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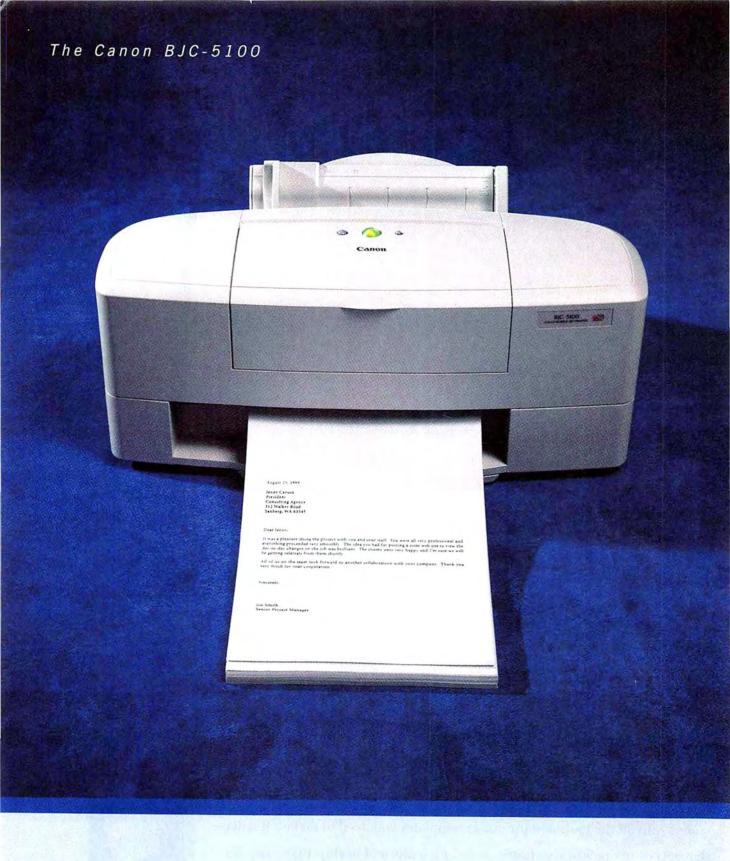
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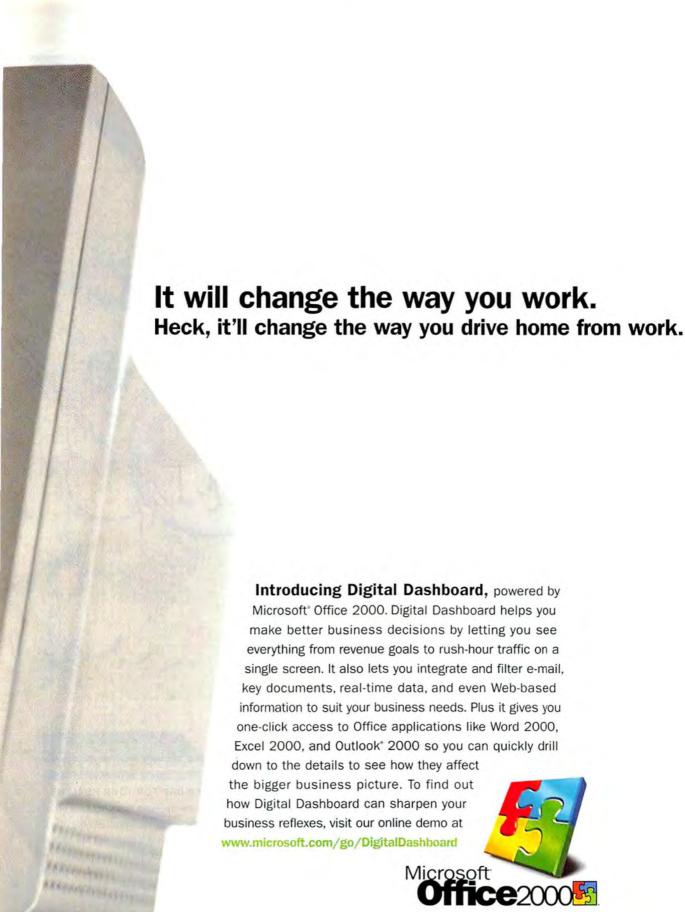
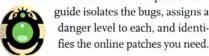*At $149, the BJC-5100
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PC WORLD FEBRUARY

VOLUME 18 ◆ NUMBER 2

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COVER Illustration by Hank Osuna

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PCW ONLINE

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H O W - T O Here are step-by-step instructions for making a Web photo album for your friends and family. It's done with free software tools—no coding necessary!
www.pcworld.com/feb00/webalbum

THE TOP CD-REWRITABLE DRIVES
R E V I E W One of two new drives we tested for this monthly roundup stood out as a winner for its speed and low price.
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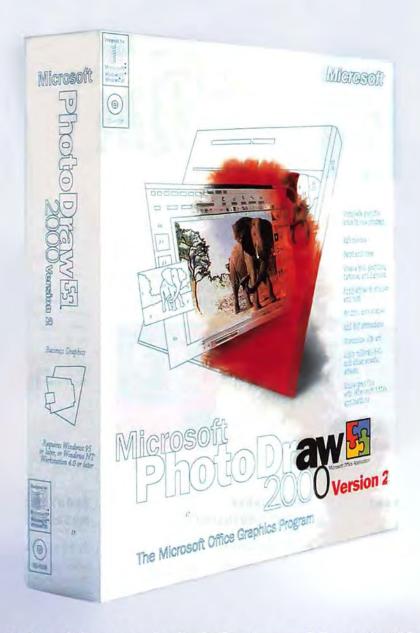
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WINDOWS 2000: THE UPGRADE

Thinking of taking on Win 2000? Upgrade with your eyes open. We test the new OS on multiple systems and give the play by play: the install, the peripherals, the hardware, the aftermath.

WINDOWS 2000: SUPER TIPS

Now that you've upgraded, here's a map to the new landscape. Find out how to customize the desktop, manage files, maintain security, network— whatever you want to do.

19-INCH MONITORS: FLAT IS IN

These days you can get flat-screen monitors without going flat broke. *PC World's* jurors check out 25 flat and traditional CRTs and rate the spectrum.

THE REWRITABLE STUFF

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THE BANK INSIDE YOUR PC

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ALSO NEXT MONTH

▶The PC World Top 100: The best Power, Midrange, and Budget desktop PCs; Notebooks; Home PCs; Printers; Monitors; Graphics Boards; and Scanners.
▶Here's How: Word Processing on embedding voice notes; Internet Tips on enlivening a Web site; Answer Line on protecting your privacy on a shared PC.

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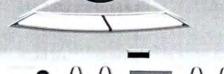
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Serial PC Killers Strike Again

THE PC IS DEAD AGAIN, the victim of a strange new breed of serial killer. In bygone days, each serial killer claimed multiple victims. The chic serial killers of the PC added a new twist: There were many killers, but the victim was always one and the same—the PC. First to murder the fledgling PC was the Big Iron Gang. This merciless band of mainframes, minicomputers, and terminals smart and dumb strangled the PC in its crib—only the PC was too stupid to realize it had met its end. On it crawled—right into the first onslaught of information appliances built in the early 1980s by Canon and Information Appliance, Inc. An appliance called the Canon Cat piled onto the lifeless PC and extinguished the last vestiges of vital signs. The PC, always slow on the uptake, failed to grasp the awful truth that it was dead, defunct, bereft of life, an ex-PC—just as surely as Monty Python's parrot was an ex-parrot.

Being dead, the PC was easy prey for natural born killers like the Newton, the pen computer, and various PDAs. These cutthroats left the PC even deader, so dead it hardly resisted the great network computer blitzkrieg of 1995. That was the year hordes of 200-MHz diskless demons began hooking their 28.8-kbps modems to the telephone network to download everything anyone could possibly need. Nonpartisan witnesses like Paul Saffo of the Institute for the Future examined the PC's lifeless body and issued the appropriate pronouncement: "The PC is dead. It's the horse and carriage of the Information Revolution." NCs went on to capture the hearts of early adopters in 1996. Claiming lower operating costs than the PC, they rode a wave of TCO mania into big corporations in 1997 and became mainstream in 1998. It couldn't have happened if Java and the browser hadn't rendered the operating system and processor irrelevant. By March 1999, no PCs were left to hear IBM chief executive Lou Gerstner announce, "The PC era is over."

That makes the new millennium a PC-free zone. All business computing is done by big corporate IT directors using NCs and PDAs to control thousands of other NCs and PDAs. The personal aspects of computing belong to those daring young digerati with their information appliances and post-modern PDAs. The

The PC is in a rare ascending death spiral camouflaged by double-digit annual growth on a huge base.

digerati can cite impressive sales figures to back their story. PDAs (mostly Palm Pilots) have sold like gangbusters—2.65 million units worldwide in 1998, according to International Data Corporation. While the NC can't match those numbers, IDC says that 305,000 "thin clients" shipped in the first half of 1999. Sales of information appliances are still being tabulated. What's certain is that NCs, PDAs, and information appliances have killed the PC.

True, PDAs that can't synchronize data with PCs don't sell. That's why Palm Pilots come with a cradle that simplifies the task. And I will be the first to admit that Web pages are much easier to read on a PC screen than on a pint-sized PDA, and that contact information (or any other kind of data) is much easier to enter on a PC keyboard than via miniature mock-keyboards or PDA pens. But the important thing to remember is that the PDA isn't a PC companion, it's a PC killer.

As for NCs, too much attention has been focused on the quantity of NC sales and not enough on the quality of the NC itself. NCs are replacing terminals at a snail's pace for a reason. NCs are the snails of the Information Age. They are supposed to move slowly. PCs are dead because they're quick. And the future belongs to the snails.

THE REAL CULPRIT

BUT IF WE HAD TO pick one of the big three serial PC killers as chief culprit, it would have to be the information appliance. It's the information appliance that will rule the new millennium. How many information appliances will this take? As it turns out, the number could be an order of magnitude smaller than the number of digerati it takes to screw in a light bulb.

Pity the poor PC in its death spiral. According to IDC, worldwide PC sales went from 80.3 million in 1997 to 89.96 million in 1998 to approximately 110.8 million in 1999. This death spiral of some 280 million units is easily misdiagnosed. It's one of those rare ascending death spirals camouflaged by double-digit annual growth on a gigantic base.

A seer from the Institute for the Past looked at recent sales figures and drew an absurd conclusion. He saw a connection between the Internet explosion and the 280 million PCs that have been sold in the last three years. "The Internet has been good for the PC," he said, "because the PC is the device of choice for accessing the Internet." He wanted to join the digerati, but only a digeramus would see things that way.

Phil Lemmons is editorial director of PC World.   ■

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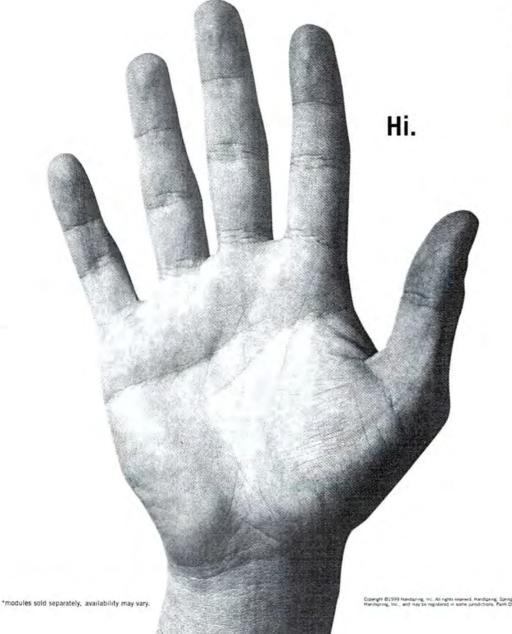
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YOUR TAKE ON: Best and worst in PC history ◆ E-shopping ◆ Online tax filing

'DIGITAL CENTURY' FANS FLAMES OF THE PAST

YOUR "Computing Through the Ages" in December's "The Digital Century" was nicely done but could have been better. You uncritically echoed the Apple PR department's claim that the company's 1983 Lisa was "the first computer to use a graphical user interface." That's like mentioning Al Gore's "invention" of the Internet. Apple's GUI was a direct offspring of the Xerox Star, from Xerox PARC (Palo Alto Research Center).

Paul Koning
Wilton, New Hampshire

YOUR LIST OF "10 Biggest Hardware Flops" includes some of the most important innovations in the computer industry. For example, the NeXT machine was not only "ten years ahead of its time," but a powerful business tool that lives on as the new foundation of Apple Computing. Your put-down of the Net PC concept ("Dumb and dumber terminals") overlooks the rapidly approaching Internet alternative for storage and retrieval of data and applications. Pentop computers paved the way for a whole generation of handwriting devices. And the PowerPC is not "just another Mac," but the number two chip architecture in the world.

Steve Jackson
Columbia, South Carolina

THE POWERPC chip is a flop? At a time when the G4 is the first consumer-oriented gigaflop machine, when iBooks top U.S. retail sales, when the new iMac line is not only taking off but has inspired imitators from EMachine's EOne to Gateway's Astro? Talk about bad timing...

Joseph Prisco, Ithaca, New York

AS A FRESHMAN in computer science in the Philippines, I congratulate the writers who contributed to "The Digital Century" for a wonderful job. However, I do challenge some comments. In "10 Biggest Software Flops," for example, on what basis do you include RAM doublers? Having studied memory management schemes, I consider them effective, though inefficient. You also list Apple's EWorld as a flop. EWorld improved America Online's interface and gave Mac users a community they could call their own. EWorld died owing to Apple's financial problems at the time.

Gino Ledesma
Ateneo de Manila University
The Philippines

READERS RESPONDED—often passionately—to our December feature article on the best and worst in computing history.

Editor's response: Our top flops included some good products, maybe even some great ones. But they either failed in the marketplace or—like the PowerPC—never lived up to the hype generated at their introduction. —**Harry McCracken**

YOU LISTED "10 Buzzwords We'd Like to Bury." I am in full agreement with your choices except for number one, which really should have been "user friendly."

Gary Marc Remson, via the Internet

IN YOUR DECEMBER "Digital Century" feature, Gregg Keizer states in "The Mother of All PCs" that the 1946 ENIAC is "at the base of the [PC] family tree." In fact Thomas Flowers, a British post office worker, built the first high-speed, programmable digital computer, called Colossus, in 1943. It was used to break the Enigma code of Hitler's high command.

Mark Griffin, via the Internet

I WAS PLEASANTLY surprised to find the work of Dr. George Stibitz mentioned in *PC World*. Stibitz invented one of the first digital computers in 1939 while working as a mathematician at Bell Telephone Laboratories. In 1937 he built a primitive contraption made of dry-cell batteries, metal strips, and flashlight bulbs soldered to wires from two telephone relays. He dubbed it the Model K, for the kitchen table where he created it. A replica is at the Smithsonian in Washington.

Carl W. Loveday, Naples, Florida

THE PROTOTYPE of the ABC—perhaps the world's first digital computer—was completed in October 1939. It was built by John Atanasoff and his assistant, a Mr. Berry. Though the ABC was small, it did carry out digital calculations. Atanasoff and Berry's work was conducted at what is now Iowa State University.

David Beresford-Green
Fall River, Nova Scotia

IS E-SHOPPING TOO EASY? NOT YET

CATHRYN BASKIN'S *Up Front* editorial [December] made e-shopping sound as easy as falling asleep after 12 hours at the mall. In my experience, online shopping is a real pain! "Fire up the modem, load up the shopping cart with a few clicks of the mouse, and—voilà!" just doesn't happen. Most of us have to shop in the evenings on dial-up modems. The resulting traffic jam means that download rates approach zero kilobits per second, not 28.8 kbps. Then there's the sheer profusion of Web sites, plus the time-consuming navigation and querying that some sites put you through.

Rick Cunnington, Oro Valley, Arizona

SPAM: MORE SOUND AND FURY

JUST A WEEK before I read "Spam! How It Happens, and How to Beat It" [November], my e-mail address was used to send out pornographic spam—because of ▶

something stupid I did. My ISP is AOL, and I daily get spams with headers like "AOL will give you one month of free service." I clicked on the Web address given in one such message, and it asked for my password. You'd think that would have been my cue to back out, but no. The next day I could not log on. AOL security told me what happened and was able to catch the spam only after it had reached 4000 subscribers. Out of that number, I received five death threats. One of the porn spams was sent to a 15-year-old!

If legitimate businesses want to send out spam mail, fine. But for some illegitimate company to steal a screen name and password and hide behind it really disgusts and infuriates me.

David Hatt, Menlo Park, California

TO CD OR NOT TO CD
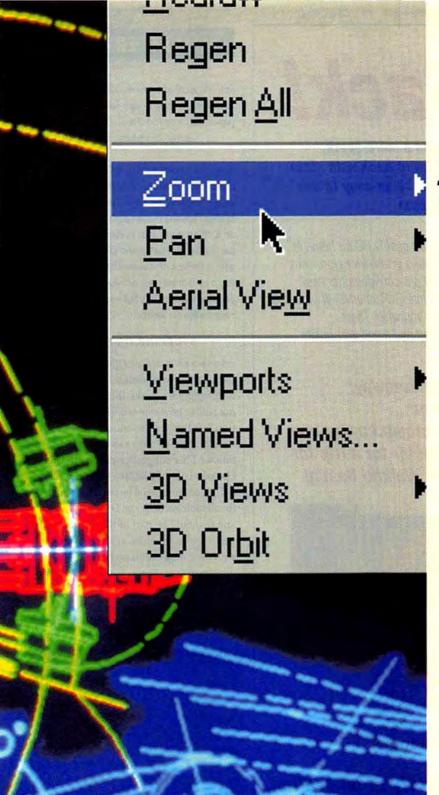
"COPYRIGHT OR Copy Wrong" from your November Special Report on Web music [page 203] says that the music industry has managed to encode recordings so they cannot be digitally copied. But it does not state that the music industry succeeded in influencing federal regulations so that only CD players, not CD recorders, could be sold. But for these regulations, CD recording devices would be as ubiquitous as tape recorders. Their price no doubt would be comparable as well. And PC data recorders would be cheaper by a factor of ten. We'd have a universal multiple-use storage device instead of the pathetic 3.5-inch disk drives that we're stuck with now.

Eric Skalwold, Ithaca, New York

FILING TAXES ONLINE

YOUR ARTICLE "Signed, Sealed, Delivered...Online" [*Top of the News*, November] states that until recently, "You could file your taxes online, but you still had to sign and deliver a paper copy afterward."

I beg to differ. I have filed my taxes for several years using form 1040PC. Last year the IRS provided me with an ID code that allowed me to submit my return electronically. My 1998 form was submitted and accepted by the IRS within 24 hours; no paper copy was required. My taxes due were electronically withdrawn at a ▶

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George Lehmberg, via the Internet

Author's response: The E-filing situation is complicated. For starters, 15 states require paper returns. The E-file Customer Number system remains in pilot phase. Without ECN, an E-filing must still route through third-party intermediaries and selected tax preparers for lack of standard filing protocols. If you owe money, your IRS-approved tax preparer can file for you, but you are separately responsible for payment. **–Rick Overton**

STOPPING HACKERS

DECEMBER'S *Home Office* column on hackers was very timely. As a software developer who works from home, I did not realize how exposed my DSL connection left me. As the column advised, I went to Steve Gibson's site, ran his tests, followed his suggestions, and also purchased a copy of BlackIce Defender.

The column should be required reading for all cable modem and DSL subscribers, and it should be part of the documentation cable companies and telcos supply with their installation packages.

*Al Henry
Vancouver, British Columbia*

PC World *welcomes your letters. Send e-mail to letters@pcworld.com.* ∎

CORRECTIONS AND CLARIFICATIONS

CONTRARY TO a statement in December's *Bugs and Fixes*, Netscape Communicator has long offered 128-bit encryption, although it had to be downloaded separately from the standard 40- or 56-bit version.

In "The Goods for Gamers" ("Ultimate Buyers Guide: Home PCs," December), we should have noted that a Cambridge SoundWorks PCWorks five-speaker system costs $100 (a three-speaker version costs $50).

In December's *Top 100*, page 282 mistakenly showed a photo of a modem rather than the graphics board the caption indicates.

In December's *Top 10 Monitors*, the number five 19-inch model, a MAG InnoVision, should have been listed as the 800V.

PC World regrets the errors.

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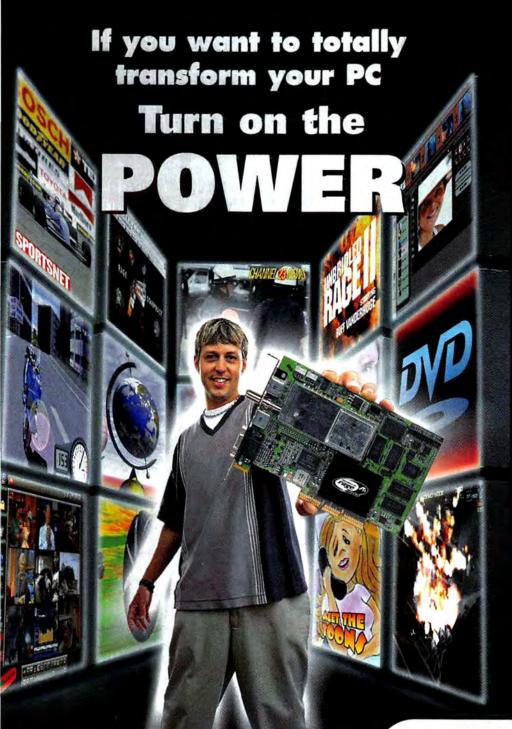
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Windows 2000 Server

Windows 2000 Advanced Server

Windows 2000 Datacenter Server

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The Web Is a Hacker's Playground

Can the Net be crime-proofed? Not as long as there are sloppy programmers and clever cat burglars.

I DON'T SCARE EASILY. But I've been terrified twice in the past year. The first time it happened was while I watched *The Blair Witch Project* at a local theater. The second time was during a demonstration of a new software product. Now, I've seen a million software demos, and in the vast majority of these my biggest fear is that I'll fall asleep. This time, though, I found myself perched on the edge of my seat. Eran Reshef, cofounder and vice president of Perfecto Technologies, was showing me why he thinks the world needs his company's product, a security package (priced at upward of $50,000) that is designed to protect Web sites from hacker attacks.

As I sat there watching, Reshef demonstrated how he could transform just about any Web site into his own personal playground. And though Reshef and most of his technical staff are former members of an elite technical unit in the Israeli Army, he denied that he possesses the hacking talents of a once-in-an-eon technical genius. In fact, Reshef was careful to characterize his skills as fairly common. He said that practically anyone who can put up a Web site—and has a burglar's moral code—can take a site down. Those same skills can be used (and this is when I really got frightened) to plunder a site for confidential information about its users.

I don't want to alert any hackers out there to security holes that are waiting to be breached. So I won't mention the names of the Web sites I saw Reshef gain access to–but they're ones you know, maybe even ones you do business with. Reshef would spend 15 minutes or so editing HTML code and performing other technical tricks...and then I'd see the names and passwords of a site's programmers scroll across his computer screen.

He dropped items into his shopping cart at various e-commerce sites, including the online home of a major computer vendor, and then changed their prices at will. He also downloaded customer information from an airline's frequent-flyer site, and he described to me how he was able to make trades from the account of the CIO of a large online brokerage firm—while the CIO looked on.

"This is bad," Reshef announced at one point in his demonstration for me. "The game is over—I can do anything I want [at this site] right now." Gulp.

PROTECTION RACKET?

RESHEF DIDN'T HAVE to hack around firewalls or break encryption. He accomplished his break-ins using only his Web browser, some know-how, and maybe a little programming code. Reshef (and presumably hackers who use their abilities less benignly) hunts around Web pages for little programming mistakes. These subtle errors—Reshef says most programmers make them from time to time—offer knowledgeable snoops points of entry to a site's server. And once they have that access, they can cause all kinds of mayhem.

Not that Reshef would—he's a nice guy. In fact, one analyst I spoke to described him as a Boy Scout. And the break-ins he performed ▶

were done only after obtaining the permission of the sites' proprietors. But in retrospect, I can't help imagining him appearing in an episode of the HBO series *The Sopranos* selling protection against the depredations of a frightening group of high-tech wise guys.

Shortly after taking in Reshef's demonstration, I saw a report of a popular news site (which will also remain nameless) being taken completely down by an unknown hacker or hackers. I called the site manager to see whether the break-in involved the kind of hacking Reshef showed me. She said no. The site had simply had a problem with an FTP server, which was now fixed. Besides, she told me, the kind of thing I was describing to her was impossible. "Did you ever think maybe you were getting a snake-oil pitch?" she asked. "'Here's the disease, now here's the medicine you need to cure it?'" That's a reasonable question, I thought.

So I did some checking.

"The problem that Perfecto is targeting is right on the money," counters Mike Zboray, vice president and research director for the Gartner Group, an industry research firm. "Take a look at your typical Web server configured for use on the Net. The people who do that configuration are not terribly meticulous about the underlying code, and they aren't meticulous about how they have safeguarded the content they have created. When it works, they put it up. Is that good enough for e-commerce? Probably not."

For quite a while, Zboray has been warning his clients to be diligent about protecting their Web sites from this kind of intrusion, either by plugging holes themselves or, more recently, by buying Perfecto's software. But to make his point, he has sometimes been forced to perform a little hacking of his own. "I'm not nearly as good at this as Reshef is, but I have been able to get complete access to servers. I do it just to demonstrate how people are exposed."

> Reshef dropped items into his shopping cart at major **e-commerce sites**—and then changed the prices **at will.**

A similar demonstration by Reshef persuaded Quote.com's Kaj Pedersen that his site needed Perfecto. "The selling point for me was when Reshef changed my password and was able to get my access privileges to the site," explains Pedersen, vice president of engineering at the financial market data site.

Okay, I'm scared. And naturally, my first concern is for my own wallet. I practically live on the Internet. Are my life and finances an open book for every intelligent reprobate who has a browser? That depends.

"If I were a vendor, I would be deathly afraid," says Zboray. "If I were a bank I would be deathly afraid. And anyone who is doing a company extranet should definitely worry if they have sensitive company data out there."

On the other hand, Zboray believes, consumers shouldn't panic about the state of security on the Web. "I'm not afraid of using my credit card [at e-commerce sites]—the credit card companies are shielding me from responsibility for any fraudulent charges of more than $50." Much the same is true at online banks: A bank's FDIC insurance shields your account from loss if your bank—online or otherwise—is robbed.

