

Insert "1234567890!@#\$%^&\*(){}+=<>" + Chr\$(11)

InsertPara

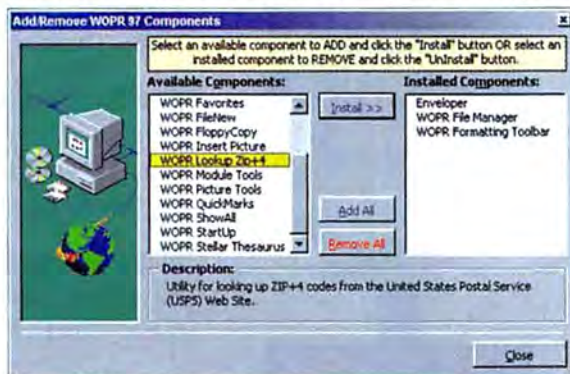
Next numfont

StartOfDocument

TableSort .FieldNum = "Paragraphs"

StartOfDocument

add-ons is Woody Leonhard's WOPR (pronounced "whopper"), available in different packages for all versions of Word. WOPR 97, for example, adds a versatile File/Open dialog box, an improved thesaurus, and other useful tools (see **FIGURE 4**). This shareware utility is free for 30



**FIGURE 4:** PICK THE COMPONENTS you wish to install, and the WOPR installer will add them to Word's menus and toolbars.

days; the registration fee is \$50. You can download a copy of WOPR from FileWorld ([www.fileworld.com/magazine](http://www.fileworld.com/magazine)).



Find more tips at [www.pcworld.com/heres\\_how](http://www.pcworld.com/heres_how). Find files from this article at [www.fileworld.com/magazine](http://www.fileworld.com/magazine). Word Processing welcomes questions and tips and pays \$50 for published items. Contributing Editor George Campbell contributed to The PC Bible (Peachpit Press, 1995). See page 14 for contact information. ■



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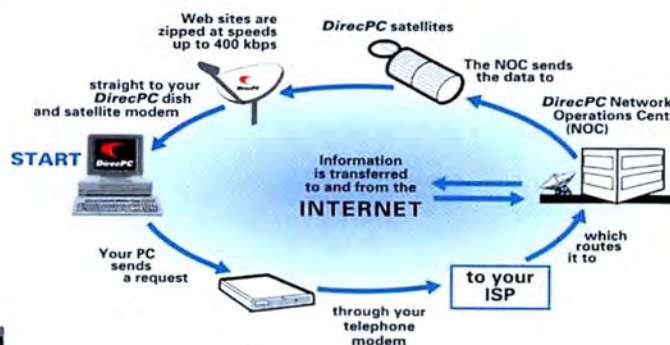
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Hours of Service (Availability)	24 Hours a Day	24 Hours a Day	24 Hours a Day
On-Line Time (Hours of usage for Turbo Internet)	25 Hours/Month	100 Hours/Month	200 Hours/Month
Additional Hourly Rate (Including ISP)	\$1.99/Hour	\$1.99/Hour	\$1.99/Hour
Additional Hourly Rate (Without ISP)	\$1.99/Hour	\$1.99/Hour	\$1.99/Hour
<b>DirecPC Services</b>			
Turbo Webcast: Broadcast delivery of popular Websites to your PC's hard drive	Included	Included	Included
Turbo NewsCast: Broadcast delivery of up to 1,000 Usenet Newsgroups to your PC's hard drive	Included	Included	Included
Turbo Internet: Fully interactive access to the Internet at speeds up to 400Kbps	Included in Online Time	Included in Online Time	Included in Online Time
Free E-mail Accounts	1	1	4
Networking (Number of Seats)	N/A	N/A	4

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# Convert Rows to Columns (and Vice Versa)

SO YOU'RE FINISHED typing a spreadsheet, complete with formulas and formatting. Just as you congratulate yourself on a job well done, you realize that the data's orientation should be flipped from horizontal to vertical (which is crucial if you plan to perform database operations). Before you start reentering the data, check out your spreadsheet's Transpose feature. **FIGURE 1** shows an example in which the data in A1:D7 was transposed to A10:G13.

In Excel, select the range to be transposed, and choose **Edit•Copy**. Next, click the upper left cell of the new range and select **Edit•Paste Special**. In the Paste Special dialog box, select the **Transpose** option and click **OK**. Excel automatically adjusts any formulas in the original range.

Transposing in Quattro Pro is very similar. However, because relative references in the original range will be invalid after the data is transposed, you'll need to select the **Paste Formulas as Values** option in the Paste Special dialog box.

In 1-2-3, select **Range•Transpose**. Specify the original and target ranges. Any formulas in the original range will be converted to values in the transposed range.

## IDENTIFY FORMULAS

HOW MANY TIMES have you accidentally deleted or overwritten cells containing formulas only to discover the mistake after it's too late? One solution is to write-

protect important cells. Another approach is to give those cells a visual flag.

David Hager of Baton Rouge, Louisiana, submitted a clever technique that uses Excel 97's Conditional Formatting feature to apply special formatting to cells that contain formulas—something that's not normally possible.

With this technique you can set up your worksheet so that all formula cells get a yellow background, for example, or so that negative values are in boldface.

Make sure that you're using Excel 97 or later, and follow these steps:

1. Select **Insert•Name•Define**.
2. Next, in the Define Name dialog box, enter **CellHasFormula** in the 'Names in workbook' box, and type **=GET.CELL(48,INDIRECT("rc",FALSE))** in the 'Refers to' box.
3. Click **Add**, and then **OK**.
4. Select all the cells to which you want to apply the conditional formatting.
5. Select **Format•Conditional Formatting**.
6. In the Conditional Formatting dialog box, select **Formula Is** from the drop-down list, and then enter **=CellHasFormula** in the adjacent box (see **FIGURE 2**). This step applies the conditional formatting whenever the formula returns 'True'.

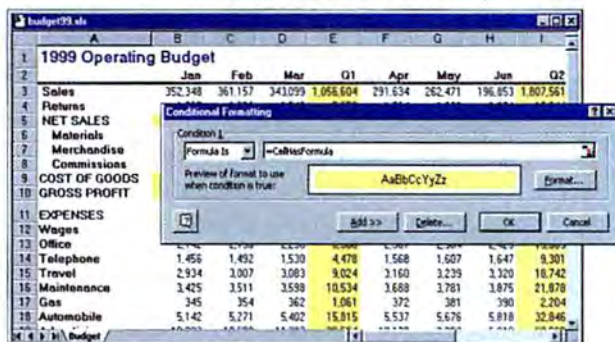
7. Click the **Format** button and select the type of formatting you want for the cells that contain a formula. Click **OK**.

Once you complete these

## Tame Excel's Text Import Wizard

IF YOU IMPORT text files into Excel (for example, data from a PIM), you've undoubtedly encountered the Text Import Wizard, which guides you through parsing the text. If the files you import are always parsed correctly, bypass this Wizard and accept the defaults. Select **File•Open**, locate the file to be imported, then hold down **<Shift>** while you click **Open**. Note: When you import a file with a .csv extension, the Wizard won't kick in. To override this default, you need to change the file's extension from .csv to .txt.

steps, every cell that contains a formula and is within the range you selected in Step 4 will display the formatting of your choice. How does this technique work? The key component is creating a named



**FIGURE 2: USE CONDITIONAL FORMATTING** to apply formatting automatically to all formula cells within a certain range.

formula in Step 2. This formula, unlike standard formulas, doesn't reside in a cell, but it still acts like a formula by returning a value—in this case either 'True' or 'False'. The formula uses the GET.CELL function, which is part of the XLM macro language (VBA's predecessor) and cannot be used directly in a worksheet. Using a value of 48 as the first argument for GET.CELL causes the function to return 'True' if the cell contains a formula. The INDIRECT function essentially creates a reference to each cell in the selected range.

Nice job, David!

Spreadsheets welcomes questions and tips and pays \$50 for published items. PC World Contributing Editor John Walkenbach ([www.j-walk.com](http://www.j-walk.com)) is the author of nearly two dozen books.

	Score.1	Score.2	Difference
Howard	754	812	58
Robin	643	781	138
Gary	313	322	9
Jackie	321	298	-23
Fred	242	317	75
John	109	154	45

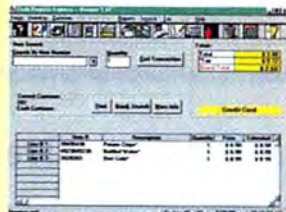
	Howard	Robin	Gary	Jackie	Fred	John
Score.1	754	643	313	321	242	109
Score.2	812	781	322	298	317	154
Difference	58	138	9	-23	75	45

**FIGURE 1: TRANSPOSING A RANGE of data is fast and straightforward, but only Excel can keep your formulas intact.**



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Identify crash culprits ♦ Trace General Protection Faults ♦ Prevent future errors

# Diagnose and Repair System Conflicts

TRACKING DOWN THE SOURCE of ongoing hardware problems or General Protection Fault errors can be as exasperating as looking for a gerbil in a cornfield.

If you're lucky, restoring a backup copy of your Registry may do the trick (consult December's *Hardware Tips*, or find it online at [www.pcworld.com/dec98/hwtips](http://www.pcworld.com/dec98/hwtips)). But if that restoration doesn't work, the cause of your troubles may be any one of

the situation in later versions of its operating system, both Win 95 and Win 98 often require a similar degree of

tweaking. In Windows 95, Microsoft shifted as much configuration data as possible to a central location—the Registry—and provided Device Manager as a tool for viewing the status of installed devices. But the Registry doesn't list every driver. To preserve compatibility with older, 16-bit software and even some older hardware, Microsoft maintains the four configuration files mentioned above as an integral part of Windows 98. And after you have checked Device Manager for obvious hardware conflicts, those files are still the best place to start looking when your PC has a serious problem.

## WINDOWS 98'S TROUBLESHOOTING TOOL

WINDOWS 98'S NEW System Configuration Utility (see **FIGURE 1**) provides a simple interface that lets you easily control which configuration file—and which lines in each file—will run when your system boots. It also provides advanced troubleshooting settings for diagnosing a number of specific common problems and lets you deselect—and thereby eliminate as a problem source—any software that automatically loads at start-up.