WATCHING YOUR WALLET

DESPITE SUCH REASSURANCES, you still need to be careful where you take your business online. "Most sites that are doing e-commerce should have some kind of security statement with regard to how your transactions are secured," suggests Matthew Devost, senior analyst for Security Design International, a company that provides security consulting to large corporations and e-commerce companies. Look for that statement and read it carefully before you provide personal information to a site.

If a site doesn't carry such a statement, and you're doing more than making a purchase there, call and grill a knowledgeable company representative on how safe the site is. Ask if the site uses an out-

side firm to test its security. Companies generally don't like to provide much detail—because they don't want to give away any secrets—but you need to make sure that they're taking measures to protect their site from intruders.

"At the moment, only a small percentage of people call us to ask about security," says Quote.com's Pedersen. "It's mostly those who understand the technology and are concerned about how we will protect their personal data concerning their net worth. But I think these questions will become increasingly common as people begin to understand the vulnerabilities. I think people should be asking these questions."

NO SAFETY IN NUMBERS

OF COURSE, THE WEB will never be entirely free of security threats. "There are a lot of smart people out there," says Devost. "And they will always find a way in if there is something they want." And unfortunately, there's no easy way to tell how safe a site is. That's partly because sites are reticent about divulging security information and partly because many sites are unaware of the risks.

"I see a time where there might be a *Good Housekeeping*–style seal of approval for the security of sites," says Devost. "There are organizations that do that now for privacy. Why not for security?"

Oh, and another thing. If you're a Web site manager, don't make the mistake of challenging a hacker. I told Eran Reshef about the news site's suggestion that Perfecto's business model was nothing more than a snake-oil pitch. Within 30 minutes, Reshef told me, Perfecto had gained access to the source code on the news site's server. He added, "That means I can do pretty much anything, including shut down the site."

But since Reshef is a Boy Scout, the Web site in question managed to escape unscathed—this time. But if I had a Web-based business—or any plans to open one—I'd be thinking very seriously about hiring a bodyguard.

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

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Know Thy Computer Vendor

KYLE DAVIS, a minister in Compton, California, had never heard of PC vendor Crossline. But when he saw one of the company's ads, he thought its offer of a 350-MHz K6 computer for $850 would be a good deal for his church. Davis arranged to pick up the PC in person to avoid shipping charges and paid for it in cash—which Crossline said would expedite his order. Told that his system would be ready in ten days, Davis got worried when that time passed without a word from Crossline. Despite countless attempts, he's been unable to contact the company since.

Sadly, Davis is one of dozens of disgruntled Crossline customers I've heard from. As of October, 1999, the company's phones had been disconnected, its Web site had disappeared, and its Cerritos, California, offices were reportedly empty. At press time, the company had still not filed for bankruptcy.

If you're considering buying a PC from a company you're not familiar with, how can you avoid getting a raw deal? First, never base a purchase decision solely on ads. Research the company before buying.

Not every start-up is a risky venture, but you might be safer going with a company that's been around for at least three years. You can find facts on companies' financial situations at sites such as www. companysleuth.com and www. companiesonline.com.

Ask the PC vendor for customer references—or better still, find them yourself at forums such as those at Deja.com (www.deja.com). And check out the Better Business Bureau Web site (www.bbb.org) to see if any complaints have been filed against the company.

When ordering, pay with a credit card, and make sure the company won't bill the card until the order ships. If there's a dispute with the vendor, your credit card company may be able to mediate—a solution that Davis can't take advantage of, since he paid Crossline in cold, hard cash.

Heads Up...

REBATE REFUND? For Jeff Rice of Denver, a $20 rebate offered by Vancouver, British Columbia–based PhotoChannel Networks wasn't such a great deal. When Rice tried to cash the rebate check, he found that most U.S. banks charge a $25 processing fee for checks that originate outside the United States. PhotoChannel has offered to honor the rebate if customers return the original checks... **Cerplex Takes Hostages:** Owners of NEC Ready laptops were victims of a recent billing dispute between NEC Packard Bell and Cerplex Group, a firm under contract to repair the laptop systems. When the two companies failed to resolve their differences, Cerplex refused to release systems that had been sent in for repairs, forcing NEC Packard Bell to provide some customers with replacement systems. At press time, NEC Packard Bell said that all repaired systems were being returned to their owners. The company no longer plans to use Cerplex for notebook repairs... **Hercules Reborn:** Peripheral vendor Guillemot has acquired Hercules Graphics Technology, the veteran graphics card manufacturer that declared bankruptcy in 1999. Guillemot will introduce its new cards under the Hercules name and will provide technical support and repairs for existing owners. Check out www. guillemot.com for details.

LETTER OF THE MONTH

I BOUGHT AN IBM Aptiva computer shortly before moving to Japan. Two months after I arrived overseas, the PC's monitor died. IBM told me to send it back to the United States for repair. I told IBM that I knew of two nearby authorized IBM dealers in Japan, but they said that I needed an international warranty to have my monitor fixed at one of those shops. Finally, I broke down and bought a new monitor.

Robert Griffith, Okinawa, Japan

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

On Your Side responds: I spoke with IBM public relations program manager Lisa Kaslyn, who says, "Because of technical and logistical differences, such as languages, electrical requirements, and modem and power specifications...IBM does not offer an international warranty on its consumer PCs. Consumers who purchase an IBM Aptiva PC are covered by a one-year warranty only in the country in which they purchased the system." IBM is working with Griffith to resolve his problem. ∎

SERIES

BE LIMITLESS

SERIES

Hassle-Free Access to CD-ROM Titles

P R O B L E M *The chore of swapping multiple CD-ROM titles is time-consuming and unwieldy.*

S O L U T I O N *Use a virtual CD-ROM utility to load the titles you use most often onto your hard disk.*

FOREIGN-CAR MECHANIC Charles Schultz understands the frustrations of trying to ride herd on a large collection of CD-ROM titles. When BMW began publishing its service manuals on CD-ROM, Schultz added a laptop to his toolbox at the Dallas/Fort Worth dealership where he worked. Running the discs on his portable PC in the garage gave Schultz quick access to data, as well as saving him a trip to the workstation where other technicians waited in line.

The setup worked well until BMW expanded its CD-ROM offerings. "They kept moving more documentation over to CD-ROM,"

says Schultz, "and my collection of discs kept growing." He found it annoying to have to scrub dirt and grease from his hands each time he swapped discs in his CD-ROM drive.

To eliminate the juggling, Schultz turned to Virtual Drive 2000, a $35 downloadable program available from Far Stone Technology. Virtual Drive 2000 simplifies the task of copying CD-ROMs to a hard disk. This utility and IMSI Software's similar CD Copier Pro ($40) allow users to run multiple titles without swapping discs or adding drives to their system. Loading CD-ROMs to the hard drive also revs up performance. And to handle titles that run only from a CD-ROM drive, these utilities create virtual CD-ROM drives that fool the software into thinking they're the real thing.

VIRTUAL CD CHANGERS

CD COPIER PRO and Virtual Drive 2000 work similarly. Both enable you to define up to 23 virtual drives, which are assigned unique drive letters just like other drives in your system. Each program uses a split-window interface that lists the virtual drives in one panel and CD titles in the other. Both utilities let you load music CDs onto your hard disk—though only Virtual Drive lets you specify the tracks you want to copy—and both allow you to compress the contents of a title to conserve hard-disk space. The number of CD-ROMs you can copy is limited only by the size of your hard drive. Maximum CD-ROM capacity is 650MB, but many titles use only a few hundred megabytes. Large reference titles, however, consume about 500MB even when compressed.

Once you've copied a CD-ROM title to your hard drive, simply load it into a virtual drive by clicking the Insert button. The first time you do this, the title's setup program will start automatically. A small number of files are copied over, and the program is registered in Windows.

In theory, you can load any CD-ROM title into any virtual CD-ROM drive, but your best bet is to dedicate one virtual CD-ROM drive to each title. Many titles search for the program files in the drive where you originally installed it, so each time you want to view a title, you'll have to reinsert the virtual disc in that drive.

CD Copier Pro and Virtual Drive 2000 differ most in how they assign letters to virtual drives. Virtual Drive 2000 adopts letters in the alphabet that fall before the letter of your physical CD-ROM drive, reassigning your CD-ROM's drive letter as necessary. So if you have one hard ▶

drive partition and your physical drive appears in system D:, creating three virtual drives with Virtual Drive 2000 will bump your CD-ROM drive letter to G:. CD Copier Pro, however, uses only letters higher than that of the CD-ROM drive and lets you choose the letter you want to start with. This approach permits you to reserve D:, for instance, for a Zip drive or another device you might attach later.

TRIAL RUN

CD COPIER PRO and Virtual Drive 2000 work well with most CD-ROM titles, but some newer titles will not work unless the disc is inserted into a physical drive. In addition, the audio content embedded in some CD games (usually as background music) may not play correctly with these utilities. To test your titles before you buy, download Virtual Drive 2000's free 21-day evaluation version. CD Copier is also available for $30 in a Gamers' Edition that lacks support for CD-Recordable discs,

audio CDs, CD Extra, and Photo CDs.

If you don't want to drop $40 on a utility, you can try to give your CD-ROMs the slip by copying the titles to your hard disk with a file manager such as Windows Explorer. But if you've already installed a title's start-up files so you can run it from the CD-ROM drive, you must first uninstall them, using Add/Remove Programs from the Control Panel. After copying the content of the title to your hard drive, remove the disc from the drive and run the setup program from the hard disk. If the title doesn't run correctly, uninstall it using Add/Remove Programs and delete the subdirectory from your hard drive. One caveat: With this method, you'll be unable to compress CD-ROM content easily.

EASIER CD-ROM REFERENCE

SCHULTZ IS ENORMOUSLY pleased with his solution, not only because it frees him from shuffling CD-ROMs, but also because titles run much faster from the hard

CD Copier Pro
Price: Download $40, Gamers' Edition $30; IMSI Software; 800/833-4674; www.imsisoft.com
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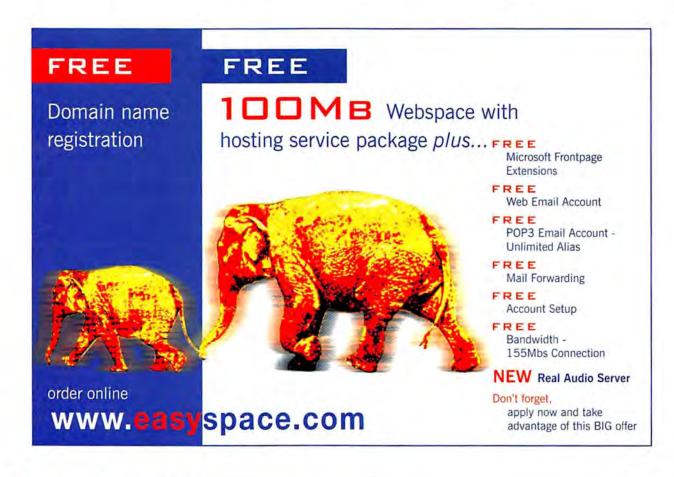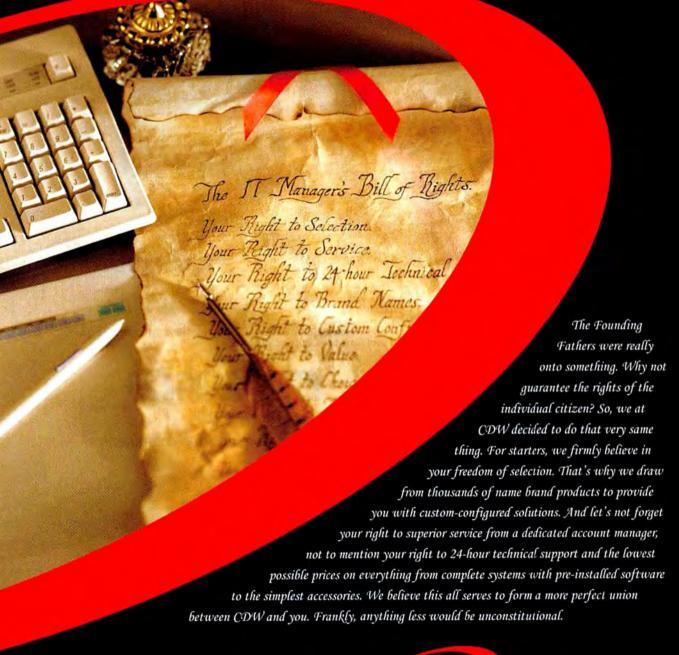
disk. Schultz's latest laptop includes a high-capacity 14GB drive, big enough to hold all his critical titles and still leave room for new ones. He also uses the utility to run a mapping package when he's traveling with his family, and to run other titles from his home collection.

Given the relatively low cost of hard drives today, having the information he needs at hand has made the cost of the hard drive upgrade well worthwhile.

Mitt Jones is a contributing editor for PC World. *If you have a solution to a PC-related hardware or software problem, send it to* got_a_problem@pcworld.com. ∎

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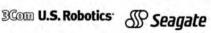
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The incredibly thin and light **Sony VAIO notebook** holds the potential to take you where you want to go—literally. Its 400MHz Intel® Pentium® II processor, 128MB RAM and 8.1GB hard drive deliver the power you demand and its size makes it easy to take with you.

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CDW 179642

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People Who Type Too Much

MEMO TO READERS of *Home Office*: You're typing too much. I know because I used to. I'd key in the same passwords, e-mail responses—even whole paragraphs—over and over. (Hi, my name's Steve and I'm a typaholic.)

Luckily, with the help of a good rehab program (a super utility, a handful of freebies, and a few nifty tricks), I recovered. And you can, too. This month I'll share the tricks and tools that'll help you reduce the number of keystrokes you make while streamlining virtually all of your computing chores.

WHOLLY MACRO

A MACRO IS a collection of keystrokes, mouse movements, or clicks assigned to a keystroke combination (such as <Ctrl>-<F9>). For example, in my e-mail program, a macro automatically replies to messages, types my name and address, and inserts a smiley-face icon (which I delete when sending mail to my editor).

Tons of free macro programs are available; nearly all of them are more than adequate for most people. But try TypeItIn first. Installation is quick, the program's a snap to use, and it's available free at File-World. The program displays a small box that sits on top of your applications. You right-click it to create a new macro button and left-click to insert text into your document. You can create up to 50 macro buttons, which is plenty.

If you have a keyboard with a Windows key, grab WinKey. It lets you combine the Win Key (get it?) with other keys and cre-

ILLUSTRATION: ADAM MCCAULEY

QuicKeys
$50 list; CE Software; 800/523-7638;
www.quickeys.com
PRODUCT INFO NO. 627

The key to **typing** success? **Watch** your **keystrokes**, note the **ones** you repeat, and **turn them into** macros.

ate macros. For example, you can assign combos for your favorite Web sites, specific apps, or Dialup Networking. The program's also free on FileWorld, and you won't burn many brain cells using it.

For $50 you can have QuicKeys, a macro program that really shines (download price is $40). Once installed, it scans your drive to find which programs are stored there, then creates macros to run them.

Using QuicKeys, I designed a sequential macro to open an e-mail in Eudora, add specific text to the reply, and send the message. And I did it in less than 15 minutes. You can design macros that work in specific programs or in all apps, with either toolbar icons or hot keys. Plus, you get toll-free tech support for 30 days.

Fair warning: Because these tools seem

to perform miracles, you may be tempted to create elaborate macros. Don't. Start slow, then work your way up to more sophisticated creations. Another tip: Record keystrokes rather than mouse clicks and movements—it's harder to screw things up that way.

Oh, yeah, one more thing: Make sure you back up your drive before installing *any* new utility. (Sorry, I'm required by contract to say that.)

MORE QUICK TRICKS

FEELING SOME resistance to using a macro program? Not to worry. Here are some tantalizing, macro-free tricks.

If you're using Internet Explorer 5.0 (I am, despite its Evil Empire lineage), you *must* try the AutoComplete feature. IE 5 keeps a history of every e-mail address, name, or other text you've typed into your browser or on a Web page. Just put the mouse cursor in the field and click the left mouse button, then pick the appropriate text from a drop-down list. And *voilà*, your saved keystrokes appear.

Eventually, however, the AutoComplete collection will get too big. To trim the list to a more manageable size, float your mouse cursor over an unwanted entry in the drop-down list and press <Delete>.

If you use Word 2000, I have another neat feat for you. Go to *Tools•AutoCorrect* and click the *AutoText* tab. Type a short phrase into the field and click *Add*. The next time you start entering the phrase, a pop-up box containing part of the phrase will appear. Hit the *Tab* key, and the saved text will appear on screen.

The key to typing success? Watch your keystrokes, note the ones you repeat, and turn them into macros. After you've used macros for a while, you'll wonder how you ever got along without them.

Find files from this article at www.fileworld.com/magazine. Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. You can reach him at steve_bass@ pcworld.com. ∎

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Meaner.

With its ultra-light design, the powerful new VAIO® 505 SuperSlim notebook makes the ideal travelling companion. Wherever your business takes you, the new VAIO 505 SuperSlim Series notebook can get you there in style. And even though it's exceptionally thin and lightweight, this ultra-slim notebook houses a powerful Intel® processor, an extra large screen and much more. Plus, the Z505 SuperSlim Pro™ Series has built-in Ethernet for fast inter-office network connections. Order your 505 notebook today by visiting our Web site or calling 1-800-682-VAIO.

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Z505RX
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Receive a $150 rebate with the purchase of a Z505RX or Z505R and a PCGA-CD51 CD-ROM Drive.[7]

Z505 Accessories

- External 16X (max.) CD-ROM Drive
  PCGA-CD51: $299.99.
- External 4X4X20X CD-RW Drive
  PCGA-CDRW51: $499.99.
- Rechargeable Lithium-Ion Battery
  Triple capacity:
  PCGA-BPZ52: $399.99.

  Standard: **PCGA-BPZ51: $199.99.**
  (One included with unit.)
- Port Replicator with i.LINK **PCGA-UPR5: $99.99.**
  Ports: Parallel, Serial, VGA Monitor, i.LINK and USB.
  (One included with unit.)
- Monitor Adapter **PCGA-DA5: $49.99.**
  Connects VGA monitor without port replicator.
- Leather Carrying Case
  PCGA-CCZ5: $149.99.
  Custom case includes detachable compartments for its accessories.
- USB Mouse **PCGA-UMS1: $49.99.**

VAIO 505 SuperSlim Notebook Standard Features

- 0.9" thin, lightweight design, magnesium-alloy case
- 10.4" XGA TFT screen
- 6.4 GB[3] hard drive
- 64 MB SDRAM (expandable to 128 MB max.)
- Integrated V.90/56K modem[1]
- High-capacity Lithium-Ion Battery
- i.LINK (IEEE-1394) interface for DV editing and data transfer between compatible VAIO computers
- One type II PC card slot with CardBus support
- One USB port
- Microsoft Windows 98 Second Edition
- Microsoft Works Suite 99, including Microsoft Word 97

N505VX
- Intel Pentium II processor 333 MHz[2]
- 3.1 lbs. light
- Bundled double-capacity battery, port replicator and external USB floppy disk drive

$1,799.99
36 month business lease only $62.64*
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(After $100 rebate[4])
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Customize with:
Upgrade to 128 MB RAM ADD $150.00

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Receive a $150 rebate with the purchase of a N505VX or N505VE and a PCGA-CD51 CD-ROM Drive.[7]

Receive a $100 rebate with the purchase of a Sony VAIO PC and a Sony Digital Handycam® camcorder (Digital8 or MiniDV).[6]

505 Accessories

- External 16X (max.) CD-ROM Drive **PCGA-CD51: $299.99.**
- External 4X4X20X CD-RW Drive **PCGA-CDRW51: $499.99.**
- Stereo Speakers **PCGA-SP51: $99.99.**
  External snap-on speakers that give you even more stereo sound.
- Rechargeable Lithium-Ion Battery
  Quad capacity: **PCGA-BP54: $499.99.**
  Double capacity: **PCGA-BP52: $299.99.**
  Standard capacity: **PCGA-BP51: $149.99.**
- Battery Charger **PCGA-BC5: $199.99.** You can charge two batteries simultaneously. Compatible with Quad, Double and Standard capacity batteries.
- Port Replicator with i.LINK **PCGA-UPR5: $99.99.**
  Ports: Parallel, Serial, VGA Monitor, i.LINK and USB.
  (One included with N505VX.)
- Monitor Adapter **PCGA-DA5: $49.99.** Connects VGA monitor without port replicator.
- Leather Carrying Case **PCGA-CC5: $149.99.** Custom case includes detachable compartments for its accessories.
- USB Mouse **PCGA-UMS1: $49.99.**

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RealJukebox and privacy concerns ◆ Finally: IE 5.01 ◆ NT fix for printer problems

RealPrivacy in the New Millennium?

THE YEAR 2000 will have dawned safely by the time you read this. And chances are the biggest Y2K challenge will be writing the correct year on personal checks. Still, in case your once-sensible PC insists on turning cartwheels on the lawn or demands drolly that you address it as Hal, we'd be remiss to yield to our "enough, already" impulses just yet.

If recent history is any indication, Internet privacy is likely to be a major concern in the next millennium. Early last year, independent security consultant Richard M. Smith (www.tiac.net/users/smiths) discovered the use of GUIDs—numbers that uniquely identify a PC—in some of Microsoft's software. More recently, Smith made news again when he spotted GUIDs at work in RealNetworks' RealJukebox audio CD and MP3 player.

Like some other players, RealJukebox can automatically download audio CD title and track information from the Web. This handy feature, Smith discovered, harbored a serious pitfall: When RealJukebox requested CD information, it transmitted a GUID to RealNetworks, which could use that data to build a list of the user's CDs. (Note: This "requesting" of information happens by default but can be disabled.)

Smith also found that RealJukebox automatically reported other information to RealNetworks, such as the user's preference in music and the portable MP3 player in use. That data could be linked to the user's e-mail address, given during registration.

RealNetworks responded swiftly when Smith released his findings. For the 10 million users who had downloaded RealJukebox

Windows NT Security Patch

ATTENTION SECURITY-CONSCIOUS Windows NT 4.0 users: You'll want to download a patch that prevents a "malformed spooler request" in all variants of NT 4.0. A malicious hacker could exploit this flaw to run amok on a Windows NT system. The intruder could, for example, cause the printer operation to crash. A second weakness addressed by the same patch could allow attackers to install their own settings as print providers and wreak all kinds of havoc. According to Microsoft, this vulnerability cannot be exploited remotely. To download the fix, visit www.microsoft.com/security/bulletins/ms99-047.asp. Find answers to frequently asked questions at www.microsoft.com/security/bulletins/ms99-047faq.asp.

IN BRIEF

Internet Explorer 5.01 at Last

IT'S TOO EARLY TO TELL how successful Microsoft has been at buffing away Internet Explorer 5's rough edges, but the new 5.01 release seems promising. A posting at support.microsoft.com/support/kb/articles/ Q244/6/55.asp lists close to 40 reliability issues that the update addresses. Version 5.01 also includes all previously released IE 5 security patches, according to Microsoft. It also upgrades the 40-bit encryption of earlier releases to 56-bit (a 128-bit upgrade is available separately). The size of the download depends on installed components, but you can expect a haul of about 17MB. To get the update, point your browser to www.microsoft.com/windows/ie/download or to windowsupdate.microsoft.com. Version 5.01 is currently available only as a download.

before November 8, 1999, the company released a 67KB patch that disables the GUID and prevents daily transmissions. RealJukebox users can download the fix from www.realnetworks.com/company/privacy/jukebox/privacyupdate.html or by choosing RealPlayer's Help•Check for Update menu option. RealNetworks also added privacy enhancements to RealJukebox's full versions; these updated versions are available at www.real.com. Finally, the company disabled the GUID in the default settings of its RealPlayer 7 streaming media player. Download the new version from www.real.com, or by selecting Help•Check for Update.

UPDATE: TOSHIBA'S FLOPPY FIX

IF YOU OWN A Toshiba laptop, chances are it uses a floppy disk controller that could cause data loss or corruption in files you save to the floppy. As reported in January's Top of the News (see www.pcworld.com/jan00/toshiba), the company posted patches that remedy the FDC condition as part of its settlement of a class-action lawsuit. However, the fix was available only for Windows 95/98 and Windows NT 4.0. To download the latest information and the fixes themselves, go to www.csd.toshiba.com/tais/csd/support/fdc/index.html. A Toshiba spokesperson told us at the time of this writing that separate patches for DOS/Win 3.x, Linux, and Free BSD will be available by the time you read this.

You can find files mentioned in this article at www. fileworld.com/magazine. Mitt Jones is a contributing editor for PC World. ∎

BUGGED?

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

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TOP OF THE NEWS
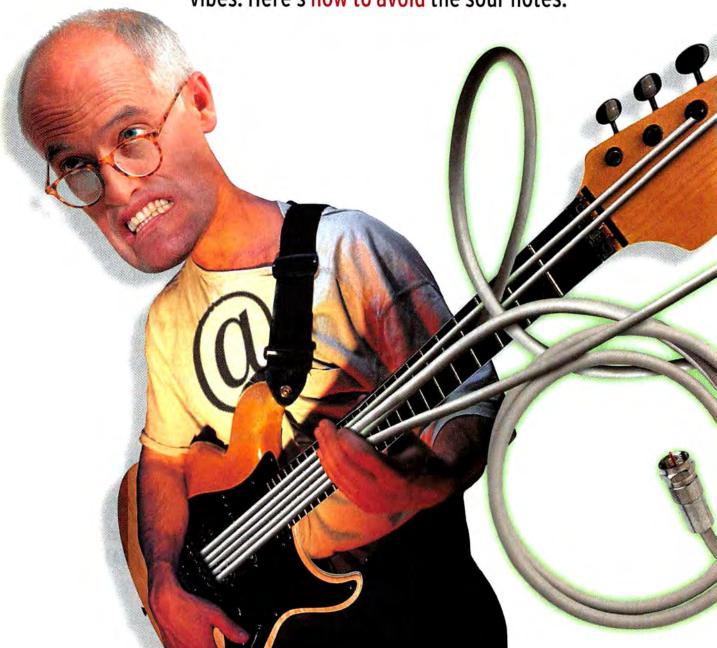
DSL and cable modems promise instant access to the Internet. But service hassles are giving users bad vibes. Here's how to avoid the sour notes.

DISPATCH

Broadband Blues

◆ **By Eric Brown**

IT WAS supposed to be the end of the World Wide Wait. For $50 a month, broadband technologies such as DSL and cable would whisk us onto the Web up to 50 times faster than dial-up modems and keep us connected 24 hours a day. Streaming media? Smooth as butter. Big bulky downloads? Quick as a keystroke.

But not all users are singing the praises of this new technology. Installation hassles, service outages, and connection speeds that sometimes dip to the level of a 56-kbps modem are giving many customers the blues. "Broadband? It's an absolute flaming pain to set up and install," says Atlanta businessman William Grand, who endured ten weeks of cable modem installation hassles.

Grand has plenty of company. In 1999, intermittent blackouts struck DSL and cable modem customers all around the nation. In Fremont, California, the cable modem service got so bad that the city council hammered out a customer Bill of Rights with the local provider, AT&T Broadband. The agreement requires AT&T to repair service outages within 24 hours in 95 percent of all cases and to answer 90 percent of customer service calls within 30 seconds.

Providers face myriad challenges in trying to correct these problems, including complex new technologies and overwhelming customer demand. According to Cahners In-Stat, a market research company, shipments of cable and DSL modems to customers are expected to reach 6.5 million in 2000, nearly twice the number shipped in 1999. The net result of this complex technology and explosive growth can be chronic problems for users. Consider the plight of Loren Krasner, office manager for a recycling company, who wanted a cable modem for his Richardson, Texas, home. Krasner ordered the service from TCI@Home (now AT&T Broadband), then endured three weeks of installation headaches, including multiple visits from technicians. Though the service eventually functioned, sometimes it ran slower than Krasner expected, and twice it failed altogether. "Installation ▶

Product Pipeline

➤ **Eudora E-Mail:** In March, Qualcomm will release Eudora E-Mail 4.3 in three modes to succeed Eudora Pro 4.2 and Eudora Light. Sponsored mode (free) has prominent ads; Light mode (free) has fewer ads and functions; Paid mode ($50) has no ads. Get the beta at www.eudora.com.

➤ **4.7GB DVD-RAM:** Panasonic and Hitachi will unveil a second-generation 4.7GB (9.4GB, double-sided) rewritable DVD-RAM drive by March. The Panasonic kit with SCSI-2 interface will sell for less than $700.

➤ **VMware 2.0:** VMware's $299 application lets you simultaneously run multiple OSs—including Windows 9x, Windows 2000, and Linux. You can also run apps for one OS in another. Look for it in March at www.vmware.com.

Tidbytes

Another IE Spruce-Up: Internet Explorer 5.5, now in beta, adds a print preview (long part of Netscape Navigator) and more tie-ins with MSN.com. Download it at msdn.microsoft.com/downloads/webtechnology/ie/iepreview.asp.
Instant Internet: Phone cards are old hat: ICopious.com's Silent Access prepaid Internet cards and software will hit stores by late March. Prices for the 5-, 10-, and 25-hour cards remain unknown. An as-yet-unnamed telco will provide connectivity. ▶

GET UP-TO-THE-MINUTE NEWS about company products and Internet happenings from PC World Online's News area. Just point your browser to **www.pcworld.com/pcwtoday**.

> Installation was **frustrating.** We had **e-mail out** for a week. The technicians would say everything was **fine—it wasn't.**

LOREN KRASNER,
broadband survivor.

was frustrating. We had e-mail out for a week. The technicians would say everything was fine—it wasn't," he says. AT&T spokesperson Angel Biasatti concedes, "We have more customers who want the product than we can serve. It's a balancing act." (For more on broadband, see "Broadband, Narrow Choices," page 139.)
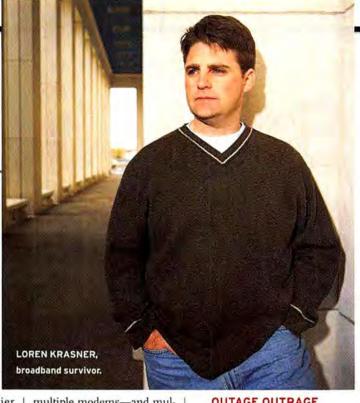
FUNKY INSTALLATION

WHETHER you choose cable modem or DSL, expect at least two installation visits. First comes the "truck roll," where line technicians check your wiring for problems—and may install a special piece of communications equipment called a splitter. Next comes the system inspection by a PC technician who confirms that your modem is installed and

your PC is configured correctly. Ordering and installation should take a few weeks. But if something goes wrong, you can find yourself waiting considerably longer.

Grand, the Atlanta businessman, describes a struggle with MediaOne cable modem service that would make the average person long for the days of quill pens and carrier pigeons. The first technician arrived at Grand's home-based business on June 12, but the service wasn't working properly until the end of August. For the most part, says Grand, the service didn't work at all. And when it did work, he was limited to near dial-up modem speeds. In the course of his odyssey, Grand went through
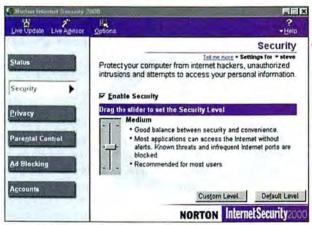
multiple modems—and multiple support technicians.

Reg Griffin, a MediaOne spokesperson, responded: "Obviously, we regret the problems that Mr. Grand experienced....It clearly took us much longer than normal to fully diagnose the problem and solve it." MediaOne didn't charge Grand for the period when service was down.

OUTAGE OUTRAGE

OCCASIONAL outages are a fact of life with Internet access at any speed. But more problems and outages occur with broadband than with dial-up, says Lisa Pierce, director of telecommunications at Giga Information Group. Broadband outages also tend to occur more frequently and to last longer, she adds.

PHOTOGRAPH: REID HORN

Arm Yourself Against Broadband Bandits

SYMANTEC'S NORTON INTERNET SECURITY 2000 includes an easy-to-use personal firewall that lets you prevent hacker attacks by choosing among different levels of protection.

IF YOU USE a broadband technology, such as a DSL or a cable modem, you need to protect yourself from hackers. Unlike dial-up users, broadband consumers maintain a persistent connection to the Internet. But because this type of connection is always linked to the Net, it allows hackers—and novices using readily available hacking tools—to break into your system. Without your knowledge, unscrupulous users can access, delete, and rename files, or even format any of your drives. (To

determine whether your PC is vulnerable to attack, log on to ShieldsUp, a free security site at www.grc.com/ShieldsUp.)

SAFER SURFING

SOME BROADBAND ISPs are now taking steps to protect their customers. Road Runner, for example, proactively checks its customers' PCs for weak points that hackers commonly exploit. Still, a personal firewall provides better defense. Symantec's $60 Norton Internet Security 2000 is the latest and most full-featured example of this new class of product that we've seen (800/441-7234, www.symantec.com).

High-Speed Service Sampler

DSL SERVICES	Download/upload speed (kbps)[1]	Installation cost	Monthly fee[2]
Ameritech 800/910-4369, www.ameritech.com	768/128 1500/256	$300 $600	$50 $180
Bell Atlantic 877/525-2375 www.bellatlantic.com/infospeed	640/90 1600/90 7100/680	$198 $198 $198	$50 $100 $190
BellSouth 888/321-2375, www.bellsouth.net	384 to 1500/256	$300	$50
GTE 877/483-5070, www.gte.com	768/128 1500/768	$340 $340	$33 [3,4] $100 [3,4]
Pacific Bell 888/792-3751, www.pacbell.net	384 to 1500/128 1500 to 6000/384	$198 $298	$49 [4] $199 [4]
Southwestern Bell 888/792-3751, www.sbc.com	384 to 1500/128 1500 to 6000/384	$198 [4] $198 [4]	$39 [4] $129 [4]
US West 800/244-1111, www.uswest.com	256/256 7000/1000	$518 $518	$48 $858
CABLE MODEM SERVICES			
Excite@Home 650/556-5000, www.home.com	2880/128	$99 to $175	$40 to $45
Road Runner 703/345-2500, www.rr.com	2880/128	$100 [5]	[5]

[1] DSL performance depends on distance from phone company.

[2] Includes Internet access unless otherwise noted.

[3] Does not include Internet access.

[4] Requires one-year contract.

[5] Typical price; varies with location.

Last summer and fall, users on both coasts experienced loss of DSL service. For example, on July 16, a buggy software upgrade interrupted service for some customers of Bell Atlantic's Infospeed DSL. Users had to wait for hours before their connections were restored. That same day, a faulty router gummed up the works for scores of Pacific Bell DSL customers in the San Francisco Bay Area. In early December, an outage knocked out service to some Pacific Bell customers for 35 minutes, the company says.

Some outages are more difficult to fix than others. Late last September, Chris Arslanyan, a computer professional, ordered DSL service from Bell Atlantic Infospeed for his home in Oradell, New Jersey. It was installed a week later, but it didn't work. Five days and seven phone calls later the modem was up and running, he says, but four days after that it went down again. A pattern began to emerge. "Every week it goes down on Thursday, and it comes back up again on Monday or Tuesday," he says. "Sometimes I call to ask what's wrong, and they say, we don't know, we'll call you back....I spend many a Friday night waiting for the phone to ring, like I'm back in high school waiting for a girl to call." Bell Atlantic subsequently credited Arslanyan for his down time.

Joan Rasmussen, a Bell Atlantic spokesperson, acknowledged Arslanyan's problems. "We have had some isolated problems that appear to have affected a few customers, including Mr. Arslanyan," says Rasmussen. Bell Atlantic is working to identify and fix the problem, she adds.

WEAK PERFORMANCE

SPEED—or lack thereof—is another common gripe, particularly among cable modem users. Throughout 1999, intermittent drops in speed in the AT&T cable network in San Mateo, California led the company to compensate users

INSIDE THE BOX

NORTON INTERNET Security 2000 contains software for creating a personal firewall as well as a copy of Norton AntiVirus 2000. When online, you're essentially logged on to a network within the Internet. The firewall blocks intruders several ways such as by protocol, IP address, port, or specific application.

Other Norton Internet Security features make browsing less annoying: The utility prevents Java applets from loading, removes banner ads, halts pop-up browser windows, and blocks cookies. The product works on Windows 9x (but not on NT).

If you want something simpler, consider Network Ice's $40 BlackIce Defender (650/341-6886, www.networkice.com). Though its interface isn't as snazzy as Norton's, BlackIce provides equal protection. It's also easier to use, and it has extensive online tutorials about hacking attacks.

Cheaper still is Zone Labs' recently announced firewall, ZoneAlarm 2.0, which is free to individuals for personal use. We couldn't test it in time for this review, but it may warrant a look after its scheduled January release (www.zonelabs.com).

—Steve Bass

Site to See: Paypal.com

WANT TO SEND money to someone who can't take credit cards? Confinity's **PayPal** (www.paypal.com) is a free personal-payment service that allows registered users to send money by debiting a credit card or bank account. To make a payment, you simply enter the recipient's e-mail address and the outgoing amount. PayPal then alerts the payee by e-mail. The recipient must register at the site and set up a PayPal account to collect the funds as a direct deposit to a bank account or a check mailed from PayPal. Confinity is backed by Deutsche Bank and Nokia, which should allay security concerns.

—Yardena Arar

for their inconvenience. But even under normal conditions, problems can exist. Performance often dips during peak use hours, and it can gradually diminish over time as more customers join the network within a given neighborhood. "We have had instances with cable systems in Silicon Valley where it slows down to a crawl during the afternoon," says Jay Pultz, vice president and research director at the Gartner Group. Neighborhood congestion is not an issue with DSL, but performance can slip during peak hours if a provider lacks adequate connections to the Internet, says Pultz. ▶

Think broadband performance is the same all over the Net? It isn't. When you browse a popular Web site that is cached on your provider's servers, performance will be lightning fast. Once you venture out onto the public Internet, however, you may get bursts of several megabits per second, but the average bandwidth can drop to around 300 or 400 kbps. Read the fine print, and you'll note that broadband providers carefully include the words "up to" with most bandwidth claims.

A NEW TUNE

BROADBAND providers and PC vendors say they'll address service and performance problems in the near future. Bell Atlantic and AT&T Broadband plan to hire and train more technicians. But the biggest improvements in service could come from technologies that reduce the number of visits technicians need to make.

With new DSL technology, for example, customers can skip the initial "truck roll" because workers don't need to install a splitter device. Instead, some customers can attach one or more small filters to their phone cords. According to Bell Atlantic's Rasmussen, up to 85 percent of all Infospeed DSL installations don't require a splitter. And when new USB versions of DSL and cable modems arrive later this year, some users will be able to avoid the second visit from technicians.

Some retailers already offer hardware and service bundles to ease installation. Last fall, Bell Atlantic announced plans to join forces with CompUSA and 3Com to simplify ordering and installing DSL. At select CompUSA locations, you can now enter your phone number in a kiosk to determine whether service is available in your area. You can order service and buy a modem on the spot, and then attempt to install it yourself. For cable Internet customers, Excite@Home has cut similar deals with CompUSA, Office Depot, and The Good Guys to permit buyers to check the availability of cable modem service, buy a modem kit, and even make an appointment for installation.

New setup software designed to ease user headaches is rolling out, too. For example, in October BroadJump announced that it had developed software designed to streamline installation. The software includes troubleshooting tools to help users install the modems and resolve their own service problems. Broadband providers are expected to offer the software by the end of 2000, according to Kenny Van Zant, a vice president at BroadJump.

Standardization should also help smooth broadband's rough edges. Modem vendors have agreed on industry standards that will have wide support by the end of the year. With the DSL G.Lite standard, users should be able to buy modems at retail that can theoretically work with any provider. A second standard could help address inconsistent perfor-

mance for some users. Next fall, cable modems based on DOCSIS 1.1 will try to fix problems of fluctuating bandwidth within a neighborhood.

WORTH THE GRIEF

WHEN AND whether these initiatives improve service is anyone's guess. But even if nothing changes, most users we spoke to said they'd rather wrestle with the new technology than return to the stuck-in-molasses days of older dial-up services. Despite their logistical problems, Chris Arslanyan and William Grand are happy with their services. Loren Krasner recently moved to Plano, Texas, and discovered that broadband Internet access wasn't available at all. "I almost paid a lot more money for another apartment that did have access," says Krasner. At least now Krasner knows that the next time he orders broadband, he'd better be prepared to sing the blues.

Four Ways to Beat the Broadband Blues

1 **Buy a PC with ethernet built in.** Current cable and DSL modems attach to a PC via a network card. If your system already has a card, you'll save on installation time and avoid hassles.

2 **Keep your 56-kbps modem.** Don't cancel your old dial-up account until you're satisfied that your broadband account is working reliably.

3 **Fight bad service.** When all else fails, cable users should contact their local cable administrator and file a complaint. DSL users can contact the FCC (www.fcc.gov/cib) or their local public utilities commission. In addition, cable and DSL customers can always file a complaint with their local Better Business Bureau.

4 **Check your speed.** Not sure whether you're getting your money's worth? Check your broadband speed with www.speedguide.net or computingcentral.msn.com/topics/bandwidth/speedtest.asp. For details about how this process works, see "Troubleshoot a Slow Internet Connection" in this month's *Internet Tips* on page 236.

For tips on choosing among the various Broadband offerings, see "Broadband, Narrow Choices" on page 139.

ILLUSTRATION: LOU BEACH

750-MHz Shootout Leaves AMD, Intel Still Standing

AT THE three-quarter mark in the race to 1 GHz, Advanced Micro Devices and Intel are running neck and neck. Both companies just released 750-MHz CPUs, and faster chips are imminent. But speed is only one measure of a CPU's worth. Which company makes the more powerful chip set? Neither. In *PC World*'s first hands-on tests of systems based on 750-MHz chips, the newest Pentium IIIs and Athlons finish in a dead heat. At press time, Intel announced an 800-MHz PIII CPU, initially available in limited quantities from major vendors.

Each company custom-built a system for us using a shipping version of its 750-MHz processor, and Compaq sent us a preproduction Presario based on the Athlon-750. All three systems handled graphics, business apps, and multitask-ing with aplomb. So should you run out to buy one tomorrow? Not necessarily.

Power users who need every bit of speed to do complex calculations, create 3D models, and develop multimedia content should stick to the top processors. The rest of us may do better to consider slightly slower PCs: 733- and 700-MHz Pentium IIIs and 700- and 650-MHz Athlons offer good values. You can save $200 to $300 (at least) while losing a mere 2 to 10 percent in performance on office apps such as Word. You can save more money with even slower systems that still handle most day-to-day tasks quickly.

FAST AND PRICEY

LOADED WITH 128MB of SDRAM, a whopping 27GB hard drive, DVD-ROM and CD-RW drives, an NVidia GeForce 256–based graphics card with 32MB of SDRAM, and a 19-inch monitor, the Athlon 750-MHz Compaq Presario 5900Z costs $3335. You get a Diamond Rio MP3 player with the package, too. A comparably configured PIII-750 system should cost the same, plus or minus $200. Mainstream configurations with a 20GB hard disk, a DVD-ROM drive, and a 17-inch monitor should sell for a less daunting $2500.

You can expect to see 750-MHz Athlon and Pentium III systems from IBM and Poly-well by the time you read this; Dell and Gateway (among oth-ers) will sell Pentium III-750 machines. As of late 1999, Gateway denied it had any plans to sell Athlon-based sys-tems, but rumors have resur-faced that Gateway is likely to use the powerful AMD chip.

Here's what we tested: AMD and Intel each submitted sys-tems with 128MB of RAM, a 32MB NVidia TNT2 Ultra–based graphics card, Windows 98, and 20GB and 17GB hard drives, respectively. On our PC WorldBench 98 test suite, Intel's machine (which uses fast RamBus memory) edged ahead of AMD's system by ▶

THREE HORSES: Compaq's Presario 5900Z (left) and custom-built PCs from AMD (middle) and Intel.

Who's the Winner? Fastest PCs Race to a Photo Finish

SYSTEM	CPU	RAM	L2 cache (KB)	PC WorldBench 98 score — Faster	Multitasking test (seconds)	AutoCAD 2000 (seconds)	Adobe Photoshop (seconds)	3DMark
AMD custom Athlon-750	Athlon-750	128MB PC100 SDRAM	512	305	272	742	8.32	7017
Compaq Presario 5900Z	Athlon-750	128MB PC100 SDRAM	512	289	312	794	9.24	6341
Intel custom Pentium III-750	Pentium III-750	128MB PC-800 RDRAM	256	315	275	732	7.77	6758
Micron Millennia Max PIII-733	Pentium III-733	128MB 133-MHz VC SDRAM	256	309	276	859	6.89	7182
Compaq Presario 5900Z	Athlon-700	128MB PC100 SDRAM	512	284	323	741	8.90	5904
Average of five systems	Pentium III-600	128MB PC100 SDRAM	512	250	366[1]	1199	9.26[1]	5453

an insignificant 3 percent (these two scored 315 and 305, respectively). The Presario was slightly slower (scoring 289) because Compaq adds useful support and antivirus programs that degrade speed a bit.

BETTER CHIP SET

WE EXPECTED to find a significant difference between the two reference systems on our multitasking test, where Intel Pentium-III PCs with RamBus memory have outperformed AMD PCs handily in the past. But this time the AMD and Intel systems finished essentially even, scoring 272 and 275, respectively. This result is likely due to recent improvements in AMD's 751 chip set, which wasn't fully optimized for use with the Athlon at launch. Here too the Presario—which

also used the improved 751 chip set—ran third, presumably due to its extra software.

On our AutoCAD and Photoshop application tests, Intel pulled ahead slightly, but not enough to notice during real-world tasks. If your work involves applications like AutoCAD that do a lot of complex 2D calculations, don't compromise on processor speed. We saw differences of nearly 2 minutes between a Pentium III–750 and a PIII-667 PC on our AutoCAD test; the gap between 750-MHz and 650-MHz Athlon PCs widens to more than 2.5 minutes.

AMD's custom-configured system nabbed the top spot on

> 1-GHz processors seemed like a distant dream. Now, AMD and Intel plan to release them by year's end.

the 3DMark test (which measures system performance in a gaming environment), but the difference was less than 4 percent—you wouldn't notice it during work or play. (This test uses Intel's SSE extensions and AMD's 3DNow instructions.) All three 750-MHz systems trailed our best-ever performer on the 3DMark test, Micron's Millennia Max Pentium-III-733. We suspect that the Micron's 133-MHz front-side bus and its 133-MHz VC SDRAM memory both contributed to its superior zip.

COMING ATTRACTIONS

SEVERAL YEARS ago, 1-GHz processors seemed a distant dream. Now, AMD and Intel plan to release them before year's end. You can expect to see 800-MHz CPUs from

Compaq Presario 5900Z
Street price: $3335; Compaq
Computer; 800/345-1518;
www.compaq.com
PRODUCT INFO NO. 723

both AMD and Intel around the time you read this, and 900-MHz Athlons should be out by spring. Intel is also developing a chip set to support 133-MHz SDRAM, which should allow systems to run comparably to systems using more-costly RamBus memory.

It's too early to declare a winner in the race to 1 GHz, but the current crop of chips powers systems that will satisfy the most demanding users. Does it really matter whether it's Intel or AMD inside at this point? You decide.

Either way, thanks to competition, you'll get what you want at a price you can afford.
—*Anush Yegyazarian*

PIII-400 Ultralights Run Longer and Faster

ULTRALIGHT notebooks may be a pleasure to tote, but many have lousy battery life. That's because an ultrathin, sub–4-pound laptop commonly uses a power pack half as big and half as powerful as the one on a full-size notebook. But the new Pentium III-400 processor eases the problem: Intel's first PIII chip designed specifically for small notebooks uses less power— 1.35 volts instead of the usual 1.6 volts— so the ultralight's

smaller power pack lasts longer.

To put PIII-400 ultralight notebooks to the test, we evaluated three preproduction models: Dell's Latitude LS H400ST, Fujitsu's LifeBook S Series, and NEC's Versa FX. The verdict: Ultralight battery life is improving. The six-cell batteries on the Latitude and

LIGHT DELIGHTS from Fujitsu (left), Dell (middle), and NEC.

the LifeBook lasted about 2.4 hours on a charge, near the average full-size PII or PIII notebook's battery life of 2.7 hours. In contrast, two popular ultralights we tested recently, the Sharp Actius A250 and the Toshiba Portégé 3110CT, run for 1.5 and 2 hours, respectively. The only disappointing time turned in by a newcomer: 1.1 hours by the NEC Versa FX's three-cell battery.

All three PIII-400 notebooks deliver more than enough speed. On aver- ▶

PHOTOGRAPH: KEVIN CANDLAND

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age, they earned a PC World-Bench score of 198, about 15 percent behind the typical PIII-500 notebook's score of 232, and 5 percent better than the average Pentium II-400 portable. (PII-400 ultralights are rare; most use 300- to 366-MHz PII or Celeron chips.)

BIG SCREENS

THESE HANDSOME, powerful laptops break new ground on the features front, too. The 3.7-pound LifeBook is the lightest notebook we've seen with an internal bay. All three notebooks have 12.1-inch screens; the Dell and Fujitsu models have 6.4GB hard drives, and the Fujitsu has a 9GB hard drive—important milestones for this weight class. But some ultrathin notebook weaknesses remain. None of the three have decent stereo audio, and you'll still have to juggle external drives and accessories.

With its 10.5-inch-wide case, Dell's 3.7-pound Latitude LS H400ST is the smallest of the notebooks here, yet it offers the quietest, most comfortable typing. It's also the only machine here that has built-in

standard connections and a network jack. On the downside, our pricey $2677 Latitude was accompanied by only an external floppy drive. An external CD-ROM drive costs $99 and must time-share an external media caddy with other optional drives. (Dell sells a $299 6X DVD-ROM drive, a $139 LS-120 drive, and a $199 Iomega Zip 100 drive.)

On-the-go professionals who need to take snapshots may find Fujitsu's LifeBook appealing: It accommodates a digital camera ($229 extra) in its internal bay. The camera's viewfinder sits outside the main unit like a periscope.

But camera or no camera, the LifeBook is the best deal in this group. Its $2699 price covers the 9GB hard drive, an external floppy drive, and an internal 6X DVD-ROM drive. The Fujitsu notebook is LAN-ready with a built-in ethernet jack. It works with a wide range of optional devices. (In addition to the camera, Fujitsu offers an optional $179 LS-120 drive, a $449 CD-RW drive, a $79 Type I or II PC Card slot, and a $229 second

six-cell battery for the internal bay.) Our only quibble: The LifeBook relegates parallel, serial, and PS/2 connections to a 10.5-ounce bundled port replicator, which you must

cables. Or you can buy a $129 USB legacy port bar ($199 with a network connection).

Upgrading from the FX's three-cell battery (to improve on its meager battery life) will

Stayin' Alive

NOTEBOOK	Battery life test times (hr:min)	Better
Dell Latitude LS H400ST		2:25
Fujitsu LifeBook S Series		2:22
NEC Versa FX	1:10	

HOW WE TEST We drain and fully recharge the battery twice and set power-saving options to match a consistent profile where possible. Office workers use Windows 9x applications, periodically saving and allowing regular idle time. Notebooks are rotated among workers. We report the time elapsed when the notebook shuts itself off. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

snap onto the notebook in order to use the floppy drive.

NEC's Versa FX boasts a simplified design: Instead of standard parallel, serial, and PS/2 connections, this 3.4-pound notebook has three USB ports. But overall, the FX isn't a great choice. The two connections for the external floppy and CD-ROM drives can handle parallel and serial peripherals, but only with adapter

cost you: A replacement six-cell battery goes for $179. A second battery—a nine-cell pack that plugs into the bottom of the notebook—runs $319 and adds 1.4 pounds.

Ultralights still can't match the longest-lasting full-size portables: Some Gateway Solo notebooks run for more than 5 hours in our tests. But Intel's new PIII-400 processor seems to help wring a bit more time out of small power packs. This advance, plus bigger screens and hard drives, makes the latest round of ultralights the most appealing yet.

—Carla Thornton ▶

Ultralight and Ultrafast: These Notebooks Boogie

SYSTEM	CPU	RAM (MB)	PC WorldBench 98 score	Faster
Fujitsu LifeBook S Series	Pentium III-400	128	203	
Dell Latitude LS H400ST	Pentium III-400	128	198	
NEC Versa FX	Pentium III-400	64	194	
Average of four notebooks	Pentium III-500	128	232	
One PIII-450 notebook	Pentium III-450	96	216	
Average of ten notebooks	Pentium II-400	64	188	

HOW WE TEST All systems are tested with PC WorldBench 98, *PC World*'s application-based benchmark. A higher PC WorldBench 98 score is better. For more details on our benchmark and how we run it, see www.pcworld.com/testing. Data based on testing conducted by the PC World Test Center. All rights reserved. All systems have 256KB of Level 2 cache.