Launch the System Configuration Utility by typing **msconfig** in the **Start•Run** box or by selecting it from the Tools menu in the System Information utility (**Start•Programs•Accessories•System Tools**). And since the utility's View menu provides quick access to many other troubleshooting

## No Printer? No Problem

YOU CAN SEND documents to a virtual printer, then print them out later when you have access to a printer. Open the **Printers** folder in Control Panel and check **Work Offline** in the File menu. Now, provided spooling is enabled (**Properties•Details•Spool Settings**) and you've installed the printer's drivers, anything you print will be stored on the hard disk. When you return to your printer in the office, go to the File menu and uncheck **Work Offline**. Windows 98 will sense the connection and initiate a print job.



tools such as Control Panel, Device Manager, and Display Settings, you may want to create a shortcut for easy launching. Find **msconfig.exe** in the Windows\System folder, make sure the folder window isn't maximized, then right-drag the file icon to the desktop. From the resulting pop-up menu, select **Create Shortcut(s) Here**.

## LOOKING FOR TROUBLE

TROUBLESHOOTING YOUR PC with the System Configuration Utility is a three-step process. The first two steps eliminate the four configuration files as potential suspects; the last examines start-up software and a few specific hardware issues.

But before you go looking for the cause of trouble, avoid making it for yourself: Back up your configuration files. Click the **Create Backup** button on the General tab



**FIGURE 1: ISOLATE SYSTEM PROBLEMS** by specifying which start-up files should be processed.



dozens of drivers or configuration files or some combination thereof.

Finding the culprit is often a tedious process of elimination: First you disable a suspect file, then you reboot the PC and hope the problem has gone away.

Fortunately, Windows 98's System Configuration Utility makes such troubleshooting vastly easier, though not entirely foolproof. But first, a word on what to do in Windows 3.x and 95.

In Windows 3.x, disabling a driver involves opening the appropriate configuration files—usually **autoexec.bat** and **config.sys** in the root directory, or **system.ini** and **win.ini** in the Windows folder—and then, in a text editor, finding the command line that launched the driver and removing that line, in most instances either by adding a semicolon to the beginning of the line in **win.ini** and **system.ini** or by adding **rem** in **autoexec.bat** and **config.sys**.

Despite Microsoft's efforts to simplify



(see **Figure 1**), and `autoexec.bat`, `config.sys`, `system.ini`, and `win.ini` will automatically be copied to the root directory and get the extension .pss. If you make changes that cause more problems, you can later restore these files by clicking the *Restore Backup* button.

Also check each file's attributes. Right-click the file's name in Explorer; select *Properties*; and if the file is marked 'read-only', remove the restriction by unchecking the *Read-only* check box.

Next, on the System Configuration Utility's General Tab, change the Startup selection setting from Normal to *Selective startup*. Each configuration file is listed next to a check box. A checked box means that Windows 98 will load the file; an unchecked box means it will be bypassed. If a box is grayed out with no check, that file doesn't exist on your machine. For example, the file `winstart.bat`—a real-mode, network file—will be gray on most machines. Note: If you don't have `autoexec.bat` or `config.sys`, don't worry. Windows 98 doesn't need them to run properly, but it must have both `system.ini` and `win.ini`.

Start testing by unchecking the box for `config.sys`, clicking *OK* at the bottom of the dialog box, and selecting *Yes* when prompted to restart the system. If your problem goes away, then `config.sys` is the culprit. If it doesn't, continue this process of elimination for each of the three remaining files.

If you do isolate a configuration file as the cause of your problem, the next step is to find which command line in the file is at fault. Go to the System Configuration Utility's tab for that file. Under the tab, you'll see each of the file's command lines—or groups of lines—listed with a check box next to each (see **FIGURE 2**). A checked box means the command line will run when the file is processed; an unchecked box means it won't.

### PROCEED WITH PATIENCE

START WITH ALL the command lines unchecked, and continually reboot the system, checking one additional line each

time. If the file has many lines, you can save yourself some time by selecting four lines—or line groups—at once and waiting for the problem to reappear. If by doing so you happen to cripple Windows, your next boot will take you to Safe Mode, in which case you'll be able to undo the damage by restoring the setting you've just modified in the System Configuration Utility to its former healthy self.

If none of the configuration files seems to be the cause of your headaches, restart

this move alleviates your problems, download an updated driver from your graphics card vendor's Web site.

**Limit memory:** Flawed memory chips can cause errors. Limiting memory to a low value—try 16MB—prevents Windows 98 from accessing more RAM than that value. If this stratagem makes your problem disappear, your memory chip may need replacing. If you have more than one SIMM or DIMM, remove them all and then add them back one at a time and restart until you've isolated the one with the bad chip; you'll then need to replace the defective memory module with a new one. Once done with this setting, don't forget to uncheck it so Windows 98 can access all of your system's RAM.

**EMM Exclude A000-FFFF:** Checking this setting will prevent memory conflicts between adapter and system ROMs and programs running in expanded memory (mostly games). If you're not a gamer, you probably have nothing to worry about, because only ancient DOS apps use the expanded memory scheme. If checking this setting fixes your problem, you can either leave it checked (which will take memory away from non-Windows applications), or try to identify the conflicting memory range(s) by first

unchecking this box and then adding the line `EMMExclude=C400-C7FF E000-EFFF` to the [386 Enhanced] section of `system.ini`. You can usually find existing conflicts somewhere within these two ranges, but if you can identify all your ROM and shadow addresses, you'll know specifically what ranges to exclude.

**Disable fast shutdown:** Some applications don't like Windows 98's fast shutdown capability and will cause your system to hang. This setting implements the slower Windows 95 procedure.



For other hardware tips, see [www.pcworld.com/heres\\_how](http://www.pcworld.com/heres_how). Kirk Steers is a PC World contributing editor. Hardware Tips welcomes your tips and questions and pays \$50 for published items. See page 14 for contact information.



**FIGURE 2: DISABLE FOUR GROUPS** of command lines at a time to speed up the troubleshooting process.

your system without any of the software that automatically runs at start-up, and see if that eliminates your problem. Perform this restart by unchecking the final check box, labeled 'Load startup group items', on the General tab. But before rebooting, open the *Startup* tab and confirm that all the programs are unchecked; programs loaded through 'run=' in `win.ini` must be manually unchecked.

And finally, if none of the above works, click the *Advanced* button at the bottom of the General tab. Here you'll find a number of useful settings for troubleshooting:

**VGA 640 x 480 x 16:** Checking this setting replaces the current display driver with a plain-vanilla VGA driver. Problems with graphics drivers are very common and can cause everything from poor on-screen image to spontaneous system reboot. If



# Install a CD-RW Drive

UNTIL A REWRITABLE-DVD standard asserts itself (not likely for another year or two), your best option for creating CDs is CD-Rewritable. This "write-many" technology has largely supplanted CD-Recordable, thanks to its ability to add and erase data on CDs—something the "write-once" CD-Rs can't do. While CD-RW discs cost more than their CD-R counterparts (\$20 versus \$1), their rewritability makes them appropriate for backups and thus worth their higher price.

If you are considering adding one of these CD-RW drives to your system, they're available from a variety of manufacturers, including Hewlett-Packard ([www.hp.com](http://www.hp.com)), HiVal ([www.hival.com](http://www.hival.com)), Philips ([www.philips.com](http://www.philips.com)), Ricoh ([www.ricohcpg.com](http://www.ricohcpg.com)), Smart and Friendly ([www.smartandfriendly.com](http://www.smartandfriendly.com)), and Yamaha ([www.yamaha.com](http://www.yamaha.com)). Prices for internal EIDE drives start around \$300 to \$350, external parallel-port drives at about \$400 to \$450. Internal and external SCSI drives are available too, but at higher prices, starting around \$500. (You may also need a \$100-to-\$200 SCSI add-in card.)

The most economical EIDE CD-RW drives still write at 2X speed and read at 6X. If you're willing to spend a bit more (\$100 or so extra), the latest EIDE CD-RW drives (such as HP's CD-Writer Plus 8110i shown here) write to CD-R discs at 4X and read at 24X (the Plus writes to CD-RW discs at 2X and reads them at 8X). Write speed can make a difference; creating a full CD-R takes about 35 minutes with a 2X drive, about 18 minutes on a 4X. But you'll need an internal drive (EIDE or SCSI) or an external SCSI drive if you want the speed; parallel-port CD-RW drives are limited to a write speed of 2X.

SCSI drives usually offer higher performance and are designed for heavy use, mainly for corporate installations that regularly need to create lots of CDs. These days 4X SCSI writers are pretty standard,

although 2X versions can still be found for budget operations; 8X writers should become available soon.

Here's a nice bonus: You can also use CD-RW drives to press CD-R discs. If you're like most users, chances are you'll write more CD-Rs than CD-RWs. It's a simple matter of economics. Blank CD-Rs cost about a buck apiece and are widely available for free with manufacturer rebates. Blank CD-RW discs cost about \$20 each—a lot for 529MB of storage space (CD-RW discs don't have the full 650MB capacity of CD-Rs because of required formatting and directory information).

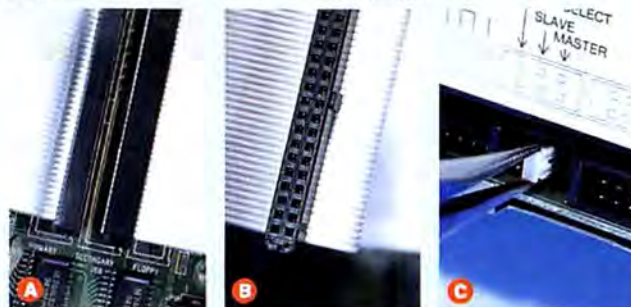
If your PC has a free front-accessible 5.25-inch drive bay, opt for an internal CD-RW drive. You'll want to keep your existing CD-ROM drive for its faster speed in reading source discs, whether the drive is internal or external. Here are the steps for installing a CD-RW drive; for EIDE start with step 1, for parallel-port with step 2.