Dell Latitude LS H400ST
Street price: $2677; Dell Computer; 800/388-8542; www.dell.com

Fujitsu LifeBook S Series
Street price: $2699; Fujitsu PC; 877/372-3473; www.fpcdirect.com
PRODUCT INFO NO. 721

NEC Versa FX
Street price: $2499; NEC; 888/632-8701; www.nec-computers.com
PRODUCT INFO NO. 722

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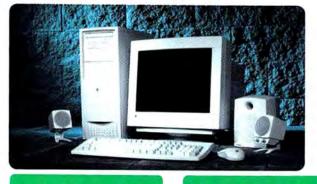
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TaxCut, TurboTax Offer More; Microsoft's TaxSaver Falls Short

IN THE PAST, selecting a tax program was a lot like choosing an accountant: Your options were limited and invariably cost more than you wanted to spend. But this year, things are different. The top tax packages, Intuit's Quicken TurboTax and H&R Block's TaxCut, face new challengers: Microsoft's first tax product, TaxSaver, and 2nd Story Software's TaxAct.

The products are easier to use than ever, and in some cases less expensive. They all expedite refunds by letting you file electronically, and one vendor even lets you get a cash advance within two business days. Web-based versions of TurboTax and TaxCut deliver many of the features you get with the shrink-wrapped versions—at half the price or less.

MISSING THE CUT

MICROSOFT'S entry into the tax arena, TaxSaver Federal Deluxe, makes a flawed debut, but the product has promise. TaxSaver shares the attractive, Web-style interface of Money,

Microsoft's personal finance package. And importing tax data from Money into Tax-Saver is exceptionally easy. (TaxSaver also imports data from other personal finance programs.) You get the same features offered by the competition: instructional videos, tax guides, Web links, and a

A NICE BOX can't paper over a flawed debut.

choice between using an interview-style approach or working directly on electronic tax forms that perform the calculations automatically.

Unfortunately, TaxSaver offers no state editions. So if you use it to prepare your federal return you'll have to download your state income tax forms, fill them out, and perform your own calculations to pay

those taxes. This is the sort of work tax software ostensibly helps you avoid. Moreover, at a street price of $45 ($25 after

MICROSOFT ENTERS THE TAX FRAY: TaxSaver Deluxe has features found in its competitors, but it lacks state editions.

mail-in rebate), TaxSaver is no bargain. Comparably priced editions of TurboTax and TaxCut include at least one set of relevant state tax forms. TaxSaver will be available in a scaled-down version for $20, which is expected to be comparable to competing products.

CHEAPER, EASIER

INTUIT's Quicken TurboTax, historically tax software's top dog, looks stronger than ever

this year thanks to across-the-board price cuts and a slick new Web interface. This year, TurboTax Deluxe costs $30

($20 less than last year) and includes mail-in rebates for one free state edition and one free federal electronic filing.

TurboTax looks much tidier than it did last year. Among other things, Intuit replaced the navigation bar (which occupied much of the left side of the screen) with a nifty pop-up window. TurboTax also adds a new Life Events planner for users anticipating the birth of a child, the sale of a home, or other major occurrences with tax implications. And Quicken users can export TurboTax data to their personal finance program to assist in financial planning after tax time.

Intuit still offers the widest range of tax-related products: Besides the flagship Deluxe edition, there's a $20 basic edition without the videos, tax guides, and state and e-filing rebates. Intuit's TurboTax lineup also includes a $70 Home and Business edition for unincorporated businesses, a $90 Business edition for part- ▶

Tax Software: The Bottom Line

PRODUCT	Street price	Mail-in rebate	State returns	E-filing fees Federal	E-filing fees State	Product info number
2nd Story Software TaxAct Deluxe 800/573-4287 www.taxact.com	$10	n/a	$13 per state	$8	$6	741
H&R Block Financial Kiplinger TaxCut Deluxe Multimedia Edition 800/457-9525 www.taxcut.com	$40	$15	Unlimited free	$10 (one free after mail-in rebate)	$10	742
Intuit Quicken TurboTax Deluxe 800/335-1348 www.turbotax.com	$30 [1]	n/a	$28 for first state; [2] additional states $20 each	$10 (one free after mail-in rebate)	$5	–
Microsoft TaxSaver Federal Deluxe 800/426-9400 www.microsoft.com	$45	$20	Not offered	Free for first return, $10 for each additional return	n/a	743

n/a = not applicable   [1] Purchase price at retail only.   [2] Free after mail-in rebate.

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Female Premiums

Age	10 YEAR	15 YEAR	20 YEAR	25 YEAR	30 YEAR
35	$ 103	$ 125	$ 145	$ 183	$ 205
40	$ 123	$ 158	$ 185	$ 238	$ 260
45	$ 190	$ 215	$ 253	$ 330	$ 368
50	$ 253	$ 290	$ 363	$ 490	$ 495
55	$ 360	$ 413	$ 550	$ 835	$ 940
60	$ 503	$ 608	$ 845	$ 2,135	$ 2,400
65	$ 775	$ 975	$1,320	$ 3,900	$ 3,900
70	$1,338	$ 1,600	$2,970	$ 5,970	$ 5,970
75	$2,275	$ 4,870	$5,820	$ 8,430	$12,420

Male Premiums

Age	10 YEAR	15 YEAR	20 YEAR	25 YEAR	30 YEAR
35	$ 123	$ 138	$ 165	$ 223	$ 253
40	$ 148	$ 183	$ 225	$ 288	$ 335
45	$ 225	$ 300	$ 360	$ 450	$ 513
50	$ 338	$ 455	$ 525	$ 730	$ 793
55	$ 500	$ 670	$ 768	$ 1,560	$ 2,330
60	$ 783	$ 990	$1,265	$ 3,630	$ 3,630
65	$1,330	$ 1,650	$2,295	$ 5,250	$ 5,250
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75	$4,400	$ 7,443	$9,600	$11,250	$15,030

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"The… solution has value for those who prize immediacy and privacy." - *U.S. News & World Report*

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nerships and corporations, and the $90 Quicken Suite 2000 bundling TurboTax Deluxe with Quicken 2000 and Quicken Family Lawyer. All of the products except TurboTax Deluxe sweeten the deal with $10 to $20 mail-in rebates.

Following Intuit's price cuts, H&R Block Financial's Kiplinger TaxCut Deluxe Multimedia is no longer decisively cheaper, as it was last year. And it's the only deluxe package that charges a $10 fee for each tech support call. But TaxCut Deluxe, which costs $40 in stores but $25 after mail-in rebate, offers several unique features. First, you can download as many state editions as you want for free,

which makes it a much better deal for the small minority of people who file in multiple states. (TurboTax Deluxe users get the first state version for free after a $28 rebate, but then must pay $20 for each additional state return.)

In addition, if you need a refund fast, you can't beat Block's new Electronic Refund Advance service. For $20, you can receive up to $5000 of any refund within two business days after the IRS accepts your electronically filed return. That substantially shortens the usual two-week waiting period before you get a direct-deposit refund from the IRS. The same service is available with the $70 TaxCut For Your

MARKET LEADERS TaxCut and TurboTax add features and value.

Home & Business edition ($50 after mail-in rebate), but not with the $15 basic edition ($8 after mail-in rebate).

CHEAPEST OPTION

FOR EVEN lower-priced tax software, consider 2nd Story Software's TaxAct, a 5MB

download that delivers everything the basic versions of TaxCut and TurboTax do—and the standard version is free. You can print and send in your finished federal return, or pay $8 to file one electronically.

This year, TaxAct also offers a $10 Deluxe edition, which bolsters help, adds planning features, supports up to five returns, and includes the capability to import data from TaxAct 1998. Under the name TaxAct Plus, CD-ROM versions of the Deluxe edition will be available at retail stores for $10. TaxAct state editions cost $13 each, far cheaper than state editions to accompany basic versions of TurboTax and TaxCut.

WHICH ONE'S FOR YOU?

IF YOUR RETURN is simple and you don't need much advice, the free version of TaxAct is your best bet. If you use Microsoft Money and live in a state that doesn't impose income taxes, consider using Microsoft's TaxSaver for your federal returns. For the best deal on a full-featured product, TurboTax Deluxe is a solid choice. And finally, if you file in several states or want a return ASAP, TaxCut is your best option. Choice is a beautiful thing.

—*Yardena Arar* ▶

Why Don't We Do Our Taxes on the Web?

IF CONVENIENCE and a low price are more important to you than lots of advice and handholding, consider a Web-based tax prep program. This year, H&R Block will introduce its first Web-based offering, becoming the second major vendor to offer an online service. True, Webbased software doesn't provide all the features of deluxe shrinkwrapped packages, but the latest editions should be more capable than ever and at most will cost half as much as their prepackaged counterparts.

Neither HRBlock.com nor TurboTax for the Web, the online version of Intuit's popular tax package, were available for testing at press time. But vendors say the products will closely resemble their desktop counterparts. Both HRBlock.com and

TurboTax for the Web will store your return on secure servers. This is safer than sending it back and forth over the Internet to the Web program when you work

TURBOTAX FOR THE WEB resembles its boxed sibling but features familiar browser menu items.

on your taxes. And you can try out the software for free: You pay only if you decide to file electronically or print a return.

When a Web version of TurboTax launched last year, it was the most full-featured Web-based

program. Pricing details were not set at press time, but this year's product is expected to include at least one new feature: It will permit you to download finished tax forms in Adobe Acrobat .pdf file format, simplifying the process of saving and printing returns.

HRBlock.com promises most of the features of its shrink-wrapped sibling TaxCut. You can also access the service via MSN's MoneyCentral. Filing or printing a federal return costs $10; state returns cost $5 each. As with TaxCut, if you file electronically, you can pay $20 to get an advance of up to $5000 on your refund two business days after the IRS accepts your return.

For more on Web-based options, check out the IRS's Web site (www.irs.gov).

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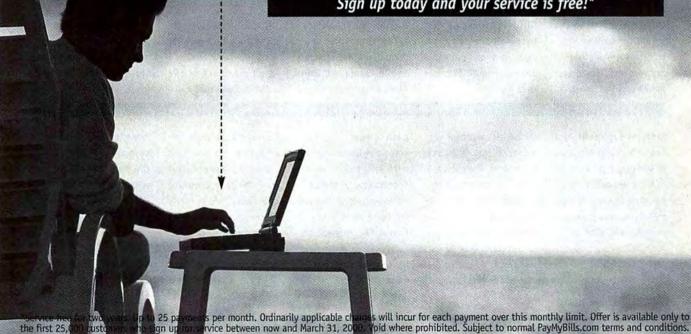
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The People's Court:
Readers Sound Off on the Microsoft Case

S U R V E Y

DO NOT PASS GO. Do not collect 2 billion dollars. Do not charge different PC vendors different prices for Windows. As the antitrust case against Microsoft nears its end, we recognize that Microsoft and the Justice Department aren't the only players in this grown-up Monopoly game: Every Windows user has a stake in it.

If *you* could decide Microsoft's fate, what would *you* do? We surveyed *PC World* readers to learn their views. Despite all the media saber rattling, less than a third of the people who responded to our poll favor breaking up the company. And 29 percent would give Bill a get-out-of-jail-free card.

At press time, it looked as if readers who favor a moderate outcome might get their wish. Microsoft and the Justice Department were behind closed doors trying to hash out a settlement. Microsoft had reason to feel conciliatory, given U.S. District Judge Thomas Penfield Jackson's stern finding of fact in November—saying that the software giant took advantage of a monopoly position in the OS market. Class action suits filed on behalf of California and Ohio consumers may also be influencing Microsoft: It gains more protection from these lawsuits by settling.

WE THE CONSUMERS

HERE'S A LOOK at what *PC World* readers we polled had to say about the Microsoft case, and what different scenarios might mean to PC users. We hired Research Results of Fitchburg, Massachusetts, to conduct an e-mail survey of 10,000 *PC World* readers. Almost 20 percent of the sample responded. (Readers could not vote more than once.)

We offered five solutions to the case: Order Microsoft to end its anticompetitive practices; drop the whole matter; break Microsoft into three separate companies to handle application-, OS-, and Web-related products, respectively; order Microsoft to make the Windows source code freely available; or break Microsoft into three competing companies, each with an equal share of Microsoft's patents. Microsoft declined to comment ►

PC World Poll Finds Few Favor Microsoft Breakup

Scenario 1: **35%**	Scenario 2: **29%**	Scenario 3: **17%**	Scenario 4: **12%**	Scenario 5: **8%**
How Would You Resolve the Microsoft Case?				
ORDER Microsoft to end its anticompetitive practices—by separating its browser and OS and selling Windows at one price.	DROP the whole matter. Microsoft should not be punished or made to change any of its business practices.	BREAK Microsoft into three companies handling operating systems, applications, and Web-related products.	ORDER Microsoft to make the source code for Windows freely available to all members of the software industry.	BREAK Microsoft into three competing companies, each with an equal share of Microsoft's existing patents.
What This Could Mean for Consumers				
Internet Explorer might not be built into Windows, or you might get a choice of browsers at first boot-up. The Microsoft logo might not always appear first when booting up.	Microsoft might be emboldened. You might see price hikes. The company would continue integrating products with Windows. Quality would likely remain at current levels.	Each company might become a virtual monopoly, with little change for consumers. Or the apps company might miss the OS company's help and face stiffer competition.	Companies building alternative OSs and apps would get a break. But they'd be hard-pressed to overcome Microsoft's marketing advantages and financial resources.	You might see chaos and support headaches as the Baby Bills changed Windows and Microsoft Office. Eventually one company would probably kill off the other two.

Survey Methodology: We hired Research Results of Fitchburg, Massachusetts, to send a broadcast e-mail with the survey URL to 10,000 randomly selected *PC World* readers. A total of 1853 completed surveys were received between November 16 and November 29, 1999. Percentage results are rounded to the closest whole number.

ILLUSTRATIONS: LOU BEACH

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for our story, except to say it would not agree to a solution that divided the company or took its intellectual property.

SIN NO MORE

FOR MONTHS now, we've heard plenty of talk about the possible breakup of Microsoft into several "Baby Bills." But most readers we polled do not favor such a drastic remedy. The greatest number (35 percent) said that Microsoft should simply be told to stop its monopolistic practices.

"While I don't think Microsoft should be punished for its success, I also don't think it should be allowed to use that success to interfere with the ability of other companies to compete," said Lili Rodriguez, a research firm partner from Glastonbury, Connecticut. In other words, let Gates know that he's erred, but don't put him out of business.

How would this solution work? It could be costly and time-consuming for the government to monitor Microsoft's behavior. So the government is likely to avoid ongoing involvement, says Hillard Sterling, an antitrust attorney with the Chicago law firm of Gordon & Glickson.

If the court opts to spell out forbidden practices, it could bar Microsoft from striking exclusive contracts with PC companies, or it could order Microsoft to untangle Internet Explorer from the Windows OS. Alternatively, the government could require Microsoft to police itself, as it did in the 1995 consent decree—though the company didn't prove to be an exceptionally good self-

> ## "Microsoft has gotten enough of a whack on the hand that it will most likely change the predatory practices that got it into this mess."
> — J. FORREST POSEY, BUFFALO

watchdog that time around.

Many people think that the courts should do nothing. About 29 percent of those we polled favored dropping the case altogether. Some said Microsoft should keep what it has earned. Others argued that consumers have benefited overall from Microsoft's success. "Microsoft has gotten enough of a whack on the hand that it will most likely change the predatory practices that got it into this mess," said J. Forrest Posey, a retired professor from Buffalo.

About one-quarter of the readers polled said they felt Microsoft should be broken up; 8 percent supported splitting Microsoft into three competing software companies, with equal shares of the company's patents and intellectual property. "Even if Microsoft could be made to stop cheating, it remains far too large and powerful for real competition to develop....So break up Microsoft into separate businesses forced to compete against each other on all fronts," says John Brooks, who

runs an import/export company in Minneapolis.

Most analysts, however, believe that this solution probably wouldn't produce a net gain for consumers in any case. "The result is that two of the companies die and one continues to live," says Michael Gartenberg, who is a vice president of the Gartner Group. "Natural market forces come into play. It's hard for three companies to stay in the same business."

More of our survey voters—17 percent—liked the idea of breaking Microsoft into three separate companies controlling OS, application, and Web-based efforts. "I'm not sure simply splitting the company into three pieces is enough, but it's a good start," says

> ## "Even if Microsoft could be made to stop cheating, it remains far too large and powerful for real competition to develop."
> — JOHN BROOKS, MINNEAPOLIS

Trenton Fagg, a stockbroker at Wimberly Investments in Corpus Christi, Texas.

This scenario could play out in two ways for consumers. It might mean a bonanza of better software and more competition, says Anthony Picardi, senior vice president of global

software at International Data Corporation. But other analysts say Microsoft might enjoy a virtual monopoly in each area, in which case you would see no overall change.

Finally, 12 percent of our readers supported making the Windows source code freely available, so OS competitors could make products compatible with today's Windows apps. But this solution might not be a big consumer win, either. Competitors would get a leg up, but Microsoft could use its vast financial resources to cut prices drastically and outlast the competition.

JUDGMENT DAY

AFTER MONTHS OF effort, judgment day approaches. The DOJ and 19 states have filed "conclusions of law," echoing Judge Jackson's findings of fact; Microsoft can respond by January 17. Thereafter, the DOJ and Microsoft can file one more response each. If the two sides do not settle, Judge Jackson could issue a ruling by March.

Interestingly, *PC World* survey respondents seem to have the pulse of the case. Whether it ends with a ruling or a settlement, the outcome will probably be similar: Microsoft will have to change some of its practices. In the future, perhaps Microsoft's logo won't appear first when you boot a PC. Perhaps all computer vendors will pay the same price for Windows. And even if Microsoft gets out of jail free, the company just might be more cautious about playing the OS integration game.

—JoAnne Robb ∎

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— **Fred Lugano**, weatherization.com, Vermont

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NEW PRODUCTS

The Movie Makers: Sony PC vs. Apple iMac

THE SONY VAIO Slimtop PCV-L620 (left) and iMac DV (below) both want to be your home video editors. Sony boasts a brilliant LCD screen with a 1024 by 768 resolution; the iMac offers a simple all-in-one design and integrated, easy-to-use software.

DESKTOPS

SO YOU WANT to direct. Great—what credentials does your computer have?

With a powerful system and the right video editing software, you can make movies for your VCR, the Net, and more. We tested Apple's graphite-colored **iMac DV Special Edition** and a violet **Sony VAIO Slimtop PCV-L620**, both loaded with tools to turn you into the next Martin Scorsese.

Aside from the admittedly large issue of having different operating systems, the PC and the Mac share many specs. Both shipping units supply 128MB of RAM, a 13GB hard drive, and a V.90 modem. The Slimtop packs a PIII-500 CPU and a 14.1-inch LCD display, which helps bump its cost to $2300 (Digital Studio models with CRT monitors range from $1499 to $2599). The iMac uses a PowerPC G3-400 and an integrated 15-inch CRT monitor, so its price tag is a thrifty $1499 (350-MHz iMacs sell for $999).

The Sony PC scored 225 on our PC WorldBench 98 test, average for a PIII-500 system. WorldBench 98 cannot be run on the iMac, so we can only say that it seems equally swift—except in DVD playback. Apple's slot-loading 4X DVD-ROM drive skipped when I merely moved its control panel (though not when I changed settings), and it stopped dead if I ran other apps. We suspect the cooperative multitasking scheme of the Mac OS may be the culprit. Meanwhile, DVD movies played smoothly in the Sony's 4.8X drive. Image quality for both was bright and sharp.

This new iMac is easier to upgrade than previous versions, but you're still limited. Like the compact Sony, there's only one open RAM slot and no bays. The iMac has a wireless LAN card slot, while the Sony offers an open PCI slot.

Both the Slimtop and the iMac come with video capture and editing software and fast IEEE 1394 ports for high-speed peripherals. We tested out both systems using a Sony Digital Handycam IEEE 1394 camcorder.

CUE THE COMPUTER

FROM THE START, the iMac worked fabulously. Apple's iMovie software is even easier to use than Avid Cinema: Connect the camera and you can control it from within iMovie. You don't have to choose settings until you really need them; all buttons and functions are clearly labeled. You simply drag and drop clips, sounds,

transitions, and effects into a timeline to create your masterpiece, then export your edited video to tape or create a compressed QuickTime movie for the Web or e-mail.

Using the camera with the Sony Slimtop proved surprisingly difficult, because Sony uses five separate applications, including DVgate Motion (its video capture app) and DVgate Clip (where you edit frames more precisely). To combine your pieces into a

PHOTOGRAPHS: MARC SIMON

CONTENTS

iMac DV Special Edition

PRO: Child-simple video editing.

CON: Uncomfortable mouse; subpar DVD performance.

VALUE: Great way to get started doing your own video editing for a bargain price.

Street price: $1499

Apple Computer

800/538-9696

www.apple.com

PRODUCT INFO NO. 707

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

single file, you then have to use DVgate Assemble. While these applications do the job, they are not very intuitive. (The just-announced $2699

Sony VAIO Slimtop PCV-L620

PRO: Fast, compact, and stylish.

CON: Complicated, nonintegrated video applications; expensive.

VALUE: Good performance and great screen for viewing your video creations, but not easy to use.

Street price: $2300

Sony Electronics

888/315-7669

www.sony.com/pc

PRODUCT INFO NO. 708

PCV-L630, will have a 15-inch LCD, and, like other new Digital Studio models, will come with more integrated versions of the Sony apps.)

Sony also includes Adobe Premiere 5.1 LE, a powerful

but complicated video editing application. To use it, however, you must first capture your video with Sony's app, save it, and *then* import the video into Premiere LE.

IT'S A WRAP

BOTH SYSTEMS do well with standard business tasks. For easy video editing, the iMac wins thanks to its low price, elegant software, and no-hassle hardware support. But don't expect to do anything else with it while you're watching a DVD movie. The Sony Slimtop is an attractive, fast, space-saving PC, but it makes working with video more difficult than it should be.

—*Alan Stafford*

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

Psion's Revo Palmtop: Sleek, Unique, Pocketable

P D A

THE WORLD IS full of folks who are addicted to 3Com's pen-based Palm organizers. But some of us are just keyboard people at heart—and that's what makes Psion's new **Revo** palmtop an intriguing alternative. A sleeker cousin of

Revo

PRO: Compact PDA with a usable keyboard and fine software.

CON: No backlit screen, memory not expandable.

VALUE: Elegant, economical palmtop for those who prefer a keyboard to a stylus.

List price: $399

Psion

800/997-7466

www.psioninc.com

PRODUCT INFO NO. 691

Psion's fine Series 5mx handheld, the $399 Revo is remarkably compact given its usable QWERTY keyboard and desktoplike software. I tested a shipping unit.

Almost as pocketable as a Palm—you can carry it in your jacket—the attractive, navy blue and silver Revo measures 6.2 by 3.1 by 0.6 inches when closed. Once my fingers got acclimated to the keyboard's small size, I tapped out text reasonably quickly and accurately. The Revo also provides a pen stylus for navigating around and between its apps.

The Revo's keyboard isn't the only feature reminiscent of a tiny notebook computer. With the EPOC OS, this palmtop packs powerful, Windows-

like applications, including a capable calendar, address book, word processor, and spreadsheet. You also get a PC docking station and PsiWin 2.3, an application that synchronizes the Revo's calendar and address book with desktop personal information managers such as Lotus Organizer and Microsoft Outlook, and it will convert documents from such programs as Microsoft Word and Excel.

The Revo does sacrifice some features to achieve its trim size and low price. For instance, there's no internal modem (an external model is a $199 option). The device also lacks a slot for memory upgrades, though its standard 8MB should prove adequate for most users. And while the 480-by-160-resolution monochrome display looks crisp and clear in good lighting, it is one of the few palmtop

screens without a backlight. You'll miss it in low-light situations such as restaurants or in transit, where you can't count on having a constant, direct light. That omission does help stretch battery life, however: Psion estimates that the Revo will run for about two weeks on a single charge.

Demanding users will want to consider Psion's beefier, costlier Series 5mx or one of the new Series 7, a near-notebook-size system. Those after powerful Windows CE–based units may look at Hewlett-Packard's even larger and pricier Jornada 680 and 690. But the affordable, portable Revo is a good fit for palmtop newcomers who find the keyboard mightier than the pen.

—*Harry McCracken* ▶

Toshiba's Top-of-Line Notebook Gets Better

NOTEBOOK

SPORTING A new Pentium III-500 mobile CPU, 128MB of RAM and a slick, silver-topped case, the **Tecra 8100** packs the power you need for mobile presentations or to replace your desktop. Toshiba improved its already good Tecra 8000 design, increasing performance and adding fea-

Toshiba Tecra 8100

PRO: Fast system, great screen, good battery life.
CON: So-so audio, pricey.
VALUE: The Tecra's weight and power make it especially attractive for mobile presenters.
Street price: $4099
Toshiba America
800/867-4422
www.computers.toshiba.com
PRODUCT INFO NO. 710

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

tures. Yet—for such a high-end machine—it sells for the not unreasonable price of $4099. Like the 8000, the Tecra 8100 offers a sharp, brilliant 14.1-inch screen, enhanced by an upgrade to the S3 Savage/MX 3D graphics chip set with 8MB of SGRAM. Colors and focus were good during DVD playback, but action was jerky on our preproduction unit; Toshiba says it will include updated graphics drivers in the shipping model.

Shipping models carry a 12GB hard drive (our test unit had a 10GB drive). The floppy disk drive can be used either externally or in the Tecra's modular drive bay. Second hard disk, battery, and LS-120

THE TECRA 8100'S silver-topped case holds a fast Pentium III-500 CPU in a 6.2-pound package.

and Zip drive modules are available. Toshiba includes a utility for hot-swapping the modules—a nice touch. The test model had an internal 56-kbps modem; if you want to add your own modem or an ethernet card, use one of the two Type II PC Card slots.

You get little perks, like a sliding cover that keeps the power button from accidentally switching on or off, and two programmable, pressure-sen-

sitive buttons along with the usual pointing-stick buttons. The keyboard and pointing stick were responsive and well placed for touch typing. But there are no external DVD-ROM or CD-ROM controls. Note: Our unit had trouble coming out of Stand By and Hibernation modes, but these functions should be fixed in shipping units, according to Toshiba.

The Tecra 8100 scored 227 in PC WorldBench 98, in line with comparable units we've tested. Its lithium ion battery lasted an impressive 3 hours, 48 minutes. With the DVD-ROM drive, the unit weighs just 6.2 pounds, trim for a system in this class.