*Stan Miastkowski is a PC World contributing editor.*

**1 Hook up an internal EIDE CD-RW drive.** Some drives require that you install their software before you install the drive itself. Read the manual and any quick-setup instructions that come with your drive before you start. If software installation comes first, skip to step 3 and come back here when that's done.

Power down your PC and remove the cover.

Your existing CD-ROM drive is probably hooked up by its wide data cable to the secondary EIDE channel connector (A) on your motherboard, and that cable's extra connector (B) is the best place to hook up your new CD-RW drive. If you find the hard drive and CD-ROM drive both attached to the primary EIDE channel connector, consider attaching the CD-ROM drive to the secondary channel.



If a CD-ROM drive is already connected to the second EIDE connector on the motherboard, set the CD-RW drive jumpers to Slave (C), and hook up that drive to the extra connector on the cable. Make sure the edge of the cable with the red marking is connected to Pin 1 on the CD-RW drive (usually next to the power connector).

If nothing's attached to the second EIDE connector on the motherboard, set the CD-RW drive jumpers to Master, and use the cable that came with the drive to connect it to the motherboard.

If you want your CD-RW drive to play music and other audio, you'll likely need to disconnect your CD-ROM drive's audio cable first, since most sound cards have room for only one such cable.

Mount the drive in your PC. Some system cases require special



mounting brackets. If you're fortunate, extra brackets came with your PC. If not, you'll need to contact your PC's maker or your computer dealer.

Find an available power connector and plug it into the drive.

Go to Step 3.



**2 Hook up a parallel-port CD-RW drive.** Power on your PC and press the key (or keys) to enter the system's BIOS setup program (this task varies by PC manufacturer, so check your manual). Make sure your PC's parallel port is set for EPP (Enhanced Parallel Port) or preferably, ECP (Enhanced Capabilities Port). On many PCs, the BIOS setup (A) offers a combination ECP/EPP mode. That's ideal.

Turn off your system. If you have a printer or other parallel port device attached, disconnect the device's cable from the PC's parallel port.

Connect one end of the data cable that came with your CD-RW drive to your PC's parallel port, and the other end to the appropriate connector on the rear of the CD-RW drive (B).

If you have a printer or other parallel port device, reconnect the device's cable to the printer (parallel pass-through) port (C) on the back of the CD-RW drive.

Hook up the power cable (D) to the rear of the CD-RW drive, and plug the drive's power supply into an available AC socket.

Finally, if you'll be using your new CD-RW to play music CDs through your PC, connect the audio cable (E) from the rear of the CD-RW drive to the input jack on your system's sound card.



**A** ROM PCI/ISA BIOS <P5HX-B>  
INTEGRATED PERIPHERALS  
AWARD SOFTWARE, INC.

IDE HDD Block Mode	: Enabled
PCI Slot IDE 2nd Channel	: Enabled
On-Chip Primary PCI IDE	: Enabled
On-Chip Secondary PCI IDE	: Enabled
IDE Primary Master PIO	: Auto
IDE Primary Slave PIO	: Auto
IDE Secondary Master PIO	: Mode 3
IDE Secondary Slave PIO	: Auto
Onboard FDD Controller	: Enabled
Onboard Serial Port 1	: 3F8/IRQ4
Onboard Serial Port 2	: 2E8/IRQ3
UART 2 Mode	: Standard
Onboard Parallel Port	: 378H/IRQ7
Onboard Parallel Mode	: ECP/EPP
ECP Mode Use DMA	: 3
Parallel Port EPP Type	: EPP1.9



**3 Install software.** Turn on your PC and install the software that came with your CD-RW drive (A). Procedures vary by manufacturer, so follow the manual's directions closely.

If you installed an internal EIDE CD-RW drive, Windows 95 or 98 or possibly the CD-RW drive's software should detect it automatically at start-up and install the required driver software (B). You may be asked to insert your original Windows 9x CD-ROM.

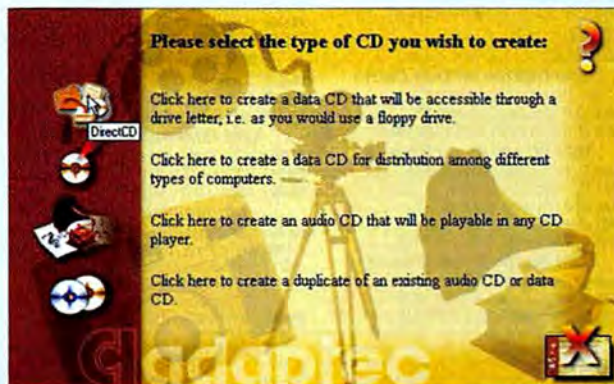
For parallel-port CD-RW drives, follow the directions, which vary by drive. The software should automatically install all of the drive's required drivers. You may be asked to restart your PC after the driver installation finishes.

After the driver software is installed and the drive is up and running, you'll also need to install the CD-RW applications, which are usually included on a CD-ROM that comes with the drive.

If the installation software can't find the drive, go to *Start>Settings>Control Panel*, double-click the *System* icon, and click the *Device Manager* tab. If your new drive is shown with an exclamation point next to it, go to *Start>Help*, type hardware troubleshooter in the search box, and follow the directions. If you still can't get the drive to work, call technical support.



**4 Start making CDs.** Software that comes with your CD-RW drive will guide you through the process of creating data and audio CD-R discs, as well as preparing CD-RW discs for use. (Formatting each CD-RW disc takes approximately an hour.)





**YOUR  
brands.  
YOUR way.  
NEXT  
day.**

## DESKTOPS/TOWERS



### AcerPower Systems

104784	300A Celeron/128K/32MB/4.3GB/32X/56K	\$749
102281	333PII/32MB/4.3GB/32X	899
102314	333PII/32MB/4.3GB/32X/10/100	959
59713	333PII/32MB/5.1GB/24X	969
102282	333PII/32MB/6.4GB/32X/10/100	979
104483	300ACeleron/128K/32MB/4.3GB/32X/56K/W98 w/15" Monitor/color scanner/color printer	999*
106063	350PII/32MB/6.4GB/32X/56K	999
59714	350PII/32MB/5.1GB/32X/10/100	1099
102317	400PII/32MB/8.4GB/32X/10/100	1299

### COMPAQ

<b>Compaq Desktop 6000</b>		
45968	233PII/32MB/2.1GB/24X/10/100/WinNT	\$799
<b>Compaq Deskpro EP &amp; EP SBS Towerable Desktop</b>		
102353	300ACeleron/32MB/4.3GB	\$849
102355	333Celeron/32MB/4.3GB	899
102356	333Celeron/64MB/6.4GB/32X	1179
102357	350PII/64MB/4.3GB	1129
102358	350PII/64MB/10GB/32X	1449
102359	400PII/64MB/10GB/32X	1459
102360	450PII/64MB/10GB/32X	1699

<b>Compaq EN Desktop</b>		
102341	300ACeleron/32MB/3.2GB	\$1049
102285	333Celeron/32MB/3.2GB/10/100	1159
102344	333Celeron/32MB/3.2GB/32X	1079
102291	350PII/64MB/10GB/10/100/WinNT	1749
56038	350PII/32MB/6.4GB	1259
102347	400PII/32MB/6.4GB	1369
102294	450PII/64MB/10GB/10/100/WinNT	1949
102348	450PII/64MB/9.1GB/32X/WinNT	2599

<b>Compaq EN Minitower</b>		
102343	300ACeleron/32MB/3.2GB/32X	\$1149
102346	333Celeron/32MB/6.4GB/32X	1379
102288	333Celeron/32MB/3.2GB/32X/10/100	1479
102296	450PII/64MB/6.4GB/32X/10/100/WinNT	1869
56051	350PII/64MB/6.4GB/32X/WinNT	1549



<b>HEWLETT PACKARD</b>		
<b>Hewlett-Packard Brio</b>		
102177	333Celeron/32MB/4.3GB/32X	\$899
102227	333Celeron/32MB/4.3GB/32X/56K	1049
101971	350PII/32MB/8.0GB/32X	1199
104051	400PII/64MB/8.0GB/32X	1599
102670	450PII/64MB/8.0GB/32X	1749

<b>Hewlett-Packard Vectra</b>		
103656	350PII/32MB/3.2GB	\$1099
103832	350PII/64MB/4.3GB/32X/10/100	1499
58873	400PII/64MB/10.1GB/32X/10/100	1829
103841	450PII/64MB/6.4GB/32X/10/100	1999
103132	450PII/64MB/10.1GB/32X	2099
104768	450PII/64MB/10.1GB/DVD/10/100	2179



<b>IBM Celeron w/128K Cache</b>		
101980	GL C333/32MB/3.2GB/W98 DT	\$915
101982	GL C333/32MB/3.2GB/W98 MT	939
101981	GL C333/32MB/3.2GB/14.32X/W98 DT	1099

<b>IBM PC 300 GL Desktop</b>		
101983	GL 350PII/32MB/3.2MB/W98/DT	\$1159
59581	GL 350PII/32MB/3.2GB/NT DT	1368
59582	GL 400PII/64MB/6.4GB/NT DT	1569
101984	GL 450PII/64MB/6.4GB/NT DT	1829
101985	GL 450PII/64MB/6.4GB/32X/NT DT	1989

<b>IBM PC 300 GL MiniTower</b>		
59584	GL 350PII/64MB/6.4GB/32X/NT MT	\$1559
59585	GL 400PII/64MB/6.4GB/32X/NT MT	1699
101986	GL 450PII/64MB/6.4GB/32X/NT MT	1959

### IBM PC 300 PL Desktop

101987	PL 350PII/32MB/4.2GB/W98 DT	\$1415
54600	PL 333PII/64MB/4.2GB/32X/NT DT	1599
54601	PL 350PII/64MB/6.4GB/32X/NT DT	1759
54602	PL 400PII/64MB/6.4GB/32X/NT DT	1879
101992	PL 450PII/64MB/32X/NT DT	2099