You pay a premium for this Tecra—it's about $600 more than comparable notebooks from Dell or Gateway. But if you're looking for one of the lighter systems in this class, you won't be disappointed.

—Anush Yegyazarian

18-Inch LCD for a Bargain Price

LCD MONITOR

IT LOOKS A bit like an Etch-a-Sketch, but Nokia's new 18-inch **800Pro+** goes far beyond child's play. Aimed at bankers, traders, and deep-pocketed CEOs, the 800Pro+ costs $2999. Though high by most standards, that's one of the lowest prices we've seen for an LCD this size—about $500 below comparable competitors. And this shipping unit's picture quality is terrific.

Capable of both analog and digital display, the 800Pro+ is among the first LCDs to support a bewildering array of

would-be standards vying for your computer's monitor connector. These include the older Plug & Display and Digital Flat Panel, and the newly arrived though incomplete Digital Video Interface, which supporters claim provides a sharper image. To use the 800Pro+ as a digital LCD, you need a PC graphics board that supports a digital interface; such boards cost about $150.

In analog mode, the 800-Pro+ displayed text and graphics quite well at its default 1280 by 1024 resolution. On everyday business applications

such as e-mail, Web surfing, spreadsheets, and word documents, the 800Pro+ rendered text sharply and crisply—even at font sizes below 10-point. Colors looked rich with deep, saturated hues. You can easily lower the panel's resolution, and the image quality remains good.

The 800Pro+ has integrated speakers, and a built-in USB hub with two upstream and three downstream ports, enabling you to connect USB devices such as a digital camera, a scanner, and a printer. There's also a loop in the back for a cable to secure the panel and prevent theft.

You may miss features,

such as a pivot mode for rotating the unit 90 degrees—handy for viewing legal documents and Web pages. Even so, you get one great-looking LCD for a good price.

—Mick Lockey ▶

800Pro+

PRO: Good price for an 18-inch LCD, deep colors, sharp resolution.
CON: No pivot feature, still too pricey for most buyers.
VALUE: Good large panel with lots of USB ports.
Street price: $2999
Nokia Display Products
800/296-6542
www.nokia.com/americas/displays/main.html
PRODUCT INFO NO. 711
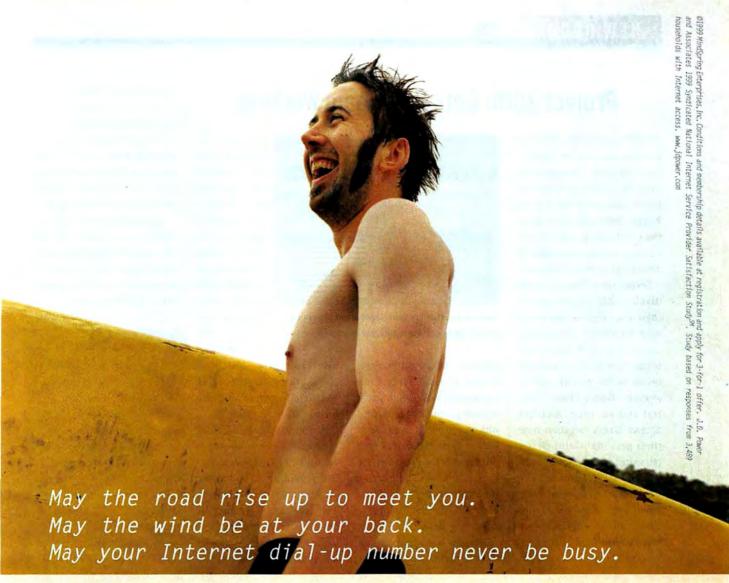
Project 2000 Gets Your Team Working

COLLABORATION makes projects happen. Recognizing this, Microsoft has striven to meet collaborative needs in its **Project 2000** suite, including the outstanding new Project Central, one among a slew of added and improved features.

Server-based Project Central displays key project pieces (new tasks, reports, and so on) on a Web page, simplifying access to project data for all team members. Managers decide which projects will be available under Project Central and set team member access. Users can then view their personal Gantt charts (showing assigned tasks with timelines), delegate tasks to coworkers, and perform many other functions. Project managers can consolidate status reports into a tidy summary report and make it available to

YOU CAN customize your Gantt chart of tasks by project name and start date, for example.

everyone. Microsoft markets Project Central for use on intranets; if you plan to use it remotely, you'll have to deal with access speed constraints. Project Central requires both Windows NT 4 (with Service Pack 4 or better) and Internet Information Server; clients must run Internet Explorer 5.

On the desktop, Project 2000 now lets you constrain tasks to particular times. The

new Outline Codes feature allows you to set reporting hierarchies and customize fields to see when certain conditions are exceeded—for example, when tasks go over budget. But the customization isn't easy: Microsoft should think about copying Excel's effective conditional formatting technique.

Project 2000's HTML-based Help enables even novices to set up and manage a project by providing step-by-step directions and clear examples. Ten new industry-specific templates make starting from a blank Project workspace far less intimidating than in pre-

vious versions. You can also easily create your own template and save it for later use.

Though Project 2000 uses a new file format, it can read and write Project 98's .mpp files. Unfortunately, it can't write the older .mpx format.

Though the price may be a bit steep for some, anyone who wants to effectively manage a project—whether simple or complex—will be well served by Project 2000.

—Joel T. Patz

A New Engine for Pentium IIs

STUCK WITH older 66-MHz motherboards and chip sets, early Pentium II adopters could not drop in faster new processors, which run on a 100-MHz bus. But now there's Evergreen Technology's **Performa 500** upgrade, featuring a 500-MHz Celeron CPU that runs on the 66-MHz bus.

Installation of a shipping unit on my 440BX-based PII-266 went smoothly: The hardware drops right into the Pentium II's Slot 1. I merely changed the speed settings in

my BIOS—no drivers to install and no jumpers to reset—and I was up and running. In my informal tests, the Performa 500–based system seemed on a par with—you guessed it—a 500-MHz Celeron PC assembled from off-the-shelf components. Depending on the CPU you're replacing, the performance difference can be spectacular.

Evergreen's Performa 500 costs $229, and there's the slight rub. These days, 500-MHz Celeron CPUs cost about $140 on the street. To use that processor in a Pen-

tium II PC, you'll need a Celeron host card—or SlotKet, as they're popularly called—which has a 370-pin socket and a voltage regulator; the card fits into Slot 1. SlotKets generally sell for less than $10. Throw in the cost of a high-quality cooling fan and Slot 1 retaining clips, and you're talking $175—or $54 less than the Performa 500. These parts are only slightly harder to assemble than Legos, though you have to be careful about static discharge. With a little Web research, you can find thorough instructions.

Evergreen includes excellent installation instructions, nice troubleshooting tips, and a

diagnostic diskette. The company also provides 8 hours of weekday tech support though you pay for the call. In the end, you simply have to ask yourself if you're willing to pay extra for the handholding.

—Jon L. Jacobi ▶

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CD-Rewriteable Drive
8x Max Variable Speed DVD-ROM Drive
US Robotics 56K V.90 Winmodem w/Telephony
Aureal Vortex2 PCI Sound, A3D 2.0 Technology
Altec Lansing ADA-305 Dolby Pro Logic Speakers
Microsoft Office 2000 SBE

$2499
Business lease:$91/Mo., 36 Mos.
Ω-QUOTE NUMBER: pcw02s45

QUANTEX SM700x

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New Intel® Pentium® III Processor 700MHz
128MB High-Performance SDRAM Memory
20GB 7200rpm Ultra ATA-66 Hard Drive
19" Monitor w/Diamondtron NF CRT (18" vis, .25ag)
New Matrox G400 AGP Graphics w/32MB (Dual-head display)
8x Max Variable Speed DVD-ROM Drive
US Robotics 56K V.90 Winmodem w/Telephony
Aureal Vortex2 PCI Sound, A3D 2.0 Technology
Altec Lansing ACS-33 Speakers w/ subwoofer
Microsoft Office 2000 SBE
Optional 2nd 19" Monitor w/Diamondtron NF CRT, add $499

$1999
Business lease:$73/Mo., 36 Mos.
Ω-QUOTE NUMBER: pcw02s05

QUANTEX M650s

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New Intel® Pentium® III Processor 650MHz
128MB SDRAM Memory
20GB Ultra ATA Hard Drive
19" Monitor (18" vis, .26dp, 1600x1200 max. res)
Intel 2D/3D Graphics Accelerator
3rd Generation DVD-ROM Drive
56K V.90 Internet Fax/Modem
Aureal A3D Sound Technology
3-Piece Speakers w/subwoofer
Corel WordPerfect Office 2000
Intel® AnyPoint® Home Network Kit, add $119

$1599
Business lease:$58/Mo., 36 Mos.
Ω-QUOTE NUMBER: pcw02m31

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56K V.90 Internet Fax/Modem¹
Aureal A3D Sound Technology, Speakers w/subwoofer
Corel WordPerfect Office 2000
Canon BJC-5100 Printer, add $149 (after $30 rebate)

$1299

Business lease:$47/Mo., 36 Mos.
Ξ-QUOTE NUMBER: pcw02m28

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Affordable Desktop Solution

Intel® Celeron™ Processor 466MHz-533MHz
64MB SDRAM Memory
8GB-10GB Ultra ATA Hard Drive
17" Monitor w/on-screen display (15.8" vis)
Intel 2D/3D Graphics Accelerator
48x Max Variable Speed CD-ROM Drive
56K V.90 Internet Fax/Modem¹
Aureal A3D Sound Technology, Speakers
Corel WordPerfect Office 2000
Special Upgrade to DVD-ROM Drive, add $49
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Ξ-QUOTE NUMBER: pcw02m14

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Quantex **Deluxe Carrying Case** Included!

$2699
Business lease:$98/Mo., 36 Mos.
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14.1" XGA TFT Active Matrix Display
64MB-128MB SDRAM Memory
6GB-12GB Ultra ATA Hard Drive
New Modular 6x Max Variable Speed DVD-ROM Drive
Integrated 3.5" Floppy Drive
56K V.90 Internet Fax/Modem'
Integrated Stereo Sound and Speakers
ATI Mobility P Graphics w/8MB, TV-Out
MS Windows 98 2nd Ed., Corel WordPerfect Office 2000
Quantex Carrying Case

Starting at ## $2199
Business lease starting at:$80/Mo., 36 Mos.
ᴄ!-**QUOTE** NUMBER: pcw02w01

Cheap Shots: New Inexpensive Cameras From Umax and Ixla

WHO WOULDN'T be tempted by a sub-$200 digital camera? New models from Umax and Ixla are both suitable for shutterbugs on a budget. If top quality isn't a priority, the Ixla SuperPro 640's $100 price tag is especially attractive, but you'll get more out of the $199 Umax AstraCam.

ZOOM OUT

FOR FIRST-TIME users, the stylish **AstraCam** offers a top optical resolution of 640 by 480 (enough to e-mail photos or post images to a Web page), and up to 20 seconds of voice annotation per image. You can adjust the white balance

AstraCam

PRO: Compact; voice annotation, rechargeable batteries.

CON: No flash, produced grainy and dark indoor photos.

VALUE: An affordable entry into digital photography—just make sure you have good light.

Street price: $199

Umax Technologies
800/562-0311
www.umax.com

PRODUCT INFO NUMBER 693

Photo Easy Deluxe with Digital SuperPro 640

PRO: Very inexpensive, comes with built-in flash.

CON: Low detail on images, fuzzy indoor shots.

VALUE: Bare-bones digital camera for buyers on a strict budget.

Street price: $100

Ixla USA
800/881-2966
www.ixla.com

PRODUCT INFO NUMBER 694

for an indoor or outdoor setting (choices include modes optimized for a cloudy sky or for fluorescent light, among others). While you can't view your photos instantly—there is no LCD—a status panel indicates the number of images you've shot and the remaining battery life. The Astra-Cam can store up to 46 shots in its 4MB of memory. The rounded edge on the camera's body allows you to hold it comfortably with your right hand, and its svelte design allows it to slide easily into your pocket.

Unfortunately, I was somewhat dissatisfied with picture quality. Likely due to the camera's low VGA resolution and lack of a built-in flash, indoor photos often came out grainy and dark. And even a slight camera movement while snapping a photo created blurry pictures. Outdoor images were clear and crisp, however.

Downloading photos to your PC is easy via an included Universal Serial Bus cradle. Umax also provides an AC adapter, two rechargeable nickel–metal hydride batteries, Umax's own software for importing and organizing photographs, and Adobe's PhotoDeluxe for editing and enhancing images.

IXLA'S $100 Digital SuperPro 640 (top) is a supercheap camera, but the $199 Astracam from Umax comes with more features.

Priced at just $100, Ixla's **Digital SuperPro 640** garners more attention for its price than its pictures. It's the cheapest digital camera we've seen, but you get correspondingly few features. This bare-bones model has 640-by-480 optical resolution and can store up to 30 photos in its 2MB of internal memory. Unlike AstraCam, the Super-Pro accepts four alkaline batteries and has a built-in flash, which improves image quality by creating brighter photos.

Still, picture quality remained disappointing, with flat colors and obscured details. You can brighten dark pictures by using the bundled Ixla Photo Easy image-editing software, but details remain lost. And even with the flash, many indoor pictures looked much fuzzier than those shot with the AstraCam. But outdoor images looked fine.

Like the AstraCam, this camera lacks an LCD viewer.

GPS Gets Chatty

AT LAST, relief for lost travelers. Etak's $200 **Sony SkyMap 2000** bundles detailed maps of the entire United States (including more than a million restaurants, hotels, and tourist attractions) and a compact GPS receiver that attaches to a notebook's serial and mouse ports (the latter to draw power). Before you go, load the maps you need on your notebook's hard drive and plan your route, perhaps taking advantage of the Etak/Metro Traffic Web-based advisory service (subscriptions cost $60 per year, but registered users can try it free for 30 days). While you roam, the GPS receiver tracks your progress. Via the included microphone/earpiece, you can get routing directions in sequence—but not pinpoint turn instructions. It may strain your notebook battery, but if your business involves lots of driving in unfamiliar territory, you may find that carrying an extra battery is a decent trade-off. Etak, 888/275-9627, www.etak.com.

PRODUCT INFO NO. 705

—*Yardena Arar*
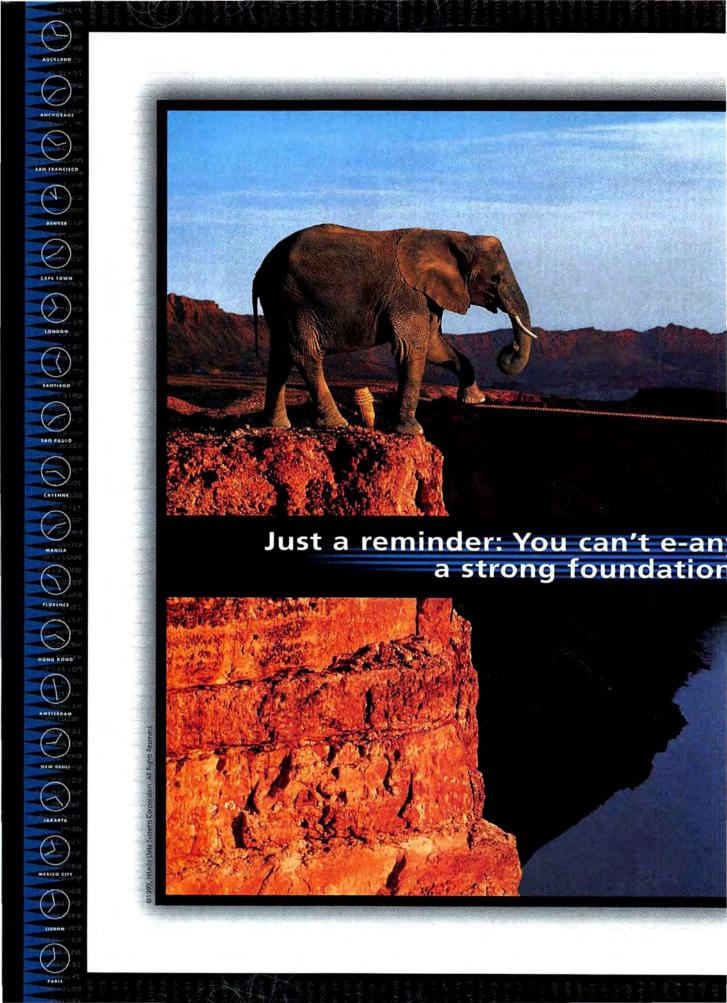
Its status panel displays the number of shots taken, flash mode, and warns you when the battery is very low. The camera comes with both a USB and a serial port, and comes with cables for both. (If you have a choice, USB moves the photos more quickly.)
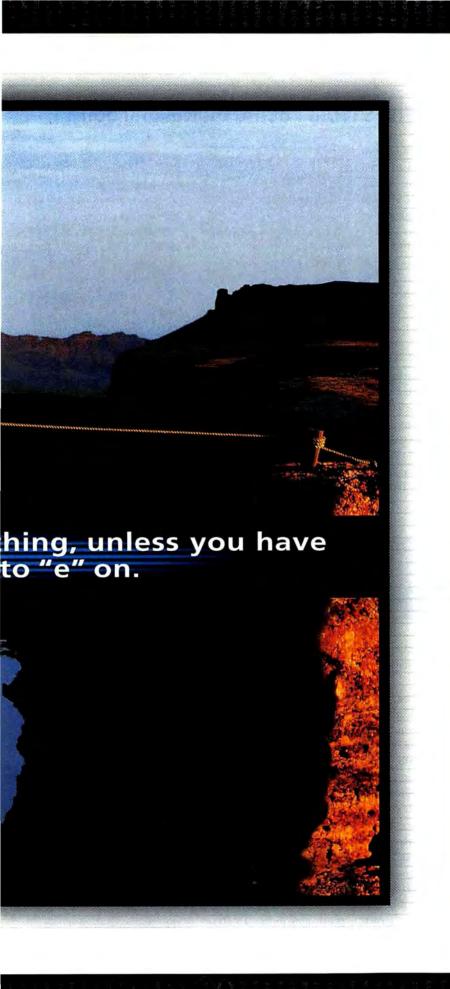
ZOOM IN

THOUGH THE Ixla's price is tempting, you may be disappointed with the photos. Despite its own indoor hiccups, the Umax should please digital camera beginners without breaking the bank.

—*Grace Aquino* ▶

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hing, unless you have
to "e" on.

Rugged USB CD-RW Drives From Pacific Digital and Sony

CD-RW DRIVES

PACIFIC DIGITAL'S $269 **PDC 448USB** and Sony's $329 **Spressa USB Plus** 4X write/4X rewrite CD-RW drives combine the plug-and-play convenience of USB with both PC and Mac compatibility. We found them to be ideal drives to share in a small or multi-platform office. We tested a shipping version of the Sony drive, and a near-final version of the Pacific Digital model.

Both of these external drives are housed in sturdy enclosures. Unfortunately, Sony positioned the power switch next to the tray-eject button, where a user can easily press it by mistake. And unlike most USB peripherals, the Spressa

forces you to install its own software and drivers and then reboot. In contrast, Pacific Digital's PDC 448USB uses Windows' USB install routine and is functional as soon as the drivers are installed.

Both units read and wrote CD-RW discs without a hitch. Their CD-ROM read speeds trail those of CD-ROM drives found in most desktops—the Spressa reads at 6X, and the PDC 448USB at 8X—but you won't notice on most apps.

Pacific Digital includes Easy CD Creator 4.01 for data and audio CD mastering, while Sony offers its proprietary CD Extreme. For packet-writing (which allows you to randomly copy and delete files on

CD-RW discs), Sony bundles its AB CD software, and Pacific Digital includes DirectCD 3, which provides 2:1 data compression and a run-time driver that lets virtually anyone with a recent CD-ROM drive

read CD-RW discs.

Sony offers Mac and PC software out of the box, plus around-the-clock support, but you'll probably find the Pacific Digital drive a better value.

—Jon L. Jacobi

Bring On the Ports

PORT REPLICATOR

HELLO, MY NAME is Michael, and I am a USB junkie. I admit it: I think the Universal Serial Port—designed to let you add as many as 127 external devices to a PC without incurring conflicts—is the best technological advance in years. But the true convenience of USB struck me only after I installed Xircom's PortStation Port Expansion System.

My PC has 2 USB ports: By connecting Xircom's $254 **PortStation Connection Starter Kit** to one of those ports, I got an extra parallel port, keyboard and mouse ports, and four extra USB ports. And all worked beautifully with Win-

XIRCOM'S USB DEVICE lets you easily snap on extra serial or ethernet ports, for example.

dows 98, without hassle. A bundled CD-ROM includes necessary drivers—but Windows 95 installation is more trouble than it's worth.

The modular casing of the PortStation has an End Cap at each end; these parts connect to your PC's USB port and to a power outlet. Between these you add separate modules that snap on like Lego toys.

The modules available now include four- and seven-port USB hubs, 10-mbps ethernet, and a 56-kbps modem. Xir-

com says that it is planning to add more modules— for cable modem, ADSL, and ISDN, plus home networking —in the near future. The End Cap Kit costs $99; the modules range from $54 for the parallel ports to $129 for the modem. Xircom's starter kits, like the one I tested, bundle a set of modules. One downside: I wish the modules stacked vertically instead of horizontally; as is, they crowd my already tight desktop real estate.

High-power USB devices, such as printers, digital cameras or scanners connected to these new ports can strain your PC's power supply.

Check with your PC vendor about possible power supply limitations before buying a swarm of new devices.

The PortStation makes adding external peripherals as easy as plugging in a home appliance. Try it and you might get hooked like I did.

—Michael S. Lasky

WORKS DAYS, NIGHTS, AND WEEKENDS.

[AND ITS IMMUNE SYSTEM IS A WONDER OF NATURE.]

QuickBooks Pro 2000 Packs New E-Commerce Enhancements

ACCOUNTING

CATCHING UP to Peachtree Accounting, Intuit's **Quick-Books Pro 2000** offers small businesses welcome new e-commerce capabilities (with monthly fees), such as a Web Site Builder and a Merchant Account Service to authorize and settle credit card payments. But that's the only area of significant improvement in this updated version of the veteran program.

QuickBooks Pro 2000, which we tested in beta form, does make it easier for sales reps to track contacts, thanks to its new capability to synchronize customer information with Microsoft's Outlook and Symantec's Act. But other changes, such as the reorganizing of information in company and customer centers, are largely cosmetic and add no accounting capabilities. Intuit also made nearly 20 more minor enhancements in the business bookkeeper.

The $219 multiuser-capable QuickBooks Pro includes all the bells and whistles, while the $119 single-user Quick-Books omits a few of the bells,

such as time tracking, job costing, and integration with apps like Outlook, Act, and Excel. Most businesses will be better served with the Pro version.

If Intuit continues to rest on its laurels, its dominant QuickBooks may lose ground to more capable competitors. One such candidate is MYOB Accounting Plus, with its multicurrency pricing capability and its ready matrix of pricing for goods that vary in cost based on quantity sold.

QuickBooks users who want to sell on the Web should get

QuickBooks Pro 2000 (there's a $70 upgrade rebate). Others can skip this offering and let

Intuit work harder for their business next time.

—*Richard Morochove*

QUICKBOOKS PRO 2000 FEATURES A NEW LOOK, organizing information in new company and customer centers.

QuickBooks Pro 2000

PRO: Provides small-business path to start selling on the Web.
CON: Redesign camouflages lack of substantive improvements.
VALUE: Worthwhile if you need the e-commerce enhancements; otherwise, save your dough.
List price: QuickBooks Pro 2000 (multiple users) $219; QuickBooks 2000 (single user) $119
Intuit
800/446-8848
www.quickbooks.com

Compaq Pumps Wireless to 11 mbps

WIRELESS NETWORKING

THE QUICK AND easy wireless office, like the paperless office, has lived only in our imaginations. Is the dream now a reality? Not exactly, but Compaq's new **WL Series** of wireless devices is a significant step forward, reaching speeds of 11 mbps and taking a lot of the hassle out of setup for people who want to extend an existing LAN or wirelessly network a small office.

We tested a beta version of Compaq's $899 hardware Access Point (AP) and $199 wireless LAN PC card ($199 PCI cards are available). Compaq will also market a $125 software and card solution that requires no hardware AP.

Base installation couldn't be easier. Compaq's AP plugs into an existing hub, switch, or server; then, using default network settings, it automatically begins searching for compati-

ble wireless network adapters. The PC Card also installed painlessly in our test notebook and had no trouble communicating with the AP.

We used WinProxy 3, an Internet sharing application, to share our cable modem connection over our test network. However, WinProxy crashed whenever we turned on Compaq's AP; we believe this problem to be as much a shortcoming on WinProxy's part as on Compaq's.

Compaq bundles a trial version of WinGate 3.0 for Internet sharing. After a lengthy installation process requiring debugging, we did get the two products to work together.

Once fully running, the network performed admirably. Throughput speeds never wavered below 10 mbps, and we could walk freely around the office. We only lost contact two floors below our AP.

Compaq WL Series Wireless LAN

PRO: Easy to set up with default settings, throughput as billed.
CON: Worked only with the bundled WinGate 3 proxy server software.
VALUE: Best if you're starting from scratch and willing to adapt to Compaq's defaults.
Street prices: $199, WL network adapter (PCI or PC Card); $899, hardware Access Point;
Compaq Computer
800/345-1518
www.compaq.com
PRODUCT INFO NO. 698

Home and business users content to let the devices run at their default settings should be pleased with this easy wireless LAN solution. If you're sharing an ADSL or cable modem via software, however, check compatibility with Compaq before you buy.

—*Oliver Rist* ▶

APC Symmetra™ ensures the Web hits you want
...and prevents those you don't

Unique Power Array™ architecture is perfect for E-businesses requiring 100% availability

Your systems host E-commerce and your datacenter is expanding rapidly. Your customer's decision to buy is based on your system's availability.

Proper power protection is a key to high availability systems. Without power, the door to your products and services is closed to all existing and potential customers.

APC products can protect your E-business when the unexpected occurs. APC's Symmetra™ Power Array™ is the single most highly available UPS in the marketplace. Consider how Symmetra protects your business:

- **N + 1 redundancy design assures continuous availability** – If a module fails, the others instantly begin supporting the full load.

- **Serviceable while load is up and running** - Additional battery modules increase runtime and the modules are hot swappable, meaning no downtime.

- **Scalable power** – Additional 4 kVA modules can be added to expand to 16 kVA of power capacity.

Protect your E-business with other APC products:

- APC Smart-UPS® protect servers from surge, irregular voltage, and blackouts.