### IBM PC 300 PL MiniTower

54606	PL 350PII/64MB/4.2GB/32X/NT MT	\$1699
54607	PL 400PII/64MB/6.4GB/32X/NT MT	1899
101993	PL 450PII/64MB/6.4GB/32X/NT DT	2149



### Inteva Minitor

105610	K6-2/333/32MB/3.2GB/Win98	\$599
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104915	CyrixM3 333/32MB/3.2GB/32X/56K/Win98	699
104570	Celeron 333/32MB/3.2GB/Win98	699
104571	333PII/32MB/4.0GB/Win98	799
104916	CyrixM3 333/32MB/3.2GB/24X/56K/Win98	799*
104573	333PII/32MB/4.0GB/32X/NT	899
104559	K6-2/350/64MB/8.4GB/32X/56K/Win98	999
104564	333PII/64MB/6.4GB/32X/56K/Win98	999
104566	350PII/64MB/8.4GB/32X/56K/Win98	1099
104567	400PII/64MB/8.4GB/32X/56K/Win98	1299

\*Includes 15" monitor

## NOTEBOOKS



### Acer Extensa

105516	P266/MMX/32MB/3.2GB/20X/56K/12.1" DS	\$1279
103764	P266/MMX/32MB/4.1GB/20X/56K/12.1" TFT	1599
57896	333PII/32MB/4.1GB/24X/56K/13.3" TFT	2149

### COMPAQ

<b>Compaq Armada 1700 Series</b>		
103055	233PII/32MB/3.2GB/24X/56K/12.1" HP	\$1999
58895	233PII/32MB/4GB/24X/56K/12.1" TFT	2299
103054	300PII/32MB/5GB/24X/56K/14.1" TFT	3499

<b>Compaq Armada 3500 Series</b>		
103057	266PII/32MB/4.1GB/12.1" TFT	\$2699
103058	300PII/64MB/6.4GB/13.3" TFT	3599

<b>Compaq Armada 7000 Series</b>		
55276	266PII/64MB/5GB/20X/13.3" TFT	\$3599
102985	300PII/64MB/6.4GB/24X/13.3" TFT	3895
102989	300PII/64MB/6.4GB/24X/33.6GB/14.1" TFT	4095
102995	300PII/64MB/8GB/DVD/33.6GB/14.1" TFT	4599

<b>Compaq Presario</b>		
102462	266MMX/K6-2/32MB/4GB/24X/56K/12.1" HP	\$1699*
102463	266MMX/K6-2/32MB/4GB/24X/56K/12.1" TFT	1999*
102464	300PII/64MB/6.4GB/24X/56K/12.1" TFT	2399
58296	266PII/64MB/4GB/24X/56K/13.3" TFT	2799
101785	300PII/64MB/6.4GB/DVD/56K/13.3" TFT	3499*

\*After rebate



### Fujitsu LifeBook

102051	233PII/32MB/3.2GB/20X/56K/12.1" HP	\$1299
102054	266PII/32MB/4GB/20X/56K/13.3" HP	1599
102055	233PII/32MB/3.2GB/24X/56K/12.1" TFT	1799
102056	233PII/32MB/3.2GB/24X/56K/13.3" TFT	2199
102059	266PII/32MB/4GB/24X/56K/13.3" TFT	2599
102061	300PII/32MB/5GB/24X/56K/13.3" TFT	2899



### Hitachi VisionBook

58078	233PII/32MB/3.2GB/24X/56K/LAN/12.1" TFT	\$1999
102035	266PII/32MB/4GB/24X/56K/LAN/12.1" TFT	2299
100119	266PII/64MB/4GB/24X/56K/LAN/13.3" TFT	2799
102033	300PII/64MB/6.4GB/24X/56K/LAN/13.3" TFT	3299



### IBM ThinkPad 380

101585	233PII/32MB/4GB/24X/13.3" TFT	\$2158
103308	233PII/32MB/4GB/13.3" TFT	2278
101586	300PII/32MB/4GB/24X/13.3" TFT	2598

### IBM ThinkPad 390

104279	233PII/512K/32MB/3.2GB/12.1" TFT	\$1699
104280	233PII/512K/32MB/3.2GB/12.1" TFT	1899
104283	266PII/512K/64MB/4.0GB/14.1" TFT	2799

### IBM ThinkPad 560

101593	233PII/32MB/4GB/56K/12.1" TFT	\$2458
101594	300PII/64MB/6.4GB/56K/12.1" TFT	3399
101595	300PII/64MB/6.4GB/56K/12.1" TFT	3398

### IBM ThinkPad 600

100860	233PII/32MB/3.2GB/24X/56K/12.1" TFT	2729
54590	266PII/32MB/4GB/24X/56K/13.3" TFT	3298
105717	266PII/32MB/4.0GB/24X/56K/13.3" TFT	
	FREE Selectabase/FREE ACAdapter/	
	FREE Scroll Point Mouse	3499*
101589	300PII/64MB/5.1GB/24X/56K/	3959

### IBM ThinkPad 770

54596	266PII/32MB/5.1GB/14.1" TFT	\$3458
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### Sharp Actius UltraLite

59797	233MMX/64MB/3.2GB/56K/11.3" TFT/3lbs	\$1999
103002	266MMX/64MB/4.3GB/56K/11.3" TFT/3lbs	2299



### Toshiba Satellite

101103	233PII/32MB/4.1GB/24X/56K/12.1" DS	\$1549
101104	233PII/32MB/4.1GB/24X/56K/12.1" TFT	1749
103394	266PII/32MB/4.1GB/24X/56K/12.1" DS	1749
103398	266PII/32MB/4.1GB/24X/56K/12.1" TFT	1995

### Toshiba Portégé

101101	266PII/32MB/4.3GB/56K/12.1" TFT	\$2895
102877	300PII/32MB/4.3GB/56K/12.1" TFT	3359

### Toshiba Tecra

101320	233PII/32MB/6.4GB/24X/56K/12.1" TFT	\$2398
101323	266PII/64MB/6.4GB/24X/56K/13.3" TFT	2949
102883	300PII/64MB/6.4GB/24X/56K/13.3" TFT	3345
102882	300PII/64MB/8.1GB/24X/56K/14.1" TFT	3799

## HANDHELD PCs

<b>3Com</b>		
39153	PalmPilot Professional Edition 1MB	\$229.95
54104	Palm III 2MB, Backlit, Infrared Port	349.95

### Beepwear

51893	Pager Watch (Ridge Face)	\$99
57121	Pager Watch (Five Point Face)	99

### Casio

104892	Cassiopeia E-11	\$395
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### Compaq

59627	C-Series 2015c	\$599
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### Cross

52245	CrossPad *After \$50 rebate	\$349.95
102534	CrossPad XP 6" x 9"	399

### Franklin Electronics

101561	REX Pro 5 for Laptops	\$189.95
101562	REX Pro 5-D for Desktops	209.95

### Hewlett-Packard

59973	660UX Color Palmtop PC	\$899
105246	HP Jornada 820	999

### Philips

55577	Nino 301 4MB w/Dock and Battery	\$349.95*
58903	Nino 312 8MB w/Dock, Batt., Modem Coupon	399.95*
51843	Velo 500 16MB w/Dock	499.95*
51844	Velo 500 24MB w/Dock	599.95*

\*w/Instant rebate

### Psion

42202	Series 5 Palmtop 8MB	\$449.95
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### Sharp

48466	Mobilin HC-4500	\$649.95
58197	Mobilin HC-4500 16MB	699.95
104295	Mobilin Pro PU-5000	899
104298	Tri-Pad PU-6000	999

## MONITORS

### Daewoo Electronics

101646	15" 518X	\$119
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7952 ML-590 Dot Matrix ..... 449

**Sharp**

53911 UX-2200CM 6-in-1 Multifunction

Print/Scan/FAX/Copy/PC FAX/Phone ..... \$399.95

51838 UX-500 3-in-1 Plain Paper Fax ..... 259.95

**Tektronix**

102731 NEW! Phaser 740L Color Capable Laser ..... \$1599

102734 NEW! Phaser 740 Color Laser Printer ..... 2149

103972 NEW! Phaser 780 Color Laser Printer ..... 4999

103973 NEW! Phaser 780 Graphics Color Laser Printer ..... 4999

**Xerox**

104005 DocuPrint C55 Color Laser ..... \$1799\*

60445 DocuPrint N24 Laser ..... 2399

104056 DocuPrint C55MP Color Laser ..... 2499\*

48289 DocuPrint N32 Laser ..... 2799

60441 DocuPrint N40 Laser ..... 3499

\*Special pricing while supplies last.

**SCANNERS****Fujitsu**

52843 ScanPartner 600C SCSI Flatbed w/ADF ..... \$1399

**Hewlett-Packard**

101191 ScanJet 4100 Cse ..... \$199

49509 ScanJet 5100 Cse ..... 299

101053 ScanJet 6200 Cse ..... 399

**IBM**

100176 Scanner ..... \$149.95\*

104608 Idea Scan Scanner ..... 129\*

**Memorex**

54936 SCF 6120P Flatbed ..... 99.95

54937 SCF 9360P 30 Flatbed ..... 79.95

**Microtek**

50485 ScanMaker V310 ..... \$49.95\*

57799 ScanMaker X6L ..... 229.95\*

101546 ScanMaker 4 ..... 699

**Minitel**

46612 Dimage Scan Dual Film Scanner ..... \$599

60144 Dimage Scan Multi ..... 2299

**Nikon**

55077 Super CoolScan 2000 ..... \$1818

**Polaroid**

31234 SprintScan 35 Plus ..... \$1399

**UMAX**

101653 Astra 1220U ..... \$129\*

54475 Astra 1220S Cross-Platform ..... 149\*

40085 Astra 1200S ..... 199\*

51167 PowerLook II Duo/Photoshop I.E. ..... 895\*

**Visioneer**

56577 PaperPort 3100B ..... \$59.99\*

52860 PaperPort 6000B ..... 89.99

40455 PaperPort Strobe Pro ..... 149.99\*

53944 PaperPort OneTouch Flatbed ..... 169\*

\*After mfr's mail-in rebate.

**DIGITAL CAMERAS****Canon**

57727 PowerShot A5 Digital Camera ..... \$499

57435 ZR MiniDV Camcorder ..... 995

101674 Vistara MiniDV Camcorder ..... 1495

57434 Optura MiniDV Digital Camcorder ..... 1795

**Kodak**

56897 DC220 ..... \$699

56896 DC260 ..... 899

**Nikon**

104285 Coolpix 900 ..... \$749

55074 Coolpix 600 ..... 379

**Olympus**

55672 D-340L ..... \$499

104248 D-400 Zoom ..... 799

47234 D-600L ..... 899

104249 D-620L ..... 1199

**SONY**

59952 Mavica FD51 ..... \$499

59953 Mavica FD71 ..... 699

103305 NEW! Mavica FDB1 ..... 799

105337 NEW! Mavica FD91 ..... 999

**Toshiba**

100907 POR-M1 ..... \$495

**PROJECTORS****Epson**

53877 PowerLite 5000XB LCD Projector ..... \$4999

**InFocus**

101433 LP425 LCD Projector ..... \$4999

101445 LP735 LCD Projector ..... 6999

**Polaroid**

52858 Polaview 211E LCD Projector ..... \$3499

49917 Polaview 215 LCD Projector ..... 3199

**INPUT DEVICES****Adesso**

21345 TriForm Extended Keyboard PC ..... \$44.95

30219 NuForm Keyboard w/TouchPad PC ..... 44.95

30217 NuForm Keyboard PC ..... 29.95

**Belkin**

58806 USB 3 Button Mouse ..... \$19.95

58804 USB 104 Key Keyboard ..... 39.95

49333 USB Express Hub 4 Port ..... 69.95

**Cross Pen**

52244 iPen Pro ..... \$134.95

**Good Systems Inc.**

101526 Telesight T3 Pro PC TV Converter ..... \$329.95

35455 Optical Laser PS/2 Mouse ..... 29.95

**Kensington Technology Group**

25695 Expert Mouse ..... \$99.95

57085 Mouse in a Box Scroll PC ..... 24.95

39535 Orbit Trackball PC ..... 49.95

**Keytronic Corporation**

40987 Keytronic Classic Keyboard ..... 29.95

57099 Lifetime Mouse PS/2 ..... 39.95

**Logitech Inc.**

102951 Cordless Desktop Keyboard and Mouse ..... \$99.95

49720 Trackman Marble FX ..... 79.95

54277 Trackman Marble Plus ..... 59.95

102961 MouseMan Wheel Mouse ..... 49.95

45949 MouseMan ..... 39.95

**Marlow Data Systems**

32761 105 Keyboard ..... \$29.95

21458 2-Button Trackball ..... 24.95

**Wacom**

101872 Intuos 6X8 ..... \$289.95

**MULTIMEDIA****Creative Labs**

100196 Sound Blaster LIVE! ..... \$195.95

100142 Sound Blaster 128 Plus 4-Pc. Speakers ..... 149.95

53742 Blaster 32X CD-ROM Drive ..... 69.95

53743 Blaster DVD-ROM Drive ..... 99.95\*

45690 PC DVD Encore Dvr2 ..... 199.95\*

53366 3D Blaster VooDoo 2 12MB PCI ..... 149.95\*

\*After mfr's mail-in rebate.