- APC Silcon® DP300E 3-phase UPSs keep your entire facility up and running.

• PowerChute® plus software provides completeUPS management support for all major operating systems, including Linux.

APC is a leader in the field of power availability. We can easily grow with your E-business and help ensure your continued success. Contact APC today and let APC's Legendary Reliability™ work for you.

APC®
Legendary Reliability™

Halfway-There Solutions to Internet Dial-Up Dilemmas

INTERNET UTILITIES

IF YOU HAVE a single phone line and a dial-up Internet connection, you can't use your phone while you're online—and that's that. It's like being told you can't use your fridge while your TV is on.

An evolving species of on-line service aims to lessen this problem by using variations on call forwarding. InfoInter-Active's **Internet Call Manager** ($5 per month), Pagoo's **Call Catcher** ($5 per month; six months prepaid required), and CallWave's **Internet Answering Machine** (free, but comes with ads) all employ the same basic principle. When you're online, incoming calls are sent to an 800 number via the busy/call-forwarding option that your phone company provides (usually at a monthly cost of $3 to $4 plus an activation fee). You're then alerted to the call via a pop-up screen on the PC desktop. The services, which can be used with any ISP, are much cheaper than adding a second phone line.

With Pagoo and CallWave, callers are forwarded to the 800 number (at no charge to you or the callers); at that number, they can leave a voice message that's sent to you instantly as an audio clip via the Internet. With Pagoo, the pop-up window appears only when you have a call. With CallWave, the window stays on your desktop and flashes ads when not in use.

InfoInterActive's Internet

PAGOO'S CALL CATCHER IS ONE OF several new services that let you use call forwarding to catch missed calls while you're on the Net.

Call Manager takes a slightly different tack. It uses a built-in caller ID function to identify your caller on screen. You then choose one of three responses: "Call me back," "I'll call you back," or "Ignore this caller." If you choose the last

CALLWAVE'S APPLICATION WINDOW stays on your desktop and flashes ads when you don't have a call.

option, the caller will be invited to leave a voice-mail message that you can later retrieve from a password-protected Web call center.
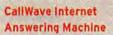
To set up any of these services, you need to download the software (easy enough), and then arrange to have your calls forwarded when your line is busy (surprisingly complex and costly). When I tried to establish busy/call forwarding with my phone company, I suffered through my worst tech-support headache in a long time: It took a week to get everything set up properly. The phone company also charged a $4.75 installation fee for call forwarding, plus $3.23 per month thereafter.

Of the three services, Pagoo's and CallWave's are more useful—instant voice mail lets you determine immediately whether you want to go offline to return a call. I see very little real value in InfoInterActive's automated responses, and returning to the Web site to retrieve voice messages turned out to be slow and cumbersome. (The company is planning to offer expanded services in the future.) Both Pagoo and InfoInterActive let you try their services for free (the former for 30 days, the latter for 12 calls), but only Pagoo will refund your phone company fees if you opt out. (As noted, CallWave is already free, if you don't mind ads.)

There's light on the horizon, however. Norton Networks is currently selling its all-in-one solution, Internet Call Waiting, to ISPs and telephone companies, which will in turn roll it out to consumers. I was not able to test Internet Call Waiting, but it appears to have everything: pop-up caller ID, call forwarding, and automated call-back messages, plus the option to switch over and take the call directly, either over the phone or via the PC. Microsoft Network is the first ISP to climb on board. Subscribers in Atlanta, Seattle, and San Diego can order the service now for an additional $5 to $6 per month. We expect more cities—and eventually more online services—to get signed up soon.

—Glenn McDonald ▶

Freestanding Mics: Farewell to Headsets Forever?

IF YOU LIKE talking to your computer, you know that wearing a headset can be a real drag. Four new freestanding microphones come to the rescue: Andrea Electronics' **DA-400 Desktop Array**, GN Netcom's **Microphone Array**, Labtec's **LVA-7280 ClearVoice Digital Microphone**, and Telex's **Super-Directional USB Digital Microphone M-560**. I looked at a beta of the GN Netcom product; all others were shipping units.

These so-called *far-field* microphones are suitable for speech recognition programs, Internet phone calls, and chatroom prattle. The good news: You can speak into them as freely as you would into a

ANDREA'S DESKTOP ARRAY (left) and Labtec's ClearVoice microphones let you dictate to your PC without headsets.

speakerphone. The bad news: These microphones pick up more background noise than headset models, where the boom is in a fixed position near your mouth. The Andrea, GN Netcom, and Labtec mics all plug into the PC sound card; Telex's device, as you'd guess from its name, plugs into a USB port.

I tested the products in an open cubicle environment (with some extraneous noise) using Dragon Systems' NaturallySpeaking 4. I dictated a business letter, e-mails, and a legal document. Overall, I was fairly impressed with performance. No microphone dramatically upstages the rest, but different models have pros and cons. For comparison, I

also tested a standard headset (most headsets are about $20), which delivered superior—but not dramatically superior—accuracy.

Andrea's $150 DA-400 Desktop Array is the smallest and priciest of the bunch—roughly the size of a bulky stapler—with a handy power switch. It mostly ignored background noise from the side. Andrea reps claim that the unit works best on top of your monitor and at a speaking distance of 18 inches or less, but it processed dictation from me at distances up to 4 feet.

GN Netcom's 17-inch Microphone Array roosts on top of your monitor like a miniature aircraft wing. I tested a prototype (a shipping unit should

be available by late March). This newcomer performed well within its designated maximum range of 36 inches, but it didn't tune out all background noise.

Labtec's $130 LVA-7280 ClearVoice Digital Microphone, about the size of a rolling pin, has a mute button and a nifty green/red light indicator that lets you know whether it's active. It will work perched on your desk or atop your monitor. It picked up some extraneous noise directly behind the microphone but not sounds to the side. Like Andrea, Labtec optimized its unit to work at 18 inches; and as with the Desktop Array, I found that the ClearVoice still worked a few feet away. At press time, Labtec was finalizing bundled software, which will likely include trial versions of popular speech apps.
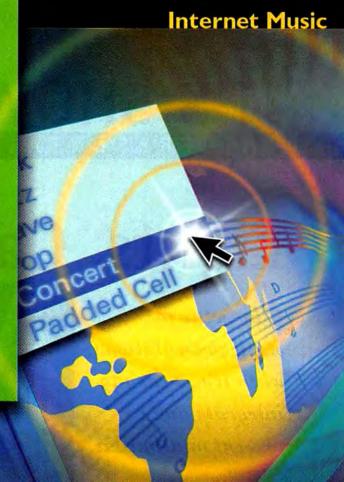
You might feel under the gun while talking into Telex's $70 Super-Directional USB Digital Microphone M-560: It points toward you like a rifle. The plug-and-play device worked—but only after I rebooted my Windows 98 PC a couple of times. The M-560 functions best if you talk at a distance of less than 2 feet. This microphone cut out noise from the side, but its accuracy overall was the least impressive of this group.

You will pay extra to dictate ears-free. A nonheadset mic will work well, assuming you have your own office with a door. And the more you use your voice with these devices, the better your results.

—*Aoife McEvoy* ∎

DA-400 Desktop Array

PRO: Ignores peripheral noise.
CON: Expensive.
VALUE: A high-priced alternative to a headset.
Street price: $150
Andrea Electronics
800/442-7787
www.andreaelectronics.com
PRODUCT INFO NO. 701

LVA-7280 ClearVoice Digital Microphone

PRO: Nice LED indicating whether mic is active.
CON: Slowest at processing voice signals; not inexpensive.
VALUE: Reasonable accuracy and good trial software enhance its appeal as a headset alternative.
Street price: $130
Labtec
360/896-2000
www.labtec.com
PRODUCT INFO NO. 702

Microphone Array

PRO: Hands-free mic allows considerable speaking distance for input.
CON: Rather unappealing-looking, picks up some background noise.
VALUE: Good if you like to roam a bit as you talk.
Estimated street price: Less than $100
GN Netcom
800/826-4656
www.gnnetcom.com
PRODUCT INFO NO. 703

Super-Directional USB Digital Microphone M-560

PRO: Least expensive in this group.
CON: Lacks power switch, works only with Windows 98.
VALUE: USB device offers great alternative to headset, if your PC's sound system is not up to snuff.
Street price: $70
Telex Communications
800/328-3771
www.computeraudio.telex.com
PRODUCT INFO NO. 704

IT'S SHOW TIME!

THE PRESENTATION SERIES

PART **1**

Lights, Camera,

Why settle for static presentations when it's so easy to integrate and present multimedia?

Action–
and Plenty of It

Used correctly, multimedia can be just the thing you need to help close the largest sale of your life, or to help explain to an audience of would-be partners why they should do business with you and your company.

"The 21st century will be unforgiving to any presenter who doesn't understand that we live in a visual world," says Nido Qubein, CEO of Creative Services Inc., a training consultancy in High Point, N.C. "Our audiences have become very discriminating in how they receive and value information."

"As we go into the 21st century, we must make what we do absolutely compelling, with video, audio, animation, and text."
—Terry Brock,
Orlando, Fla.-based professional speaker and presenter

ROBIN NELSON/MERCURY PICTURES

INTRODUCING AN
LCD PROJECTOR SO DEPENDABLE,
YOU'LL WANT TO TAKE IT
EVERYWHERE.

AND SO PORTABLE, YOU CAN.
(SHOWN ACTUAL SIZE)

Though it weighs under 6 pounds, the PowerLite® 710c performs like a true heavyweight, giving you everything you need to captivate an audience. Perfect color. Razor-sharp detail. And plenty of brightness – even for rooms that are lit. Plus, when it comes to clarity, no DLP can beat our three LCDs. There's even Private Line℠ phone support for immediate assistance. With all that, there's a lot more to the PowerLite 710c than meets the eye. For while its size may make it the smallest projector you've ever seen, its performance will surely make it the greatest.

IT'S SHOW TIME!
THE PRESENTATION SERIES

Lights, Camera, Action!

For the smart presenter—one who thinks about what the audience wants or needs to hear and then crafts the message appropriately—multimedia can be an important part of delivering a high-quality, visual message. And equally important is the quality of the presentation itself, which is often the product of the presentation projection system used.

The good news is that multimedia presentations have gotten easier than ever to pull off well. The major presentation software packages make pulling in sound, animation, graphics, and even movies just a few mouse clicks away, in most cases. And there's a raft of other tools at your disposal that, with some learning time invested, will help you create original, high-quality graphics or drawings—or capture the photos and sounds that will help your presentation really shine.

MULTIMEDIA TOOLS

Microsoft Corp.'s PowerPoint, Lotus Development Corp.'s Freelance Graphics, and Corel Corp.'s Presentations are among the most commonly used tools

ViewSonic Litebird

for computer-based presentations run either with an overhead projector or from a stand-alone PC with a good-quality screen. The newest versions of these packages have multimedia features, and they let you publish your multimedia-enhanced presentation to the Web with minimal fuss. That allows you to leave your PC at home and run the presentation from any computer that's equipped with a browser. Or you can ask people to "call" into the presentation at their convenience and overcome barriers of time zones and distance.

PowerPoint 2000 gives you a couple of options when you pull a movie file into your presentation. It asks whether you want to run the movie when you originally pull up the slide, or if you want to click on the slide to get the movie to start. And it asks whether you want it full screen or not. Corel's Presentations 9 lets you set several different levels of animation, if you wish, for things including bullets and lists. Lotus Freelance Graphics lets you set different individual effects (sound, movement, etc.) for each of the items you might have in a presentation—photo, chart, bul-

Epson Boosts Image Quality

Size matters for busy, on-the-go professionals—but not at the sacrifice of presentation quality. With the new PowerLite 710c from Epson America Inc., Long Beach, Calif., professional presenters get the best of both worlds: a light-weight projector for high-quality presentations.

The PowerLite 710c boasts 1,000 lumens, weighs in at 5.8 pounds, and supports resolution up to 1600 x 1200.

Other features include picture-in-picture, electronic zoom, on-screen help, and a retractable projection lens for added protection while on the road.

Also, the 710c makes use of a three-LCD projection system to help boost image quality when compared to single-LCD systems. The 710c uses separate LCDs to create the different shades of red, green, and blue that blend to produce a projected image. With a separate LCD for each color, the result is brighter and truer colors with sharp black text. And the lamp can last up to 2,000 hours.

The 710c will be available this quarter for $7,999.

Simple, powerful and endlessly versatile. The new MultiSync® MT840,™ MT1040,™ and MT1045™ are the superior choice in conference room projectors. They put any presenter in control with intuitive one-touch AutoSense™ and source buttons that optimize incoming data and video signals for the best possible on-screen image. Our exclusive Advanced AccuBlend™ technology delivers jaw-dropping resolution, even from non-native sources. And with a variety of optional lenses, you're ready for just about any projection scenario imaginable. Plus, each is backed by our worry-free InstaCare™ service programs. The new MultiSync MT40™ Series. Now anyone can take the floor, and rule the room.

	MT840	MT1040	MT1045
Weight:	12.3 lbs.	12.3 lbs.	12.8 lbs.
Brightness:	1500 ANSI lumens	1300 ANSI lumens	2000 ANSI lumens
Resolutions:	SVGA Native; VGA, XGA w/Advanced AccuBlend	XGA Native; VGA, SVGA, SXGA w/Advanced AccuBlend	XGA Native; VGA, SVGA, SXGA w/Advanced AccuBlend

To receive your free Projector Tester CD-ROM, visit http://mt40.nectech.com or call (800) NEC-INFO.

NEC Technologies

Circle 180 on card or go to www.pcworld.com/productinfo

Rivet 'Em with Video

Terry Brock roams audiences with his camcorder, and weaves the clips into his multimedia presentation.
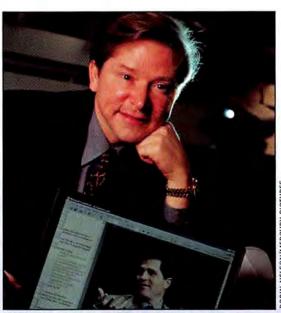
Terry Brock, a professional speaker and presenter, has been using multimedia in his craft since the mid-1980s. But, fond as he is of the newest bells and whistles—he says he changes his tools often to keep his competitive edge—he agrees that content is still king and always will be.

"You have to have something to say to the audience that's going to improve their lives," insists the Orlando, Fla.-based Brock. "If you're not going to give them great content, sit down and let them watch TV."

Video is, in fact, one of Brock's specialties. Just before he does a speech, he'll go into the audience with his camcorder and ask about a particular hot topic. Or, at a corporate gathering, he'll ask the company's top salesperson to say a few words about how she does her job. Another use of the medium is to go into the field and record customers talking about a product—what they like and dislike—and then weave that into the presentation.

"The audience is riveted" with video, Brock says, because it's different from the usual PowerPoint presentation. And, most important, "they know I'm not making it up. If Mary's the top salesperson, they know her and they know she's successful. And they want to hear how she does it, so they can do it, too."

After Brock finishes taping, he'll figure out which 30-second or 45-second piece to use in his presentation. He then creates an MPEG file, using a tool called the Dazzle Digital Video Creator, from Dazzle Multimedia Inc. (*www.dazzle.com*), Fremont, Calif., so that he can use the file in his PC-based presentation.

"Every millisecond that they're with you must be perfect." —Terry Brock

ROBIN NELSON/MERCURY PICTURES

"The key to this technique is to make it as relevant as possible to your audience, and not to rely on the tools," Brock says. "I'd like to believe I can spend so many dollars [on presentation technology] and win. But your competition can go out and buy the tools, too." It's how you use technology that differentiates you and your presentation, he insists.

GETTING THEIR MONEY'S WORTH
It's incumbent upon the presenter to give people information they can take back with them. "If you're speaking in front of 1,000 people—think about how much money is sitting there, listening to you," Brock says. Salary, lodging, travel, regis-
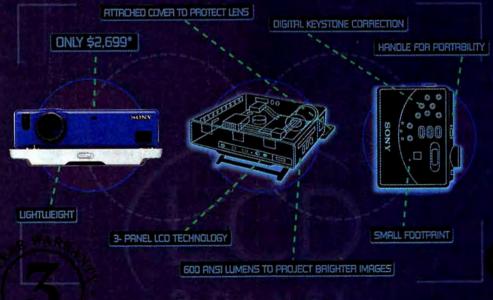
Rivet 'Em with Video

continued from page 7

tration costs—all can add up to several hundred thousand dollars per hour. "Every millisecond that they're with you must be perfect," he says.

And a big part of that, these days, is multimedia—not to shore up a weak presentation, but to make great content even better. "As we go into the 21st century, we must make what we do absolutely compelling, with video, audio, animation, and text," Brock explains. "If all you're doing is words across the screen, welcome to 1984. If you're doing pictures, welcome to 1990."

It took a while, and lots of trial and error, for Brock to hit on his video technique. "I had to be willing to endure some mistakes" in technical and operations areas. "It would have been great to get someone to teach this to me—plug this cable in here, shoot the video this way and not that way." He says he can now teach others how to do this in about a day.

ROBIN NELSON/MERCURY PICTURES

Terry Brock in action in Atlanta last November.

One of the many lessons learned: When overseas, he asks a local to handle the interviewing of the people he's taping. Otherwise, when it comes time to show the clip during a presentation, "people will focus on my little gaffes and not on the point I'm trying to make." Even if he speaks the language, no one knows the innuendos of the local lingo like someone born and raised in the area.

Another tool in Brock's kit bag is a minidisc player, which he uses to record audio for his pre-

sentations. He also uses both the audio and video on his Web site (*www.terrybrock.com*). One of the ways he continues giving value to the people at his presentations is to give them a community on his site so they can continue talking to him long after the presentation is done.

"I'll give them a secret place to go to on my site. Then I'll put some of the audio, video, and other presentation material there, and continue to add relevant content or links to other sites. And there's a place where they can ask questions of me," Brock explains.

"They get a special place where I answer their questions and they can see what their colleagues see," Brock says. "And I get traffic to my Web site. Everyone wins."

A SECRET WEAPON

A "secret weapon," Brock says, is his membership in the National Speaker's Association, based in Tempe, Ariz. "It's taught me huge amounts. I've gotten to know hundreds of the best presenters in the world—by working with others, I give to them and they give to me."

An alternative for many people just starting out is Toastmasters International, an organization based in Rancho Santa Margarita, Calif., that is devoted to helping people learn the mechanics of speaking in front of a crowd. Toastmasters has hundreds of clubs in cities and towns throughout the U.S.—to find one, look in your phone book or on the Web at www.toastmasters.org. "I heartily endorse it," Brock says.

Something else he uses is called PowerPlugs, a software package from CrystalGraphics Inc. (*www.crystalgraphics.com*), Santa Clara, Calif., that has unusual transitions for PowerPoint slides. "It gives me things that most people haven't seen yet. As soon as other people start using this, I'll switch to something else to stay ahead of the pack," Brock says.

"Multimedia is something we have to consider in terms of how it's going to generate more dollars for our business, and in most cases we need to use it," Brock says. But a relatively small, well-placed bit of multimedia will go a long way. "A meal without salt and pepper can give you nutrition— but it doesn't taste as good." ▶

Mitsubishi Ultraportable Projectors.
One Great Design, Three Delicious Choices.

From your living room to your conference room... in your den or in your class... Mitsubishi offers a better choice that impresses both you and your audience. Whether yours is a story to tell or a pitch to sell... Mitsubishi's *Better Choice*™ Series of ultraportable projectors provide lighter and brighter presentation solutions. Call **800-843-2515** today for a free demo or visit us at **www.mitsubishi-display.com/pb/pwd/don** and let your dealer know that they need to give you the *Better Choice Series* from Mitsubishi. For a truly tasty experience, make your next projector a Mitsubishi.

BETTER CHOICE SERIES		
Performance Choice	Super Choice	Value Choice
X70	X50	S50
1100 ANSI Lumens Typical	750 ANSI Lumens Typical	1000 ANSI Lumens Typical
XGA 1024 x 768 Native	XGA 1024 x 768 Native	SVGA 800 x 600 Native
SXGA 1280 x 1024 Max.	SXGA 1280 x 1024 Max.	XGA 1024 x 768 Max.
7 lbs. (3.2 kgs.)	7 lbs. (3.2 kgs.)	7 lbs. (3.2 kgs.)
More benefits including 3-year warranty, 2,000-hour lamp life. Natural Color Matrix Algorithm, and zoom and focus adjustment.		

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PRESENTATION PRODUCTS

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lets, and so on.

Also, the major presentations packages use their company's Web sites to give you access to third-party tools for doing even more types of multimedia things. Microsoft's site (*http://office-update.microsoft.com*) makes available over 70 free downloads, from its own and other companies, to help create photo albums or use clip art on slides,

InFocus LP330 projector

among many other things. Corel's site (*www.officecommunity.com*) includes masters, clip art, and animation—and it's updated monthly.

Both Corel and Lotus presentations packages are available

WordPerfect Office 2000 (available for $99), and Lotus' is SmartSuite 2000 ($149). PowerPoint 2000 is available either standalone ($339) or as part of the Microsoft Office 2000 standard suite ($499).

Other options to create presentations include Harvard Graphics 98 ($295.95) from Software Publishing Corp., Nashua, N.H (*www.harvardgraphics.com*). It supports sound, animation, and clip art. The company is coming out, early next year, with a package that combines Harvard Graphics with more multimedia functions and other drawing facilities—the street price is estimated to be around $295. Also, Astound 6.0 ($249), from Astound Inc. (*www.astound.com*) in Mississauga, Ontario, Canada, supports animation, sound, and video—and it works with your existing PowerPoint slides.

Lots of more specialized tools are available, too. For example, you can edit photos by changing their size or rotating the people in the photo to face another direction—and then pull the finished product into your presentation. The industry's photo-

> ## "The 21st century will be unforgiving to any presenter who doesn't understand that we live in a visual world."
> ### —Nido Qubein, CEO, Creative Services Inc.

only as part of larger applications suites, which include spreadsheet and word processing software. Corel's is called

editing standard is Adobe Systems Inc.'s Photoshop ($649; *www.adobe.com*). It's the one used by many professional

The MultiSync LT84 and MultiSync LT140, part of the Go! Series projectors from NEC Technologies Inc., Itasca, Ill., feature Digital Light Processing (DLP) technology from Texas Instruments. The projectors' advanced electronics system automatically locks onto incoming computer and video signals to provide the best image quality possible—no need to make adjustments via the menu system.

The MultiSync LT84 and LT140 weigh just 5.3 and 5.5 pounds, respectively. The MultiSync LT84 offers native SVGA resolution and 700 ANSI lumens, while the MultiSync LT140 offers native XGA resolution and 800 ANSI lumens.

graphic designers, but it's so powerful that it requires a fairly steep learning curve. So for simpler photo-editing tasks, there are lower-priced alternatives available. Among them: Photoimpact 5 ($79.95) from Ulead Systems Inc. in Torrance, Calif. (*www.ulead.com*).

Another source for multimedia products is Macromedia Inc. (*www.macromedia.com*) in San Francisco. Among its wares is Freehand 8 ($399), a tool to draw illustrations from scratch. Visio 2000 ($199; *www.visio.com*) from Visio Corp., Seattle, Wash., lets you do flowcharts, organization charts, and other things that you can pop into your presentations.

Jasc Software Inc., Eden

SUBSTANCE: 4.8 Pounds.
STYLE: Tons.

A notebook projector that's light on weight,

heavy on style. The new InFocus® LP™330 "Dragonfly" with

XGA resolution projects a truly stunning image,

even before you turn it on. From the number-one name

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Prairie, Minn., sells its Media Center Plus ($39; www.jasc.com), which lets you organize your photographs and multimedia files—including ones you got from CDs and Zip drives—so you can reuse them in different presentations.

To help create and edit videos, among the available tools is Digital Video Producer from Click2learn.com (formerly Asymetrix) in Bellevue, Wash. You can download the software and try it for free for 30 days from the company's Web site at www.asymetrix.com/products/dvp. Another video-editing pro-

there are the Litebird projector from ViewSonic Corp., Walnut, Calif.; the InFocus LP330 and LP770 from InFocus Systems Inc., Wilsonville, Ore.; and the Scout from Lightware Inc., Beaverton, Ore.

The Litebird lets you take your show on the road. It weighs five pounds, sports over 850 lumens, and carries a street price of $5,795. It supports screen resolution up to 1024 x 768.

The InFocus 330 weighs 4.8 pounds—an easy fit into a briefcase—and sports 650 lumens. It supports resolution up to 1024 x 768. Street price is about $6,000.

Lightware Scout

Lightware's Scout weighs in at 5.3 pounds, with 500 lumens and a street price of $2,995; it supports resolution up to 800 x 600. It's designed for professionals on the move, and is part of the ViewSonic Office Theater family.

EASY ON THE BELLS, WHISTLES

With all these products on the market, it would be completely understandable for a first-time multimedia maven to go a bit nuts with lots of special effects, audio, and visuals in a presentation. But that would also be a huge mistake, experts warn.

"People think they need to use every bell and whistle," says Marjorie Brody, a professional speaker and author based in Elkins Park, Pa. "The key is to be comfortable, be prepared for crashes, and be focused on the audience—not on getting the equipment to work."

Indeed, experts warn that the more complex the presentation, the more prepared the presenter needs to be. Tom Antion, author of *Wake 'Em Up!: How to Use Humor & Other Professional Techniques to Create Alarmingly Good Business Presentations* (Anchor Publishing, Jan. 1999), says, "You have to learn to do them properly. Many of the ones I've seen fail for stupid reasons." Among the problems, Antion says: People often practice so

The Better Choices Series from Mitsubishi Presentation Products in Cypress, Calif., lets customers choose which features they want to have fit into a seven-pound chassis. Prices range from $5,995 to $7,995, and all three models use the same remote control, carrying case, and lamp. Differences lie in the number of lumens—700, 900, or 1000—as well as the quality of the graphics supported. Emergency roadside help is also available with the top-of-the-line X70 model.

Other features common to all three projectors include point-'n-zoom digital magnification as well as picture-in-picture function. The latter allows any two input images to be displayed actively at the same time.

gram is the VideoWave III package ($99.99; www.videowave.com), from MGI Software Corp. in Toronto.

So you're all set to go with your multimedia, show-stopping presentation. Just remember, it takes quality projection hardware to make the job complete. Among the hottest machines out

For its part, the InFocus LP770 is a conference room projector with networking software that allows shared use throughout a company—similar to a networked printer. Thanks to InFocus' LightPort™ Networking Software, the machine hooks right into your company's network. Street price is about $8,000.