**DATA STORAGE****Hewlett-Packard**

100153 Surestore 8110i CD-Writer Plus Ext. .... \$399

101297 CD-R Media (50 Pack) ..... 89.95

105042 8GB Colorado External Tape Drive w/Tape ..... 299

105034 24GB Surestore Dat 24e DDS-3 External ..... 1299

**Imaging**

102641 Zip Drive Parallel External ..... \$119.95

102640 Zip Drive SCSI External ..... 119.95

46089 Zip Drive SCSI Internal w/Zip Zoom ..... 119.95

46090 Zip Drive ATAPI Insider ..... 99.95

44705 Zip Plus ..... 169.95

103933 Zip Disk 10-Pack (Gray) ..... 99.95

23616 Jaz 1GB SCSI External ..... 299.95

102878 Jaz 2GB SCSI External ..... 349.95

24202 Jaz 1GB Disk Single ..... 99.95

32556 Jaz 1GB Disk 3-Pack ..... 269.95

47079 Jaz 2GB Disk 3-Pack ..... 299.95

**Kodak**

101649 CDR Media-30 ..... \$59.95

**Memorex**

52498 CDR 74min 10-Pack w/ \$20 Mail-In Rebate ..... \$27.95

39920 CDR 74min 100-Pack ..... 149.95

48590 CD-RW Disc 5-Pack w/5 FREE CD-R Discs ..... 49.95

**Meridian Data**

102404 8GB Snap! Server ..... \$949.95

102405 16GB Snap! Server ..... 1699.95

**Quantum**

48043 DLT IV 35/70GB Tape Cartridge ..... \$79.95

58561 5.1GB Fireball EL Ultra SCSI HD ..... 159

50869 4.3GB Fireball SE Ultra SCSI HD ..... 289

50868 6.4GB Fireball SE Ultra SCSI HD ..... 369

50867 8.4GB Fireball SE Ultra SCSI HD ..... 489

**Seagate**

46199 3.2GB Medalist IDE HD ..... \$119

49529 2.1GB Medalist IDE HD ..... 115

51476 4.3GB Medalist Ultra ATA HD ..... 139

51475 6.5GB Medalist Ultra ATA HD ..... 169

50294 8GB TapeStore Int. SCSI Travan Tape Drive ..... 219

54435 9.1GB Medalist Pro Ultra ATA HD ..... 239

54431 9.1GB Barracuda 9LP SCSI ..... 539

55983 9.1GB Cheetah Ultra2 LVD HD ..... 719

56519 18.2GB Barracuda Ultra Wide SCSI HD ..... 999

56524 4.5GB Cheetah Ultra2/LVD HD ..... 1299

**Smart and Friendly**

53407 4x12 CD Speedwriter SCSI Internal ..... \$399

53408 4x12 CD Speedwriter SCSI External ..... 499

50101 4x26 CD-RW 426 SCSI External ..... 599

**Western Digital**

42537 5.1GB Caviar Retail-Packaged HD ..... \$149.95\*

45919 6.4GB Caviar Retail-Packaged HD ..... 169.95\*

55997 8.4GB Caviar Retail-Packaged HD ..... 199.95\*

101327 10.1GB Caviar Retail-Packaged HD ..... 249.95\*

**Yamaha**

102843 4x416 CRW4416S Internal SCSI ..... \$419.95

102844 4x416 CRW4416SX External SCSI ..... 499

**UPS & POWER****American Power Conversion**

56170 Back-UPS Pro 650 (410W) ..... \$279.95

56167 Back-UPS 500 (330W) ..... 149.95

21929 Back-UPS Pro 1000 (670W) ..... 379.95

56165 Back-UPS Office 280 ..... 84.95

21928 Back-UPS Pro 1400 (950 Watts) ..... 479.95

56169 Back-UPS Pro 420 (260W) ..... 229.95

31466 Smart-UPS 700 NET (450W) ..... 369.95

31469 Smart-UPS 1400 NET (950W) ..... 629.95

31470 Smart-UPS 2200 NET (1600W)/PowerChute+ ..... 899.95

**Opti-UPS**

101381 280ES (280W) ..... \$99

101383 420ES (420W) ..... 149

**Tripp Lite**

101100 Super 6+ Ultra ..... \$15.95

8630 Isobar 6 Ultra ..... 54.95

13147 Isotek 6 Ultra ..... 64.95

100094 Internet Office 400 ..... 89.95

45094 OmniSmart 1050 PNP ..... 359.95

21044 BC Pro 1400 UPS (940 Watts) ..... 419.95

45091 SmartPro 1400 NET UPS ..... 494.95

**NETWORKING****3Com**

52953 3Com/USR Winmodem internal ..... \$49.95\*

55204 Fast Ethernet XL with wake up 5 pack ..... 389.95

102772 SuperStack II Switch 610 24-Port ..... 929

51639 SuperStack II Dual Speed Hub 500 24-Port ..... 949

**Asantec Technology**

38297 10BaseT FriendlyNet 8-Port Hub ..... \$49.95

100083 FriendlyNet 10/100 8-Port Switch ..... 379.95

**Bay Networks**

100960 Baystack 450 switch 24-Port ..... \$2299

**Belkin**

37711 OmniView KVM 2-Port ..... \$179.95

32066 OmniView KVM 6-Port ..... 269.95

**Cisco**

52027 Catalyst 1900 10BT 24-Port Switch ..... \$1049

**DLink**

53371 Dual Speed 10/100BTX SOHO 4-Port Hub ..... \$84.95

53384 Dual Speed 10/100BTX 8-Port Hub ..... 219.95

53385 Dual Speed 10/100BTX Stackable 8-Port Hub ..... 299.95

53373 DFE-916X 10/100BaseTX 16-Port Hub ..... 599.95

**HP Networking**

29582 Jet Direct EX Plus Print Server Ethernet LAN ..... \$229.95

53458 Jet Direct 300X Ext Print Server 10/100BaseT ..... 239.95

**Intel**

45633 PRO/100+ PCI Adapter ..... \$79.95

10571 Create &amp; Share Camera w/Software &amp; Burny Doll ..... 109.95\*

102751 InBusiness Internet Station w/FREE ..... 399.95

**Linksys**

59207 10/100BaseTX PCMCIA PC Card; 16-bit ..... \$74.95

60032 10/100BaseTX PCMCIA PC Card; 32-bit ..... 79.95

59632 10/100BaseTX Etherfast 5-Port Hub ..... 69.95

59650 10/100BaseTX 24-Port Auto-sensing Hub ..... 429.95

59629 10/100BaseTX PCI Etherfast LAN Card ..... 29.95

59208 10/100BaseTX 8-Port Auto-Sensing Hub ..... 149.95

**Netgear**

35404 FA310TX 10/100BTX Fast Ethernet PCI Adapt. .... \$28.95

47800 RT328 ISDN Router ..... 269.95

50635 DS108 10/100BaseTX 8-Port Hub ..... 219.95

53562 DS516 1/100BaseTX 16-Port Stackable Hub ..... 599.95

48222 FS508 Fast Ethernet Switch 8-Port ..... 619.95

**Xircom**

55424 RealPort 56K Modem &amp; 10/100BTX Ext Adapt. .... \$319.99

**SOFTWARE****Adobe Systems**

10878 Adobe Illustrator 8 Upgrade ..... \$118.95

100160 Adobe Illustrator 8 ..... 359.95

54674 Adobe Photoshop 5.0 Version Upgrade ..... 189.95

54675 Adobe Photoshop 5.0 ..... 598.95

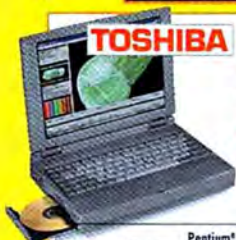


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#34767	8000T	PII266MMX*	64	6GB	24X	13.3" TFT	56K	\$3,449
#30978	7800CDT	PII266MMX*	64	5.1GB	20X	13.3" TFT	56K	\$3,869
#30976	7800DVD	PII233MMX*	64	5.1GB DVD	13.3" TFT	56K		\$3,869
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#34755	4000CDS	PII233MMX*	64	4.1GB	24X	12.1" DSTN	56K	\$1,649
#34758	4000CDT	PII233MMX*	64	4.1GB	24X	12.1" TFT	56K	\$1,949
#37253	4010CDS	PII266MMX*	32	4.1GB	24X	12.1" DSTN	56K	\$1,949
#37260	4010CDT	PII266MMX*	32	4.1GB	24X	12.1" TFT	56K	\$2,249
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\*Pentium\* processor with MMX\* technology. 1Windows 98



## Notebook Computers

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#35180	TP380Z	PII300MHz MMX*	32	4.0GB	24X	12.1" HPA	—	\$2,689
#35181	TP380Z	PII300MHz MMX*	32	4.0GB	24X	12.1" HPA	—	\$2,789
<b>ThinkPad 560</b>								
#35329	TP560X	PII233MHz MMX*	32	4GB	—	12.1" TFT	56K	\$2,499
#35338	TP560X	PII300MHz MMX*	32	4GB	—	12.1" TFT	56K	\$3,369
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#30323	TP600	PII266MHz	32	4.0GB	10-24X	13.3" TFT	56K	\$3,799
#33832	TP600	PII266MHz	32	3.2GB	24X	12.1" TFT	56K	\$3,049
#35187	TP600	PII266MHz	32	5.1GB	24X	13.3" TFT	56K	\$4,139
#35193	TP600	PII266MHz	32	6.0GB	DVD	13.3" TFT	56K	\$4,399
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\*Windows 98 1Windows NT

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#36034	E330	PII233MMX*	32	3.2GB	24X	12.1" TFT	56K W95	\$1,799
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<b>Armada 1700 Series</b>								
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#31073	7800	PII 266MHz MMX*	64	5.0GB	20X	13.3" TFT	—	\$4,099
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#35381	3500	PII 300MHz MMX*	64	6.4GB	—	13.3" TFT	—	\$4,199
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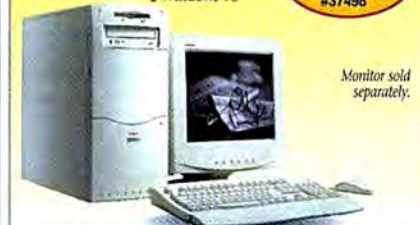
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350/Pii 64MB 10GB 32X	1438.50
400/Pii 64MB 10GB 32X	1553.76
450/Pii 64MB 10GB 32X	1689.17
<b>Deskpro EP Series Small Business Solutions</b>	
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<b>Deskpro EN Series desktops</b>	
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300 Celeron 32MB 3.2GB 10/100	1106.95
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333 Celeron 32MB 6.4GB 32X	1299.47
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350/Pii 32MB 6.4GB 24X 10/100	1529.41
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350/Pii 64MB 6.4GB 32X NT	1612.56
400/Pii 64MB 6.4GB 32X NT	1745.28
<b>PC 300PL Series mini-towers</b>	
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400/Pii 64MB 6.4GB 32X 10/100 NT	1958.55
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<b>HP Brio Series mini-towers</b>	
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333 Celeron 32MB 4.3GB 32X	939.56
333 Celeron 64MB 8GB 32X	1151.91
333 Celeron 32MB 4.3GB 32X	1084.56
333/Pii 32MB 4.3GB 32X	1186.95
400/Pii 64MB 8GB 32X	1639.43
450/Pii 64MB 8GB 32X	1798.32
<b>HP VE Series desktops</b>	
300 Celeron 32MB 3.2GB	912.35
300 Celeron 32MB 3.2GB 10/100	956.65
<b>HP VE Series mini-towers</b>	
300 Celeron 32MB 3.2GB	912.35
300 Celeron 32MB 3.2GB 32X	1084.71
<b>HP VL Series desktops</b>	
333/Pii 32MB 4.3GB	1387.29
450/Pii 64MB 10.1GB 32X 10/100	2298.72
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## Notebooks



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<b>TOSHIBA</b>	
<b>Libretto mini-notebooks</b>	
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100CT 166/MMX 32MB 2GB 7.1" AM	1487.56
<b>Satellite &amp; Satellite Pro notebooks</b>	
330CDS 266/MMX 32MB	
4GB 12.1" DS 20X	1387.23
4000CDS 233/Pii 32MB 4.1GB 12.1" DS	1587.23
4000CDT 233/Pii 32MB 4.1GB 12.1" AM	1767.56
4010CDS 266/Pii 32MB 4.1GB	
12.1" DS 24X	1787.91
4010CDT 266/Pii 32MB 4.1GB	
12.1" AM 24X	1997.56

4020CDT 300/Pii 64MB 6.4GB	
13.3" AM 24X	2897.56
<b>Tecra notebooks</b>	
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12.1" AM 24X	2477.63
8000CT 266/Pii 64MB 4GB	
12.1" AM 24X	2967.39
8000CT 300/Pii 64MB 6.4GB	
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7000CT 266/Pii 32MB 4.3GB 12.1" AM	2897.36
7010CT 300/Pii 32MB 4GB 12.1" AM	3367.86
7010CT 300/Pii 32MB 4.3GB 12.1" AM NT	3427.11



<b>Extensa notebooks</b>	
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4.1GB 12.1" DS 20X	1467.26
502T 266/MMX 32MB	
4.1GB 12.1" AM 20X	1657.23
710DX 233/Pii 32MB 2.1GB 12.1" DS	1529.06
710T 233/Pii 32MB 3.2GB 12.1" AM	1989.10
711TE 266/Pii 32MB 4.1GB 13.3" AM 24X	2668.97



<b>Armada notebooks</b>	
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1700 233/Pii 32MB 4GB 12.1" AM 24X	2257.36
1700 300/Pii 32MB 5GB 14.1" AM 24X	3457.26
3500 266/Pii 32MB 4.1GB 12.1" AM	2727.36
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14.1" AM 24X WNT	4167.28
7400 300/Pii 64MB 6.4GB 13.3" AM 24X	4137.23
7800 266/Pii 64MB 5GB 13.3" AM 20X	3497.44
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380Z 300/Pii 32MB 4GB 13.3" AM 24X	2737.16
380Z 300/Pii 32MB 4GB 13.3" AM 24X NT	2797.66
380Z 233/Pii 32MB 4GB 13.3" AM 24X NT	2327.36
560Z 233/Pii 32MB 4GB 12.1" AM	2527.14
560Z 300/Pii 64MB 6.4GB 12.1" AM	3387.56
600 233/Pii 32MB 3.2GB 13.3" AM 24X	3057.23
600 266/Pii 32MB 4GB 13.3" AM 24X	3476.56
770X 300/Pii 128MB 8.1GB	
13.7" AM DVD NT	5237.16
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Jornada 820 Palmtop PC 16MB	949.17
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C350 266/Pii 32MB 4GB 13" DS 20X	1599.00
E330 233/Pii 32MB 3.2GB 12.1" AM 24X	1774.48
E340 266/Pii 32MB 4GB 13.3" AM 24X	2543.71
E350 300/Pii 32MB 5GB 13.3" AM 24X	2835.18



<b>HITACHI</b>	
VB Pro 7630 233/Pii 32MB	
3.2GB 12.1" AM 24X	2199.00
VB Pro 7755 266/Pii 64MB	
4GB 13.3" AM 24X NT	2999.00
VB Pro 7775 300/Pii 64MB 6.4GB	
13.3" AM 24X	3299.00



<b>AMS Tech</b>	
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32MB 4GB 12.1" AM 24X	1685.19
Roadster 15CT 266/MMX	
32MB 3.1GB 12.1" AM 24X	1597.36
Roadster 15CX 266/MMX	
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AM = active-matrix color display DS = dual-scan color display

## Peripherals

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OfficeConnect Hub 8/TPO	85.91
SuperStack II DS Hub 500 24-port	1038.80
SuperStack II Switch 3300 24-port	2385.60
Impact IQ ISDN modem	199.35
Office Connect LAN modem	399.20



<b>Cisco</b>	
Catalyst 2916M-XL 16-port 10/100 switch	2194.40
Catalyst 2924A 24-port 10/100 switch	1109.27
1601 Ethernet Serial Modular Router	1139.17
1602 56K Modular Router	1307.77
1600 IP/PIX/AT Feature Pack	153.96
2501 Ethernet Dual Serial Router	1744.20
2524 Ethernet Modular Router	1604.38



### COMPAQ Deskpro EP

<ul style="list-style-type: none"> <li>300MHz Intel Celeron™ processor</li> <li>128KB Level 2 cache</li> <li>32MB RAM standard</li> <li>4.3GB SMART II Ultra-ATA hard drive</li> <li>Windows® 95</li> <li>Towerable desktop case</li> <li>3-year limited warranty</li> </ul>	
<b>\$855.61</b>	CDW 127791