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THE PRESENTATION SERIES

Lights, Camera, Action!

much that they use up all the PC's resources and the machine might just crash during the presentation. So reboot before you start the real show. Also know how to turn the video projector back on if it goes to "sleep" during the presentation.

These may sound like fairly minor points, but they're not. Mistakes distract from the message—and you need to know how to handle problems when and if they do happen. Know what you want to tell the audience backward and forward, so if there is a glitch you can keep going. A little humor helps ease troubled times, too.

Also, keep the message simple. Use large titles on your slides—48-point or larger, with no more than seven words/line. Don't mix and match more than two different effects per slide, or you run the risk of having people's eyes bug out.

Another trick the experts use is to do as much prep work as is feasible. Know the size of your audience—and the individual

> *"For multimedia presentations, less is more."*
>
> —Linda Richardson, author, *Stop Telling, Start Selling*

members, if possible—as well as the kind of room you'll be in. Is it brightly lit or dimly lit? Adjust your presentation accordingly. "For multimedia presentations, less is more," says Linda

A network-friendly model, the VPL-CS1 SuperLite LCD data projector from Sony Electronics Inc., Park Ridge, N.J., allows a computer to control up to 127 different projectors. And Sony's new Projector Station software allows the projector's remote to launch an electronic presentation via the touch of a single remote control button.

The SuperLite uses three LCD panels for high-quality images and weighs just 6.4 pounds. Using a new 120W UHP lamp, the VPL-CS1 can output 600 ANSI lumens of brightness, enough to display images in a fully lit room. Suggested retail price is $2,699.

Richardson, the Philadelphia-based author of *Stop Telling, Start Selling: How to Use Customer-Focused Dialogue to Close Sales* (McGraw-Hill, 1997).

YOUR BEST TOOL: YOU!

Felicia Lindau, CEO and founder of Sparks.com—a maker of greeting cards and gifts based in San Francisco—does 30 or more presentations each month. When her company was in startup mode, she gave several a day for "several months," she says. "I give different presentations for different audiences." So what she does to educate is very different from a pitch to persuade potential investors or business partners.

Her best tool, she says, is herself. "The point of a presentation is to engage the audience—and I'm an engaging storyteller. I don't rely on the magic to come from the technology—it has to come from me."

Still, she says, multimedia can help differentiate a pitch or presentation in a crowded field. "There's an old saying: You can't save souls in an empty church. And if you need multimedia as a gimmick to get them into the church, then you can save them." ▶

SO, HOW DID YOUR PRESENTATION GO?

THE *swat* TEAM

kill bugs

dead

Face the facts: your pc is infested. We round up the most insidious software bugs and point you to their fixes.

BY SCOTT SPANBAUER

DO YOU SUSPECT that Windows is running a little slow? Does it lock up when you try to shut down? Do you worry that hackers are reading your files while you surf?

No, you're not losing your mind. But you might be losing the war against one of the most powerful, frustrating, and insidious forces in the universe: buggy software. By now, you're probably scared to death of computer viruses: They'll eat your files, trash your programs, and make your computer unbootable. But even without a virus in your system, surfing the Web or reading your e-mail can be just as dangerous. Buggy software–based security flaws that afflict most versions of Internet Explorer and Netscape Navigator leave your system open to attacks from hackers and the viruslike applications they write. The ▶

only way to ensure your safety is to update your applications vigilantly.

Unfortunately, bugs are inevitable. In fact, software quality seems to be deteriorating, in part because of unrelenting financial pressure on producers to get new versions onto store shelves faster. And software companies can't test each product's compatibility with every possible hardware and software configuration residing on users' PCs.

What can you do about bugs? First, back up your data frequently and avoid beta software and nonessential utilities that can cause more problems than they solve. For more tips on keeping bugs at bay, see "Bugs Be Gone" on page 115. For updates on the latest bugs and fixes, visit online bug-reporting sites, some of which are described in "The Best Pest Sites" on page 118. And most important, install bug-fixing patches and software updates as soon as they're available.

To help with this last task, we've assembled a list of lethal and pesky bugs, plus

bug alert

NOXIOUS

NASTY

NUISANCE

information on where to find patches and updates to extirpate the little menaces. The list covers operating systems, apps, and utilities. For info on hardware bugs, see www.pcworld.com/feb00/ bugs. Most bugs are nameless, so we usually identify them in our list by the patch that fixes them. For each bug, we explain its known symptoms, what the fix is, and where to obtain the fix.

Some bugs just waste your time. But the worst species destroy your data, and they may even render your PC useless. To help you determine the seriousness of the pests in this rogue's gallery, we've assigned a traffic light icon to each bug. The bugs that affect the most users or inflict the worst damage get a red light. An amber light identifies those that cause headaches for many users. And a green signal indicates a relatively benign but irksome bug that affects fewer users.

Now that you know what to do, it's time to take action. Go after those damn bugs before they get your data.

Windows 98 Second Edition

Shutdown Patch

BUG Windows 98 SE is supposed to be the most bug-free version yet. But as with the first edition of Win 98, modifications to the power management software cause problems on laptops (and some desktops, too). A few BIOSs apparently don't interact well with Windows 98 SE's power management feature, which can prevent you from booting, resuming from suspend mode, or shutting down.

FIX Microsoft has posted a 502KB patch that fixes the problem for some combinations of hardware and software. If the patch doesn't work, try following the troubleshooting steps at support.microsoft. com/support/kb/articles/q238/0/96.asp. If that doesn't work, check with your system's manufacturer for a BIOS update. www.microsoft.com/windows98/downloads/ contents/WURecommended/S_WUFeatured/ Win98SE/Default.asp

ICONS: HANK OSUNA

bug medics
the 411 on 911 software

ARGHHH! SYSTEM FREEZE! For months I battled a nasty bug in Internet Explorer 5 that intermittently locked up my PC, forcing me to do a cold boot—and lose all unsaved data in the process. None of the suggested fixes I'd found on Microsoft's support site worked, so I turned to three software programs—Symantec's Norton CrashGuard, Wild File's GoBack, and PowerQuest's Drive Image 2—for help with IE 5 problems and anything else that might pop up. Each package promised solutions. Did they deliver? Read on.

Norton CrashGuard: I began by installing a crash protector, Norton CrashGuard. Installation was a breeze, and CrashGuard left only a small icon in the System Tray to let me know it was running. Then I tried to induce IE 5 to crash. But no matter how often I tried to break the browser, IE 5 kept chugging along. Until one day, kaboom: system crash.

Clearly, CrashGuard made my system more stable, but it didn't guarantee freedom from crashes in perpetuity. My interview with a Norton rep didn't shed much light on the situation, though the rep did say CrashGuard tries to repair some problems—stack overflows and such—behind the scenes. If my bug is caused by a couple of problems, the program may catch one and not the other.

GoBack: As a second layer of defense, I installed a time machine (H. G. Wells had nothing to do with this one). Wild File's GoBack promised to let me turn back the clock by restoring my PC to a state prior to a crash or software installation (the utility earns a Best Buy in "Bullet-Proof Protection," page 124). GoBack runs in the background while you work; at a frequency you predetermine, it takes a snapshot of your system and stores it in a History folder. When things go wrong,

you just start GoBack, select a Safe Point (a place where GoBack determines your system was stable), and restore that version of your hard drive. You can also recover old versions of lost or damaged files without reverting to an earlier version of the entire disk. How far back you can go depends on how often you use your computer and how much space you allot to the software, but Wild File says the default setting (10 percent of drive space) generally gives people a week's buffer.

I found GoBack ideal for recovering old versions of my stories. Otherwise, I hardly noticed it was there. But it has a few drawbacks. First, a system-level utility should let you create boot disks, in case of hard drive troubles; GoBack doesn't. And GoBack took over my PC's file system, where it was incompatible with my beloved multi-OS boot manager. I also learned that GoBack isn't ideal for people (like me) who continually install new apps. Doing this can quickly fill the History folder and sharply limit how far GoBack lets you go back. Still, for recovering the odd file here and there without hav-

Intel SE440BX-2 BIOS Update

BUG If the Microsoft shutdown patch doesn't correct the shutdown and resume errors that are discussed above, the problem may be traceable to your system's BIOS.

FIX Check your system manufacturer's Web site for BIOS updates—many offer downloadable patches. If your PII or PIII system uses Intel's popular SE440BX-2 motherboard (call the PC manufacturer if you're not sure), downloading the latest BIOS from Intel's SE440BX-2 BIOS update Web page may solve the problem. developer.intel.com/design/motherbd/se2/se2_bios.htm

Windows 98

Service Pack 1

BUG Other than power management and a few Y2K issues, Windows 98 is fairly stable. Nonetheless, it harbors some glitches, including problems that occur when you plug a USB device into a computer on standby; Plug and Play network adapters that don't plug or play; and

a problem that you may never encounter: After running for precisely 49.7 days, Windows may freeze up. We should all live to see Windows run without crashing for a month and a half. You can find a fuller description of the contents of Service Pack 1 at windowsupdate.microsoft.com/v3contentA/Descriptions/2/3113/0x00000409/w98sp1.htm.

FIX Depending on what the Windows Update site (windowsupdate.microsoft.com) determines you need, the SP1 download may range from 2MB to 6MB. Alternatively, you can order the update on CD for $5 at 800/426-9400 or by filling out the order form on the Windows Update site. For $20, you can get Microsoft's Windows 98 Second Edition Updates in-

stead. In addition to supplying the entire contents of SP1, the SE Updates CD includes Internet Connection Sharing, expanded hardware support, Internet Explorer 5, and NetMeeting 3. To get this version, call 888/287-9755 or use the Windows Update site order form. windowsupdate.microsoft.com

Windows 98 Registration Wizard Update

BUG Win 98's Registration Wizard automatically uploads system configuration data to Microsoft's servers, even if you've told it not to. Microsoft says it didn't know that this would happen.

FIX A patch prevents the upload—but forget it if you've already registered. windowsupdate.microsoft.com ▶

ing to worry about scheduling incremental backups, GoBack is a step forward.

Drive Image 2: Utilities like GoBack don't obviate the need to make real backups. If your system catches fire, GoBack's History folder will vaporize in the same cloud of oily smoke as everything else. Being paranoid, I decided to install the ultimate backup software—PowerQuest's Drive Image 2.

Drive Image goes far beyond old-fashioned pick-a-file backup apps by letting you create images of entire hard drive partitions. If something goes seriously awry, you don't have to fuss with reloading your operating system, reinstalling the backup software, and trying to piece your electronic life back together one file at a time. Instead, you simply restore the most recent drive image, and your entire system is as good as new.

When you run Drive Image, it boots from DOS or loads from a disk. The app tells you to choose a drive or partition to back up and asks where to store the backup (options include other hard drives, Jaz disks, and Zip disks). You can compress the image to save

space or leave it uncompressed to save time.

When something goes wrong, you start Drive Image and instruct it to recover the drive using whichever image you choose. Everything comes back—all your passwords, browser cache files and cookies, and system files. Afterward, the PC will run as it did when you originally created the image. I always keep an image of a virgin Windows install with only my most basic network, sound, and graphics drivers in place. And I create a backup drive image every two or three days, or before installing new software.

Running this trio of utilities won't keep software makers from writing bad code. But at least now I'll be ready for the bad things that ensue. **–Christopher Lindquist**

- **Drive Image 2**, $70 list, PowerQuest, 800/379-2566, www.powerquest.com

PRODUCT INFO NO. 676

- **GoBack**, $70 street, Wild File, 888/945-3345, www.goback.com

PRODUCT INFO NO. 677

- **Norton CrashGuard**, $40 list, Symantec, 800/441-7234, www.symantec.com

PRODUCT INFO NO. 678

Virtual Private Networking Update

BUG If you've used the Virtual Private Networking feature in Windows 98, you know it can be slow. It's also less than secure. According to Microsoft, it's possible for outsiders to capture log-in passwords from a Windows NT server session. See support.microsoft.com/support/kb/articles/q189/7/71.asp for the minute details.

FIX Dial-Up Networking 1.3 strengthens VPN security by adding a new, more secure password authentication protocol and speeds up VPN connections.
www.microsoft.com/windows98/downloads/contents/WURecommended/S_WUNetworking/VPN/Default.asp

Power Management

BUG Windows 98 may not cooperate with your laptop when the latter goes into or out of standby mode—choosing the standby option results in a reboot or shutdown, and sleeping machines refuse to wake up.

FIX Microsoft's free Power Management can help you pinpoint and in some cases correct the problem. An early version of the tool is included on your Win 98 CD-ROM (look for pmtshoot.exe in Tools\Mtsutil\Pmtshoot\directory). Microsoft, however, recommends that you download a more up-to-date version from its Web site.
ftp.microsoft.com/softlib/mslfiles/pmtshoot.exe

Windows 95

Password Corruption Patch

BUG In the process of beefing up the operating system's password security, Windows 95 Service Pack 1 trashed the password list file, so Dial-Up Networking can't save your password.

FIX Microsoft issued a fix, but to use it you must delete your corrupted password list file so Windows can create a new one.

To delete password lists, choose *Start•Programs•Find•Find Files or Folders*, and then search for *.pwl*. Delete any files found.
www.microsoft.com/windows95/downloads/contents/WURecommended/S_WUServicePacks/W95Password/Default.asp

AMD K6-2 Incompatibility Patch

BUG According to AMD, the 350-MHz and faster versions of its K6-2 processor generate the following error message in Windows 95 OSR 2, 2.1, and 2.5: 'Device IOS failed to initialize. Windows Protection Error. You must reboot your computer.'

FIX Rebooting the computer usually makes the problem go away, but a 284KB patch resolves the conflict as well.
www.microsoft.com/windows95/downloads/contents/WURecommended/S_WUServicePacks/AMDPatch/Default.asp

Windows 95 Service Pack 1

BUG Windows 95 was more stable than its descendants proved to be—probably because it wasn't tangled up with a browser. Nevertheless, Microsoft found some obscure networking security holes, bidirectional printer port problems, and weak password encryption that the company saw fit to repair.

FIX Microsoft's 1.2MB Windows 95 Service Pack 1 patches up all of the above and tosses in a few extra fixes, including one for a bug in Office 95 that tacks bits of old deleted files onto your Word, Excel, and PowerPoint files.
www.microsoft.com/windows95/downloads/contents/WURecommended/s_wuservicepacks/W95SvcPack1/w95svcpack1.asp

Windows NT 4.0

Windows NT 4 Service Packs

BUG Though you may find that Windows NT 4.0 works fine without any updates, Microsoft has corrected more than 600 problems—many of them security related—over the course of six cumulative service packs. Some drivers and applications won't install unless you've installed Service Pack 3 or 4.

FIX If you are willing to put in the time, you can download Service Pack 6 from Microsoft's Web site. It waddles onto your

hard drive at a bloated 30MB, however, so you may prefer to call Microsoft at 800/370-8758 and spend $20 to order it on CD-ROM.
www.microsoft.com/ntserver/nts/downloads/recommended/SP6/allSP6.asp

Internet Explorer

Internet Explorer 5.01

BUG Security researcher Georgi Guninski has found more than a dozen security flaws in Microsoft's browser. Most of them exploit weaknesses in IE's ActiveX scripting component and could, in theory, allow hackers to access or destroy files on your computer. IE 5.0 suffers from other glitches as well, including a dysfunctional back button and pages that don't download completely.

FIX As we go to press, Microsoft is close to releasing IE 5.01, a fully patched-up version, through the Windows Update Web site. You can also find individual patches for IE 5.0 on that site.
windowsupdate.microsoft.com

Java Virtual Machine Update

BUG Java security experts at Xerox PARC discovered that Microsoft's Java Virtual Machine, which allows IE and other applications to run Java applets, is vulnerable to hacker attacks in ways similar to those Guninski found in IE.

FIX Microsoft released updated Java Virtual Machine software for both Windows 95/98 (6.3MB) and Win NT 4 (4.4MB).
www.microsoft.com/java/vm/dl_vm32.htm

Internet Explorer 4.0 SP2

BUG Before Georgi Guninski made poking holes in Internet Explorer 5's security his avocation, Juan Carlos Cuartango and other researchers did the same with Internet Explorer 4. The selfless security sleuths discovered dozens of weak points in IE 4.0, 4.01, and 4.01 with Service Pack 1 through which a malicious (and fairly well informed) hacker could gain access to data on your PC.

FIX The third major patch to Internet Explorer 4 (following IE 4.01 and Service Pack

bugs be gone
tips to keep them away

YOU'RE BOUND TO RUN afoul of a bug every now and then, no matter how diligently you set up safeguards, but taking a few simple precautions should reduce your exposure and protect you from all-out catastrophe.

Fight upgrade fever: The more frequently you change software on your PC, the likelier you are to attract bugs. If you need the features offered by the latest version of your operating system or applications, by all means upgrade; but don't upgrade simply because a new version is available.

Be the second one on you block: If you can stand to wait, stay away from beta versions altogether—and let your friends try out first-version software before you give it a spin.

Back up, back up, back up: The best defense against catastrophe is a full backup. If you have a second hard drive or a single drive with a big enough second partition, try using a disk imaging utility like PowerQuest's $70 Drive Image 2 (see "Bug Medics," page 112). Such a utility can copy an exact image of your hard drive to one compressed file.

Pry before you buy: Before buying new software, check its maker's Web site for mention of any known problems, and review *PC*

World's *Bugs and Fixes.* It can also pay to search Usenet and other online sources for mentions of problems. For a few sites to try, see "The Best Pest Sites" on page 118.

Read the readme: Many software makers list known issues in the readme file provided with the software. The readme file may also include key information such as whether to uninstall a previous version of an app before installing the new one. Usually it pops up after you install the program, but review it before the installation process if possible.

Watch the clock: Install software during the maker's technical support hours, so you can get help fast if you need it. In fact, even if the vendor offers 24-hour service, it's best to call during daytime business hours when a larger staff is on duty and senior personnel are likelier to be available.

Take notes: Keep a record of specific keystrokes or actions that trigger buggy behavior. Most software vendors take a problem more seriously if they can duplicate it easily.

Call first: If installing a new piece of software leaves your system in a coma, call the software maker before doing anything else. A prompt call may avoid hours of frustration.

Search for solutions: Have a problem the software maker can't solve? Revisit the Web. Others may have run into the same problem. If the bug causes screen corruption or system lockups, include your graphics card in your searches and try its maker's Web site.

Use auto-save: To avoid losing work when bugs strike, try to set up your applications—old and new—to back up documents automatically every 15 minutes or so.

Speak up: When bugs bite, report them, both to third parties such as *PC World*'s *Bugs and Fixes* column and to the vendor. Software makers tend to focus on problems that users complain about most. —Mitt Jones

1) includes all post–Service Pack 1 security fixes and solves some interface glitches to boot. To upgrade your copy of Internet Explorer 4.0, IE 4.01, or IE 4.01 Service Pack 1, choose *Help•Product Updates.* You need not have loaded the previous patches before loading this one.
www.microsoft.com/windows/ie/ie40/ie40sp2.asp

IE 4.0 Post-SP2 Security Fixes

BUG The tireless bug hunters found a pair of HTML-related security flaws that could allow Web site operators to view the contents of your clipboard, execute scripts on your system, and copy files from your hard disk.
FIX The 1.1MB MSHTML patch plugs three security holes, and the 170KB DHTML Edit Control update fixes one.

Make sure that you have already upgraded to Internet Explorer 4.01 Service Pack 2 before you attempt to install either of these post-SP2 security patches.
www.microsoft.com/windows/ie/security/default.asp

Netscape Communicator

Netscape Communicator 4.7

BUG Though somewhat less security-challenged than Internet Explorer, browsers descended from Navigator 4.5 have seen their share of troubles, including freeze-ups, security holes that permit access to your hard disk, and problems with PalmPilot synchronization.

FIX It serves primarily as a vehicle for various new features, but Communicator 4.7 also offers a cumulative fix for all the above-mentioned bugs. To update your current version, choose *Help•Software Updates* on your browser's menu bar.
home.netscape.com/eng/mozilla/4.7/relnotes/windows-4.7.html

Netscape Communicator 4.08

BUG Before Netscape Communicator 4.5 appeared, Communicator 4.0 received the same security-minded scrutiny. Researchers found flaws in the browser's Javascript and HTML inter- ▶

preters and its e-mail module that hackers could exploit to view your browsing history, paw through your preferences, and even upload and execute a program on your machine.

FIX The only way to get Communicator 4.08 is to download one of four packages (Base, Complete, Professional, or Navigator Standalone) that are available from ftp.netscape.com/pub/communicator/ 4.08/english/windows/windows95_or_nt. Communicator 4.0x users can make the upgrade to version 4.08 by choosing *Help• Software Updates*.

home.netscape.com/eng/mozilla/4.0/relnotes/ windows-4.0.html#Whats_New

Microsoft Outlook

Outlook 98 Archive Patch

BUG Both Outlook 98 and 97 (but not 2000) can lose messages if your computer crashes, reboots, loses power, or otherwise expires while Outlook is moving them to the archive file.

FIX Microsoft offers a 5MB fix that prevents system failures during archiving.

officeupdate.microsoft.com/downloaddetails/ arch98en.htm

Long File Name Crash Patch

BUG Unethical hackers can crash Outlook 98 simply by sending you a message containing a file attachment that has a very long file name. Worse, determined miscreants can embed program code in that long file name and get it to run on your computer.

FIX Microsoft released a 4.7MB Patch 2 for Outlook 98.

officeupdate.microsoft.com/downloadDetails/ outptch2.htm

Outlook Express

Long File Name Crash Patch

BUG Outlook Express users are vulnerable to the same security problems that afflict Outlook: Carefully craft a message with an attachment that has a long file name, and just about anything could happen on your computer.

FIX Microsoft's 1MB fix will install on top of IE 4.01 with Service Pack 1 or 2 only.

www.microsoft.com/windows/ie/security/ oelong.asp

Eudora

Version 4.2.1 Update

BUG If you use Eudora Pro 4.0 or 4.0.1, wrongdoers can disguise malicious Java programs as Web-page links and execute the programs on your computer when you click on the links.

FIX Eudora 4.2 closes the Java holes and adds new features to Eudora 4.0 and 4.1. As we went to press, Eudora 4.2 was the latest version of the popular e-mail package available, though Eudora 4.2.1, which fixes some minor bugs in 4.2, was in beta testing. Eudora 4.2 is a free upgrade for 4.0 and 4.1 users.

eudora.qualcomm.com/pro_email/updaters.html

PRODUCTIVITY SOFTWARE

Microsoft Office

Excel 2000/97
ODBC Security Hole Patches

BUG Office 97 and Office 2000 are vulnerable to a security flaw that allows an Excel spreadsheet containing maliciously embedded commands to take virtually any action on your computer. All someone has to do is e-mail the spreadsheet file to you as an attachment; if you double-click it, your goose is cooked.

FIX Microsoft has posted separate 2.8MB patches for Excel 97 and 2000 that eliminate the flaws.

Excel 2000: officeupdate.microsoft.com/ 2000/downloadDetails/excel2000odbc.htm
Excel 97: officeupdate.microsoft.com/ downloadDetails/excel97odbc.htm

Excel 97 Russian New Year Patch

BUG Excel 97's Call function allows an Excel worksheet—without any warning—to run another external program including one that deletes files or infects your system with a virus.

FIX Microsoft has posted a 132KB patch that disables the Call function in worksheets, but does not when Call is used in such macros as Autostart. For details, see support.microsoft.com/support/kb/ articles/q196/7/91.asp. The patch won't work unless you've already installed Office 97 Service Release 2 (see below).

officeupdate.microsoft.com/downloadDetails/ xl97cfp.htm

Office 97 ID Removal

BUG Attention Big Brother, your software is ready: Office 97 generates a unique ID number and embeds it in every document you create. As a result, each document can be traced back to you.

FIX Microsoft has released two fixes for this problem: a patch that puts an end to the ID madness, and a utility designed to remove the ID from existing documents. Corrective patch: officeupdate.microsoft.com/ downloadDetails/Off97uip.htm

ID removal tool: officeupdate.microsoft.com/ downloadDetails/pf_setup.htm

Office 97 Service Release 2

BUG Bugs that cropped up after the release of Service Pack 1 (see below) include Excel recalculation flaws, a PowerPoint year-2000 glitch, an Access data-entry bug that can potentially destroy data, and numerous other problems peppered throughout the Office suite.

FIX SR-2 is a hefty 23MB download. If that's more than you want to squeeze through your modem, order Microsoft's free Year 2000 Resource CD, which contains the SR2 patch. To order the CD, call 888/673-8925.

officeupdate.microsoft.com/Articles/sr2fact.htm

Office 97 Service Pack 1

BUG Early Office 97 adopters had to tolerate numerous flaws, including a problematic Word 95 file export format and a potentially embarrassing blind-carbon-copy bug in Outlook 97.

FIX You need to install this 7MB patch before installing SR-2 and subsequent security fixes.

officeupdate.microsoft.com/DistribDownload/ sr1off97ddl.htm ▶

Corel WordPerfect Office

WordPerfect Office 2000 Service Pack 1

BUG Have you been experiencing irritating glitches with the latest version of Corel's suite? No surprise—the company admits to more than 100 problems bedeviling WordPerfect 9, Quattro Pro 9, and other applications, including paragraph- and list-numbering glitches, and interface bugs. If you'd like to read the complete details, you can find Corel's release notes page at www.corel.com/support/ftpsite/pub/wordperfect/wpwin/office2000/2000_service_pack_readme.htm

FIX The downloadable, 36MB Service Pack 1 banishes bugs from the Standard, Voice-Powered, and Professional versions. To order the update on a CD-ROM (at a cost of $10 to cover the shipping and handling), call 800/772-6735.
www.corel.com/support/ftpsite/pub/wordperfect/wpwin/office2000/2000_service_pack_1.htm

WordPerfect Suite 8, Service Pack 5

BUG Corel has dutifully and painstakingly corrected version 8 of its office suite over the course of five cumulative updates. Problems include interface glitches, formatting flubs, and errors that occur when documents are saved to other file formats. For an exhaustive list of the changes Suite 8 has been through, see ftp.corel.com/pub/WordPerfect/wpwin/8/wp8sp5_readme.htm.

FIX Service Pack 5 incorporates the patches from all four previous service packs and adds nearly 20 new fixes.
ftp.corel.com/pub/WordPerfect/wpwin/8/wp8sp5.exe

Corel WordPerfect Suite 7.03

BUG As with WordPerfect Suite 8, Corel (and WordPerfect Corporation before it) has done a good job of regularly fixing problems, including file-save, password, and macro bugs that persisted through version 7.02 of the office suite. Unfortunately, the resulting array of ▶

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the best pest sites

WHETHER you're researching software *before* you install it or trying to wriggle out of a jam, a few minutes of study at these bug-reporting Web sites might produce the information you need. While you're at it, sign up for some of the e-mail bug update newsletters noted below.