### AMS Tech

<ul style="list-style-type: none"> <li>300MHz AMD K6 Processor with 3D Now!™ technology</li> <li>512KB Level 2 cache</li> <li>32MB RAM standard</li> <li>96MB maximum</li> <li>21GB hard drive</li> <li>24X CD-ROM drive</li> <li>12.1" SVGA active-matrix display</li> <li>56K bps modem</li> <li>PC Card slots: two Type II or one Type III</li> <li>3-year warranty</li> </ul>	
<b>\$1497.23</b>	CDW 130122


### Roadster 15CTA

<ul style="list-style-type: none"> <li>300MHz Intel Pentium® II processor</li> <li>4GB hard drive</li> <li>32MB RAM standard</li> <li>12.1" active-matrix display</li> <li>24X active-matrix display</li> <li>Integrated 56K bps (K56flex) modem</li> <li>Windows® 95</li> </ul>	
<b>\$2257.36</b>	CDW 117882


### COMPAQ Armada 1700

<ul style="list-style-type: none"> <li>233MHz Intel Pentium® II processor</li> <li>4GB hard drive</li> <li>32MB RAM standard</li> <li>12.1" active-matrix display</li> <li>24X active-matrix display</li> <li>Integrated 56K bps (K56flex) modem</li> <li>Windows® 95</li> </ul>	
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### Armada 1700

<ul style="list-style-type: none"> <li>233MHz Intel Pentium® II processor</li> <li>4GB hard drive</li> <li>32MB RAM standard</li> <li>12.1" active-matrix display</li> <li>24X active-matrix display</li> <li>Integrated 56K bps (K56flex) modem</li> <li>Windows® 95</li> </ul>	
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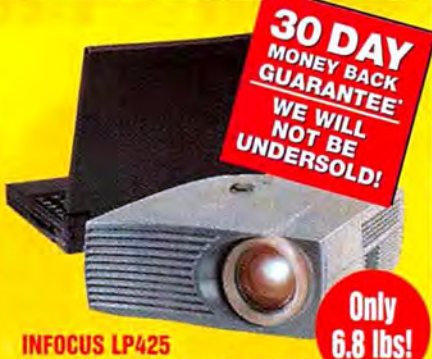


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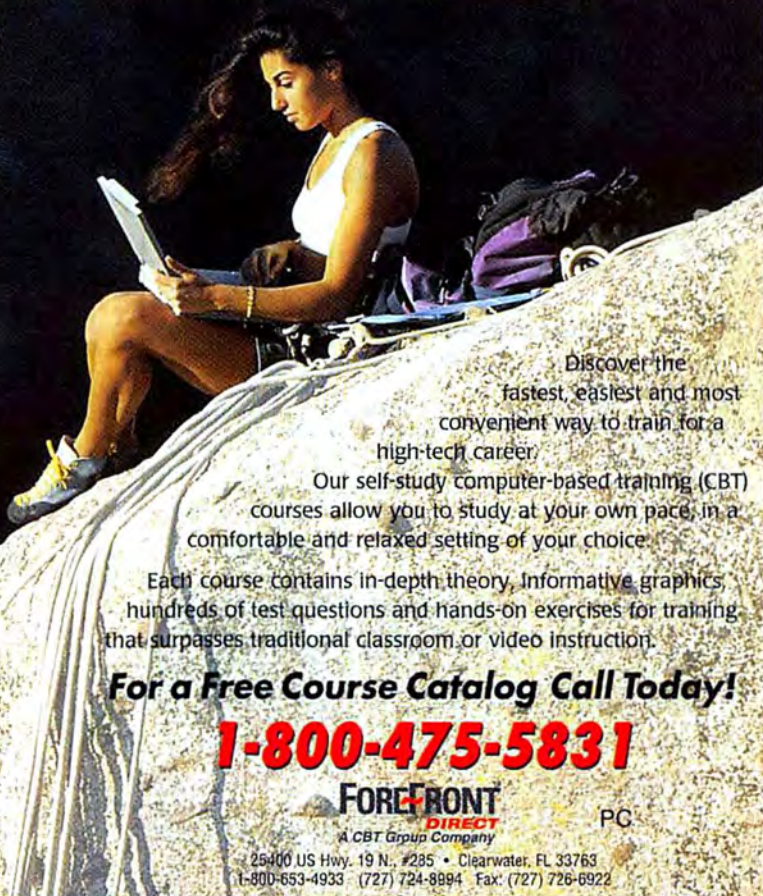


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## SCSIVue™ Active Terminator



Four models available with optional Remote LED Pak. These are the finest terminators available, they fix SCSI problems and improve reliability.

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  - Less Errors, More Reliable Data Transfer
  - Diagnoses Problems - Analyzes Signal Quality
- Features:**
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  - Status Indicators - Gold Contacts

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**From: \$599**

**Benefits:**

- Up to 14 Devices to 1 Computer
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**Features:**

- 2-1 Active Digital Switch/Repeater
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## Gold Diagnostic Adapters



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• Both 50 pin and 68 pin (all combinations)

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**Styles:** 58 Pin Adapter Wide to 50 Pin Narrow  
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**Styles:** For Adapter, Ultra Wide Card  
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**Hot Swap Powered Terminator**

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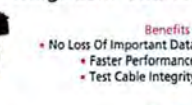
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## SCSIVue™ Gold Diagnostic Cables



**Benefits:**

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- Faster Performance
- Test Cable Integrity

**Features:**

- Diagnostic Indicators
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## Teflon 90 Ohm External Cables



**From: \$159**

**Benefits:**

- Ultra SCSI 40 MB/s operation
- Fixes Ultra SCSI Cable Problems

**Features:**

- Perfect 90 Ohm Impedance Match
- Triple Pronged Connector With Gold contacts

## Gold .8mm Ultra SCSI Cables



**From: \$109**

**Benefits:**

- Faster Performance
- Test Cable Integrity
- No Loss Of Important Data

**Features:**

- New .8mm Ultra SCSI Connector
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- Diagnostic Indicators
- Large Ferrite Filters

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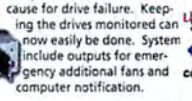


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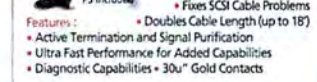
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- Fixes SCSI Cable Problems

**Features:**

- Doubles Cable Length (up to 18')
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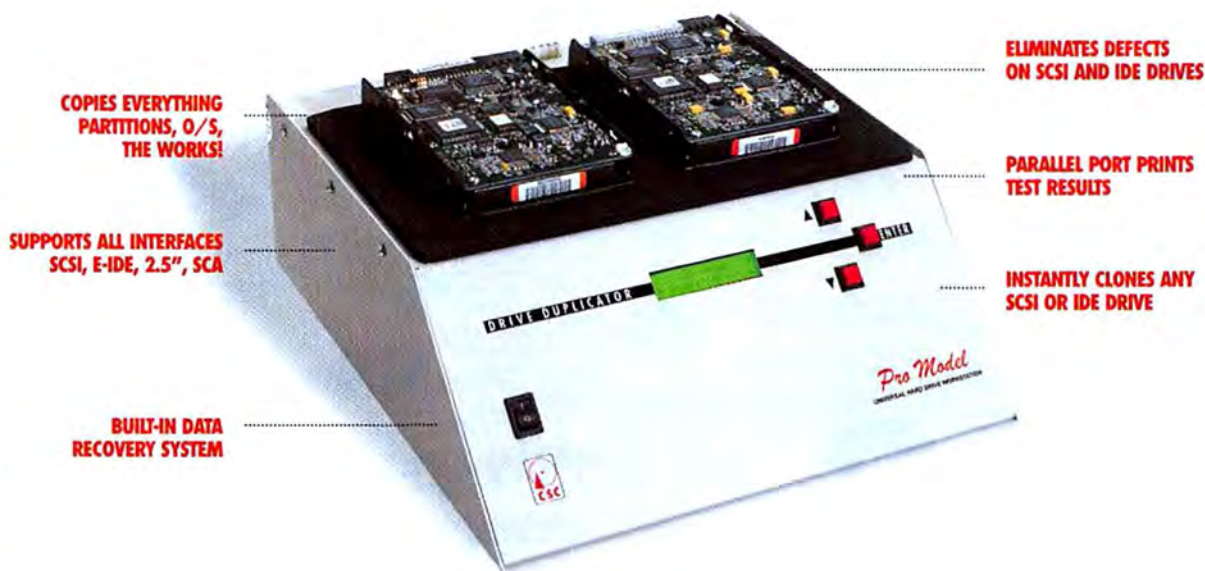
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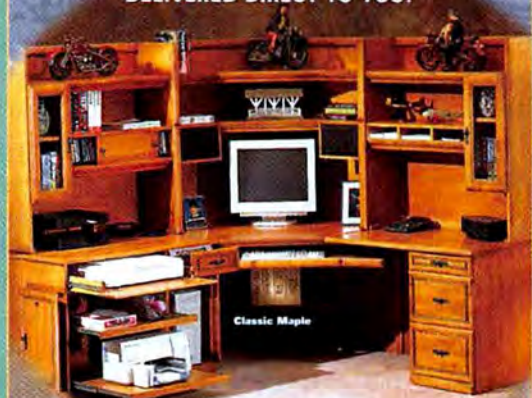
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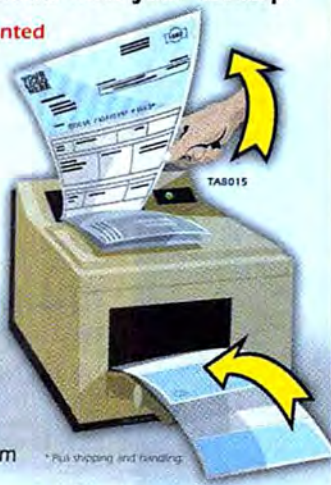
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The PC World Marketplace—see the back of this issue.

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Max. monthly cost	\$14.95	\$19.95	\$109.95	\$139.95	\$299.95	\$859.95	\$3999.95
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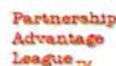
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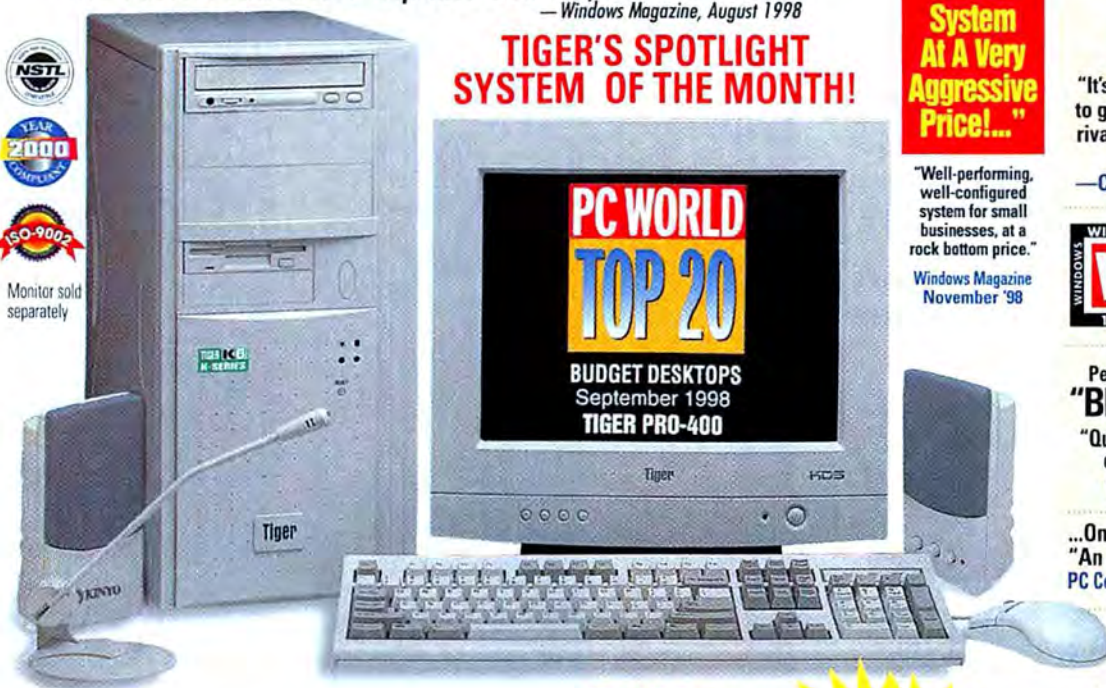
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# No More Excuses: Bugs Must Die

SOFTWARE BUGS ARE A LOT like Seattle rain or New York City noise: They surprise you mainly by their absence.

I've read article after article about software's inherent imperfections. I'm willing to accept the academic notion that developing software without a stray defect or three may be impossible. But bug-free programs are so far from what we typically get that there are galax-

ies of room for improvement. And the software industry has generated almost as many excuses as bugs. Here are some of the worst:

**It meets the spec.** Developers seem to think their code is fine as long as it meets design standards set for the project. Too bad most specs typically describe hermetic worlds that bear no resemblance to reality.

**It works fine on its own.** If a program works perfectly on its own terms but disables your printer, your USB adapter, and your floppy drive, is it bug-free? Laugh if you like, but I recently had to uninstall a suite of scanner software just to get my Internet connection to work. The scanner itself never had any problems. Should I count my lucky stars for such great software?

**It's good enough to ship.** Say there are 2000 features in a program, and 17 don't work. Is that good enough to ship? Welcome to the Windows 98 upgrade, where the number's a lot bigger than 17. The geniuses in Redmond thought Win 98 was good enough to ship. By Microsoft's slack standards, I suppose it was.

**We tested it again and again.** Testing can be as flawed as software. Wouldn't you be ashamed if your company not only released products with major flaws but then released "fixes" that then had to be recalled? Microsoft keeps doing just that, and it doesn't even blush. Where are all those testers it brags about?

**The other guys are no better.** I've heard this repeatedly from Microsoft employees. It's the same corrupt argument the Big Three automakers made in the 1960s before a sizable hunk of their market got swallowed by high-quality imports. As the mar-



Bugs may be  
**inescapable**, but  
much of the **junk**  
vendors ship is a  
**step away** from  
consumer **fraud**.

ket leader, Microsoft should be a leader when it comes to quality. Instead, it ships shoddy goods and tries to make up for bugs with marketing. If that business model works for Microsoft, competitors figure it will work for them.

**Whose bug is it, anyway?** Wordstar, the first application I bought for my IBM PC, refused to run on DOS 1.1. The makers of the operating system and the application blamed each other. The modern equivalent: Device drivers that get rewritten every week and end up crippled by Windows 98. Who's at fault? There's usually blame enough to go around.

**It's always been this way.** Software makers rarely consider quality a major goal. Microsoft's early slogan was "We Set the Standard." True enough: The company was not averse to shipping defective code to the computer makers that were its first customers, and others picked up the tune. The culture hasn't changed, but now you get your bugs direct from the source.

**It's a complex world out there.** As the permutations of software and hardware grow, so does the potential for trouble. That means the industry needs better tools and techniques for taming this complexity. In the early days of Microsoft's DirectX video technology, the software took down entire machines. Last week a mouse driver brought my PC to its knees. Amazingly, we take this sort of thing for granted.

**Quality is too expensive.** That might be the sad truth for some low-volume game developer who has to get stuff out the door in a hurry. But the cost of supporting and surviving buggy software is the truly expensive item; it just happens that customers pay instead of vendors.

We don't accept major defects in our cars. We'd refuse to spend hours every month replacing defective parts in our refrigerators. Bugs

may be an inescapable part of software, but much of the junk that vendors ship is a step away from outright consumer fraud.

So here's my challenge to Bill Gates: As Microsoft's pot of cash nears \$20 billion, how about investing \$5 billion in an industry-wide quality initiative, beginning at your own doorstep?

**Rule 1:** No product will ship with known bugs. Period.

**Rule 2:** See Rule 1.

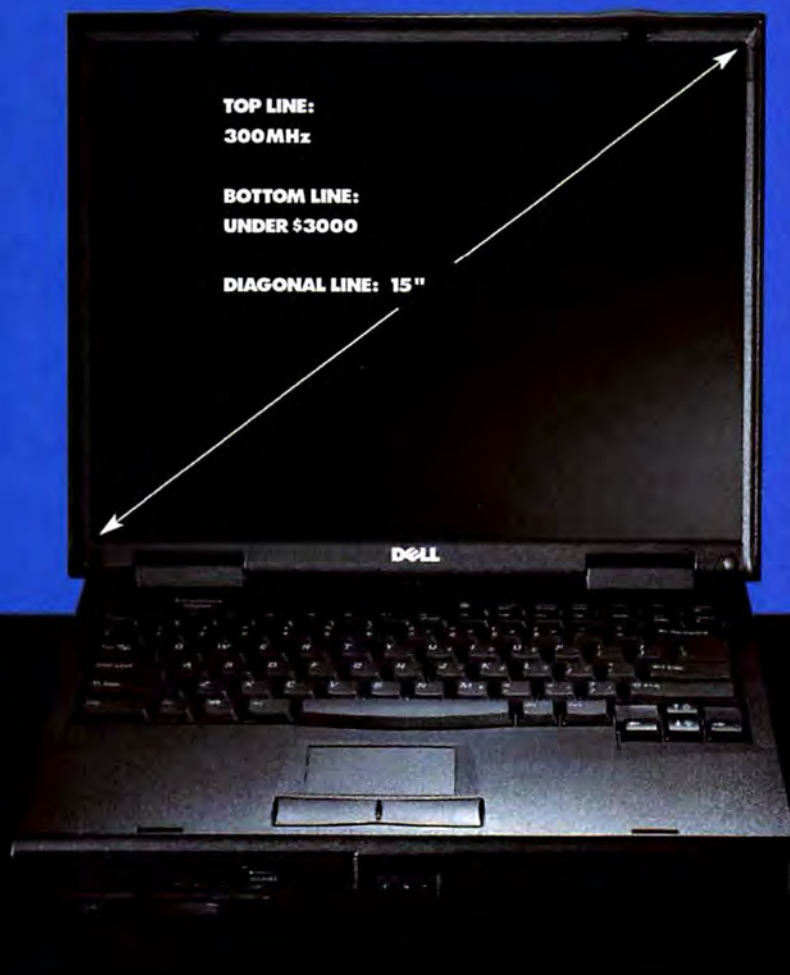
PC World Contributing Editor Stephen Manes has been writing about computers and their frustrations for more than 15 years. He is coauthor of Gates, a biography of Microsoft's chairman. ■



PC World® (ISSN 0737-8939) is published monthly at \$29.90 for one year (12 issues), \$59.80 for two years (24 issues), \$89.70 for three years (36 issues) by PC World Communications, Inc., 501 Second St. #600, San Francisco, CA 94107. Foreign orders must be prepaid in U.S. funds with additional postage. Add \$20 per year for Canada and Mexico; add \$46 per year for airmail for all other countries. Canadian GST Registration #R124669680. Periodicals postage paid at San Francisco, California, and additional mailing offices. Canada Post International Publications Mail Product, (Canadian Distribution) Sales Agreement No. 0463566. POSTMASTER: Send address changes to PC World, Subscription Dept., P.O. Box 55029, Boulder, CO 80328-5029. Editorial and business offices: 501 Second St. #600, San Francisco, CA 94107, 415/243-0500. Copyright © 1998, PC World Communications, Inc. All rights reserved. The trademark PC World is owned by International Data Group and used under license by PC World Communications, Inc. PC World Top 20®, Top 20®, PC World Top 10®, Top 10®, PC World Top 100®, Top 100®, and Consumer Watch® are trademarks of International Data Group, Inc., and used under license by PC World Communications, Inc. Printed in the United States.



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