Bugs and Fixes/Bug Watch

This handy page by *PC World* Contributing Editor Scott Spanbauer provides convenient links to *PC World's* Bugs and Fixes columns for the past four years.
www.spanbauer.com/bugs.htm

BugNet

BugNet is a subscription-based clearinghouse for bugs and bug fixes (fees depend on category of user). Subscribers receive BugNet alerts via e-mail; nonsubscribers can search the database of free articles.
www.bugnet.com

Corel Software

Choose Corel's FTP site (www.corel.com/support/downloads) for patches and updates, or visit Corel's knowledge base to search technical support documents. WordPerfect Office 2000 users can go directly to www.corel.com/office2000/support.htm.
www.corel.com/support

Lotus

Support resources for Lotus software include the searchable Lotus Knowledge Base and a download section for upgrades, patches, and other fixes.
support.lotus.com/lshome.nsf

Microsoft

You can start at this portal to Microsoft's extensive online support, but shortcuts for some products will save time. For Windows 98 downloads, click *Windows Update* on the Start menu, or hop to windowsupdate.microsoft.com. For Office updates, go to officeupdate.microsoft.com. Typing in the URL support.microsoft.com will take you to the Microsoft Knowledge Base, where you can search technical support documents.
www.microsoft.com/support

Netscape

Starting at help.netscape.com may make sense for you, but as at the Microsoft site, shortcuts can speed you along. To download updates for Communicator, select *Help•Software Updates* from Communicator's menus. To read about Communicator updates or search Netscape's knowledge base, select *Help•Product Information and Support*.
help.netscape.com

Symantec

Start here for documented problems and fixes involving Symantec software, such as Norton AntiVirus and Norton Utilities. You can sign up for free e-mail bulletins announcing updates to some Symantec products. Use your software's LiveUpdate feature for automatic updates.
www.symantec.com/techsupp

Woody's Office Portal

Drop in here to subscribe to the twin tip sheets produced by Windows and Microsoft Office guru Woody Leonhard—Woody's Office Watch and Woody's Windows Watch. Office Watch is a weekly e-mail newsletter devoted to information about Microsoft Office, including bugs and work-arounds. The newer Windows Watch covers Windows twice a month. You can also find and peruse back issues at mcc.com.au/wow and mcc.com.au/www.
www.wopr.com —Mitt Jones

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Browse us: www.bizfon.com

patches is confusing. To figure out which ones you need to obtain, download Corel's Update Guide, which is available at ftp://ftp.corel.com/pub/WordPerfect/wpwin/70/wp7_update_guide.

FIX Version 7.03 is probably the patch most North American users will want. This 4MB update contains all previous patches in addition to new file-save, password, and macro fixes.

ftp://ftp.corel.com/pub/WordPerfect/wpwin/70/wps7_03p.exe

PERSONAL FINANCE

Intuit Quicken

Quicken 99 Version 4

BUG Users of the initial version of Quicken 99 reported interface glitches; problems with Netscape Navigator, transactions, and securities; automatic online payments that vanished; and difficulty downloading securities transactions from online brokerage accounts.
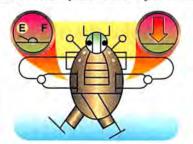
FIX Intuit reports that it has succeeded in fixing most of these problems through a series of cumulative updates—the latest is version 4. But the list of fixes doesn't include any correction for the problems with online brokerage securities, so you should continue to approach that task with caution. Upgrading to Quicken 2000 solves these issues, but if history gives any indication, the latest Quicken probably has bugs of its own.
www.intuit.com/support/updates

Microsoft Money

Money 99 Update

BUG The program can trigger false 'low on resources' and 'out of memory' error messages under Windows 95.

FIX To download and install the 150KB fix for this glitch, launch Money 99 and choose *Tools• Update Internet Information*.

Exit and restart Money after the download is complete.
support.microsoft.com/download/support/mslfiles/Mnysc7b.exe

UTILITIES

Symantec Norton Utilities

Norton Utilities 3.0 Live Updates

BUG When Norton Utilities 3.0 reached the market, *PC World* readers deluged our mailbox with bug reports. Problems included trouble shutting down Windows 98, inability to access the floppy drive, conflicts with video board drivers, disk-eating flaws in the Zip Rescue feature, and Registry corruption.

FIX Symantec's series of Live Update patches must have done the trick, because we stopped getting complaints about NU 3.0 (In striking contrast, NU 4.0 generated almost no reports of faults.) If you lack an Internet connection, you can order Live Update patches on disk at 800/441-7234. The company will also replace any Iomega Zip disks the utility wrecked. You can access Live Updates only from the Norton program, not from your browser.

McAfee Office

McAfee Office 1.0 Install Snafus

BUG McAfee Software acquired several other utility vendors and hastily corralled their products into a single suite—perhaps too hastily. To limit conflicts between programs, the company recommends installing the suite one product at a time. But even then, Guard Dog's File Guardian feature may lock up your system when you try to use Nuts & Bolts 98's DiskMinder, DiskTune, or Image tool.

FIX Obtain any update you need online by using the Oil Change utility that comes with Network Associates' McAfee Office, or take a look around the McAfee Clinic at www.mcafee.com.

First Aid 2000/98-IE 5 Clash Fix

BUG First Aid 2000 or 98 may not work properly when you install Internet Explorer 5.0, due to changes in .dll files that the two programs share.

FIX Network Associates offers users a

715KB patch that updates both affected editions of First Aid to overcome the shared .dll file bug.
downloaduswest.mcafee.com/updates/faie_update.asp

Nuts & Bolts 98 Registry Corruption Patch

BUG The Registry Wizard's Tune Up option in Nuts & Bolts 98 can corrupt Windows 98's Registry. And as the Registry goes, so goes the PC nation, so to speak.

FIX A Nuts & Bolts Instant Update fixes the problem. To download and install the cumulative Nuts & Bolts 98 Instant Updates, choose *Start• Programs• Nuts& Bolts 98• Instant Updates*.

VirusScan 4.0.2 SP2

BUG New online technology used in the latest version of VirusScan causes problems with the AOL 4.0 client software when you connect to the AOL network, among other glitches.

FIX The 817KB Service Pack 2 corrects several bugs discovered since VirusScan version 4.0.2 appeared; the pack also incorporates SP1's fixes.
ftp://ftp.nai.com/pub/antivirus/win9x/svc_pack/v98sp402.zip

Norton Antivirus

Norton AntiVirus Lockup Minimization

BUG After installing Norton AntiVirus 5.0, you may encounter problems—such as system lock-ups and programs that refuse to load—when Windows starts up.

FIX A Symantec knowledge base article tells how to minimize start-up problems.
service1.symantec.com/SUPPORT/nav.nsf/docid/19983374923

Find coverage of hardware bugs at www.pcworld.com/feb00/bugs. Contributing Editor Scott Spanbauer wrote the magazine's Bug Watch *and* Bugs and Fixes *columns for more than five years. Contributing Editor Mitt Jones is the new* Bugs and Fixes *columnist. Christopher Lindquist is a San Francisco freelance technical writer.* ∎

Your email server won't go down with Trend ScanMail®

No viruses. No downtime. No sinking feeling. ScanMail detects and removes email viruses in realtime — right at the Microsoft Exchange or Lotus Notes server. It detects and cleans known viruses while spotting the malicious behavior of newly-released viruses to block them too. ScanMail automatically updates its virus detection pattern files without stopping scanning services — and there is no need to re-boot the server to implement scan engine or software version updates. For those hours while cures for new virus outbreaks are being developed, you can block email with the suspect attachments. ScanMail's flexible configurations and remote management free up bandwidth and resources for more critical business tasks. Get the protection that will keep your email environment sailing. Call 1 (800) 228-5651 OR try our free HouseCall™ diagnostic service at http://housecall.antivirus.com/

www.antivirus.com

www.trend.com

PCWEEK BEST OF COMDEX

Designed for Microsoft BackOffice

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TREND MICRO™
your Internet VirusWall

LIKE HURRICANES, viruses are often named after people. (Who could forget Melissa?) And just as a hurricane can devastate an entire community overnight, an e-mail virus can ravage the networked machines of the corporate world, system by system, leaving millions of dollars of damage—and heaps of aggravation—in its wake.
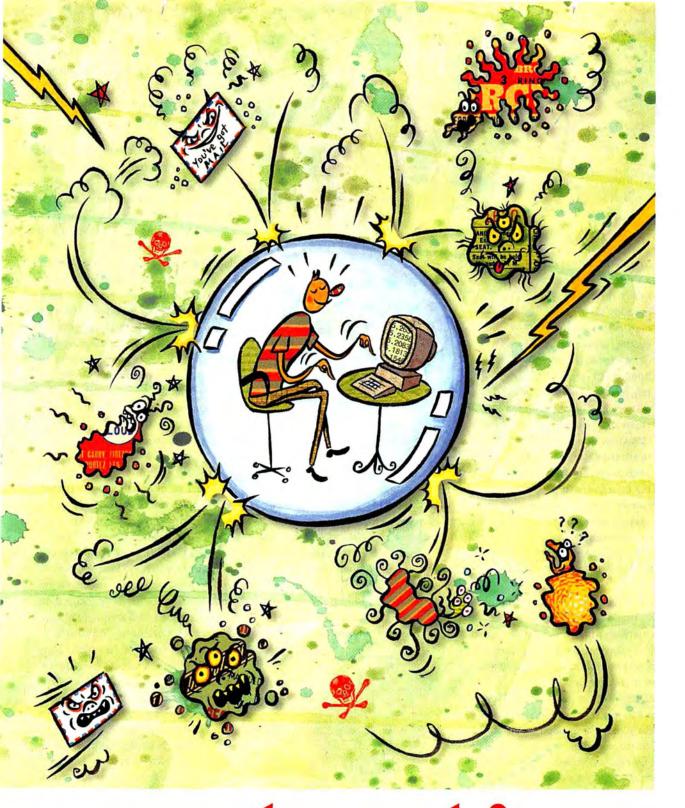
But of course viruses aren't the only grave threat to your computer. Bugs (see "The Swat Team: Kill Bugs Dead," page 110), conflicting peripherals, unnecessary files, and—quite frankly—holes in Windows itself can cause headaches, downtime, and system slowdowns. To optimize your computer and protect it against these and other insidious agents, you need an effective tool kit of system utilities, including antivirus protection. Heavy-duty applications such as word processors and Web browsers may get most of the press and log the majority of downloads, but statistically, many more utilities fly off retail shelves.

Utilities are usually inexpensive, sometimes because their design or function is simple, in other cases because cutthroat competition keeps prices low. But despite their low price, are they good investments? Some of them, such ▶

THE *swat* TEAM

bullet-proof

23 utilities to help you ward off viruses and other nasties that bring your system to its knees.

BY STAN MIASTKOWSKI

protection

Best Buys

SYMANTEC virtually threw a shutout. The company's ① Norton AntiVirus 2000 ($40) posted high marks in virus hunting. Among suites, ② Norton SystemWorks 2000 ($60) earns our Best Buy, incorporating all the individual Norton winners here. Among diagnostics, ③ Norton Utilities 2000 ($50) runs away with the title, thanks to effective system analysis, repair, and preventive maintenance. ④a Norton CleanSweep 2000 ($40) safely removes unwanted applications and space-robbing files to earn co-Best Buy honors in the uninstaller/undoer category, along with ④b Wild File's Innovative GoBack ($70).

as antivirus programs and system monitors, swallow up processing power and memory, slowing your PC. Others, like Registry diagnostics and system monitors, can be downright dangerous to your system if you use them incorrectly. Surrounded by stacks of utilities and several test PCs, we set to work to learn which packages deserve space on your machine.

For this roundup, we concentrated on the four most-essential categories of utilities: antivirus software, utility suites, diagnostics, and uninstallers/undoers. (For coverage of disaster recovery utilities, see January's "When Good Data Goes Bad," www.pcworld.com/jan00/data_recovery). In each category, we scrutinized a cross section of products, including well-known titles from McAfee (a division of Network Associates) and Symantec, as well as Windows' built-in utilities and a few innovative packages from other vendors.

We tested a total of 23 utilities, including some updates that improve substantially on previous versions. After extensive comparisons of features, price, ease of use, and efficacy, we picked Best Buys in each category. Although some categories produced close races, Symantec's Norton products dominated the field, largely because of their stability, usefulness, and commendable customer support. But despite Norton's preeminence, utilities in general continue to evolve, and all PC users benefit from the competition.

Antivirus Utilities

The More Things Change...

MARCH 26, 1999, will long be remembered in the annals of personal computing. It was M-Day—the day the Melissa virus hit. Melissa was a frightening new virus that perpetuated itself through personal info stolen from e-mail address books. In a matter of hours, Melissa spread throughout the world, replicating itself on tens of thousands of PCs. But the publicity Melissa generated had a perversely positive effect, underscoring the importance of antivirus software.

And it *is* important. According to the International Computer Security Association (www.icsa.net), an independent organization that certifies antivirus software, virus incidents are on the rise: Your chances of getting hit by a virus in any given month are now about 1 in 10, about double the rate of just a year ago. Viruses are more destructive, and the bad guys (and they are mainly guys) are better organized. Where once we contended with hackers who wrote relatively harmless viruses to show off their programming skill, we now see criminals who pull credit card information and other sensitive data off unprotected PCs for the purpose of making money. With this development, the message is clear: If you buy just one utility, make it an antivirus package.

The Antivirus Lineup

THE WORLD of antivirus software has seen another year of change and consolidation. Many former players are gone (farewell, Dr. Solomon), acquired by other companies. And IBM, while still active in antivirus research, no longer offers its own retail package. Still, the market is flooded with products. We focused on eight best-selling, well-known, or intriguing utilities: Command AntiVirus 4.57, Computer Associates' InoculateIT 4.5 Personal Edition, F-Secure Anti-Virus 5, McAfee VirusScan 4.04, Norman Virus Control 4.72, Panda Antivirus Platinum 6, Symantec's Norton AntiVirus 2000, and Trend Micro's PC-cillin 6. For the third straight year, Norton AntiVirus earns a Best Buy, thanks to comprehensive protection, innovative features, ease of use, and excellent support. McAfee's VirusScan finished a close second in this category.

Prices remain low in this highly competitive arena. For example, McAfee VirusScan retails for $19, PC-cillin for $40 (downloadable for $30), and Norton AntiVirus 2000 for $40. Even better, two of the packages we tested—Command AntiVirus (which will be redubbed CS Virus Free by the time you read this) and

InoculateIT—are downloadable free from the Internet. (Support for these last two isn't free, however, and it's available only online, but that arrangement sounds like a fair deal to us.) The companies behind these free products make their money by providing advanced antivirus protection to corporate networks and e-mail servers.

In another continuing trend, antivirus software is sold in much the same way as razors and razor blades: Buy the basic utility once (the razor), and you're committed to buying the virus signature updates (the blades) to protect your PC against the latest threats. McAfee and Symantec, for example, provide one year of unlimited free updates, but after that, unlimited updates costs $4 annually for either utility. That amount isn't exactly a budget buster (unlike the $63 you pay for F-Secure's annual updates), and you'll probably want to buy an updated product after a year anyway. To compete with the Big Two, Command Anti-Virus, InoculateIT, Panda Antivirus Platinum, and PC-cillin all offer free antivirus signatures for the life of the product. (*Virus signatures* are certain specific strings of binary code, present in most viruses, that allow antivirus software to detect them.) New viruses contain new signatures, so it's essential for an antivirus product to maintain up-to-date signature files. (One caveat: When a newer version of the software comes out, the virus updates usually are not compatible with older versions.)
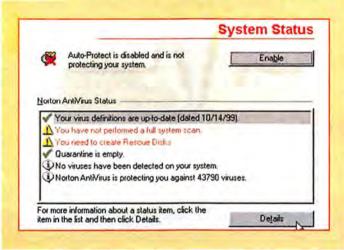
Facing the Fire

ALL ANTIVIRUS UTILITIES share several features. For example, every package we tested provides full-time virus protection, lets you schedule full-system scans, and offers updates that you can download from the Web. Each product allows you to create emergency floppy boot disks, so you can restart your computer even if it's infected with a boot-sector virus—assuming you created the boot disk before the virus attack. Beyond these standard features, some packages offer extra trimmings—such as added levels of protection

against e-mail viruses (a growing concern) and malicious ActiveX and Java applets (still a rare problem). Panda Antivirus Platinum, and PC-cillin even allow parents to block their system's access to inappropriate Web sites.

Of course, what really matters is how effectively an antivirus program ferrets out viruses. Again this year, we enlisted PC virus authority Joe Wells—creator of the monthly WildList (www.wildlist.org), which tracks viruses that have made their way onto real-world PCs. Wells Research used a selection of 245 viruses (148 of them currently in the wild, along with 97 alumni of previous WildLists) to test the packages. Each product was scrutinized for scan speed, false positives, detection

AT A GLANCE: The new interface for Norton AntiVirus 2000 shows the status of your antivirus protection.

and repair of the 20 most common viruses, and effectiveness at detecting and removing a common e-mail virus.

Only our Best Buy, Norton AntiVirus 2000, earned a perfect score in all our stringent tests, but the others performed well. Every utility we tested scanned for viruses relatively quickly, with the exception of F-Secure, which needed more than 72 minutes to scan our samples. (The others averaged between 7 and 12 minutes; InoculateIT took the checkered flag at just 4 minutes, 42 seconds.)

Similarly, each package excelled at detecting and removing viruses. Norton AntiVirus 2000 didn't miss a single test virus and didn't generate any false positives. False positives aren't as pernicious

as true viruses, but they can slow your system down, causing the antivirus program to search for a cure to a virus that doesn't exist.

Not to be outdone by Norton in the detection and repair category, Command AntiVirus and Panda Antivirus Platinum also caught every virus Wells threw at them. Bringing up the rear were F-Secure, which missed three wild viruses, and InoculateIT, which missed seven.

All the programs detected and repaired a sample virus attached to e-mail, but each handled this chore differently. For example, Norton AntiVirus detected the Concept macro virus during download and removed it before the virus reached the hard drive. McAfee AntiVirus, F-Secure Anti-Virus, Norman Virus Control, and Panda detected the virus, but Wells Research could not open the file attachment on the first test. Testers did open it on the second try. Overall, every utility we tested performed well. We weren't surprised to see a high level of performance across the board: In this competitive market, only the best antivirus packages survive.

In-Your-Face Interfaces

MOST OF the packages we looked at pluck out viruses with equal aplomb, so making a choice can be tough. One key factor is ease of use. Most of us want minimal interaction with an antivirus utility, but when you do need to work with one—to remove stubborn viruses, run manual scans, or update those all-important virus signature files—you want something that's easy to handle.

Antivirus interfaces fall into three basic categories. Some packages use a no-nonsense, minimalist approach (exemplified by Command AntiVirus and F-Secure); midrange models have a slightly fancier look and feel (InoculateIT and Norman Virus Control); still others employ an information-rich interface (McAfee Virus-Scan, Norton AntiVirus 2000, Panda Antivirus Platinum, and PC-cillin). ▶

ILLUSTRATION: DAVID GOLDIN

Which one is right for you? It's a subjective call, but for most occasional users, the more information, the better. The best-sellers—McAfee VirusScan and Norton AntiVirus—offer abundant detail. Both have greatly revamped their interfaces since we last looked at them. We particularly like Norton's new System Status screen, which gives a quick overview of your last scan and the current virus update status. McAfee also has a new look and feel, with the basics—including scan and update status—displayed on the main interface, not buried in submenus. (You can switch to McAfee's "classic" interface, the plain-vanilla version of years past.) Honorable mention goes to PC-cillin's well-designed interface, which offers fast access to scans, updates, and support but is still easy to use.

Help When You Need It

IN AN EFFORT to keep expensive support calls to a minimum, antivirus companies are providing more online help. But sometimes you'll still need phone assistance from a live person. If you pay for a product, you'll likely get free phone and Web support, but with the free packages, support will cost you.

PC-cillin's online support shines with a unique feature. In addition to requesting support via e-mail, you can chat online with a Trend support technician around the clock. (Of course, this unique option isn't terribly useful if your machine's locked up and you can't get to an Internet connection—but it *is* free.)

Meanwhile, Norton AntiVirus 2000 and McAfee VirusScan are backed by the largest virus research groups in the industry—Norton by the Symantec AntiVirus Research Center, and McAfee by the Anti-Virus Emergency Response Team. Consequently, Norton and McAfee react to new virus threats exceptionally quickly. But the manufacturers of every program that we tested provide useful Web sites.

All seven of the companies covered here do a laudable job of updating virus signatures. They all offer frequent updates, including emergency updates if a particularly nasty virus appears. A year ago we suggested updating your virus signatures once a month, but in this era of new and nasty viruses, it's probably wise to check at least once a week, either manually or through your package's automatic update feature. McAfee, Symantec, and Trend Micro make this process easy by permitting one-click updates.

Making Choices

CHANGES MAY BE in store for antivirus protection—or at least in the way it's delivered. Already McAfee.com (a separate corporate entity from McAfee Software) offers online antivirus scanning (plus a

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tip

update regularly

OLD ANTIVIRUS SOFTWARE is like medicine that's past its expiration date. If you don't update the product's virus signature files, you won't be protected from the latest viruses. Most antivirus makers update their signature files at least twice a month—and more often when a major virus breaks. Use your antivirus package's automatic Web update feature. We also recommend that you never, ever run more than one antivirus utility at the same time, to avoid strange behavior ranging from hard lockups to ultraslow performance.

TEST REPORT

No Mercy for Wild Viruses

Only Norton AntiVirus 2000 earned a perfect score on our virus testing, but most everybody fared well.

ANTIVIRUS PROGRAM	Detect Wild-List boot virus (percent)	Detect WildList file and macro viruses (percent)	Detect/repair rate for top 20 viruses (percent)	False positives	Scan time (minutes:seconds)
Command AntiVirus 4.57	100	100	●/100	2	9:12
F-Secure Anti-Virus 5	100	98.5	●/85	3	72:20
InoculateIT 4.5 (Personal)	100	96.4	●/80	1	4:42
McAfee VirusScan 4.04	100	100	●/85	0	9:22
Norman Virus Control 4.72	100	100	●/80	0	12:02
Norton AntiVirus 2000*	100	100	●/100	0	10:22
Panda Antivirus Platinum 6	100	100[1]	●/100	9	7:15
Trend Micro PC-cillin 6	100	99	●/100	5	10:56

*Best Buy   ● = yes

THE AVERAGE scan time for all products was just over 9 minutes, if you remove F-Secure Anti-Virus's sluggish time.

HOW WE TEST On a Quantex QP6 350-M2X Pentium II-350 PC, Joe Wells of Wells Research tested each package's ability to detect 51 wild boot viruses and 194 wild file and macro viruses; to remove a sample virus received as an e-mail attachment; and to remove the 20 most commonly reported wild viruses as listed in the September 1999 WildList from Wells Research. Each test used the most current virus signatures available on the vendor's Web site as of October 7, 1999. The scan test measured time to review 12,000 files in 689 directories on a Quantex QP6 350-M2X PC's 8.6GB hard drive. [1]By default, Panda does not scan files with .scr or .vxd extensions. Thus, performing just the default scan lowers Panda's detection rate to 99 percent. When all files are scanned, detection level is 100 percent. All versions were the most recent available at time of testing.

selection of diagnostics) through its McAfee Clinic. This subscription-based service costs $50 a year, but specials are often available, as is a 14-day free trial. The clinic uses ActiveX applets to check for viruses remotely. The applet accesses the latest virus signatures posted on the software maker's Web site. You still must download a utility if you want full-time virus checking, but the McAfee.com utility at least offers an intriguing alternative to the shrink-wrapped antivirus packages.

More changes are in the works. At press time, Trend Micro announced agreements with several national ISPs, which will automatically check e-mail attachments for viruses before delivery. IBM is developing a so-called immune system to detect new viruses and generate ways of destroying them. (Don't look for it on your PC soon, however. The first incarnations will be designed for corporate networks.) In the meantime, a full-fledged antivirus utility remains essential for any PC. If your system isn't protected, get moving!

Norton AntiVirus 2000 Street price: $40; Symantec; 800/441-7234; www.symantec.com
PRODUCT INFO NO. 724
•**Command AntiVirus 4.57** Free; Command

Software Systems; www.commandcom.com
•**F-Secure Anti-Virus 5** Street price: $125; F-Secure; 888/432-8233; www.f-secure.com
PRODUCT INFO NO. 725
•**InoculateIT 4.5 Personal Edition** Free; Computer Associates; www.antivirus.cai.com
•**McAfee VirusScan 4.04** Street price: $19; McAfee; 888/712-1477; www.mcafee.com
PRODUCT INFO NO. 726
•**Norman Virus Control 4.72** Street price: $80; Norman Data Defense; 888/466-6762; www.norman.com
PRODUCT INFO NO. 727
•**Panda Antivirus Platinum 6** Street price: $59; Panda Software; 800/603-4922; www.pandasoftware.com
PRODUCT INFO NO. 728
•**PC-cillin 6** Street price: $30; Trend Micro; 800/228-5651; www.antivirus.com
PRODUCT INFO NO. 729

Utility Suites

The Best of Everything

A SUITE IS LIKE a well-stocked pantry— a little of this, a little of that, and a lot of everything. As with antivirus utilities, McAfee and Norton are far and away the most popular, comprehensive products. Other suites are available, but we don't include them here because most of them focus on particular areas: Mijenix's Fix-It, for example, is billed as a suite but is really a diagnostic tool with basic antivirus capabilities plus a few extra features. ▶

sharing
the wealth

USEFUL PC UTILITIES aren't found only on retail shelves. Thousands of clever and useful shareware utilities reside on the Web, available for download or via mail order. Here are four that we like.

Deletor

Like some of the other uninstaller programs reviewed here, Deletor (free for 30 days, then $10) aims to free your PC of superfluous browser cache files, temporary files, empty directories, and other space hogs that can slow your system. Deletor's Filter Packs let you specify certain types of files to be deleted. The app can also "shred" files by overwriting their disk space, making them

irretrievable. But because of Deletor's powerful deletion and shredding capabilities, this utility may be best left to advanced users. www.basta.com

DragStrip

If your Windows desktop is beginning to look as cluttered as your hall closet, DragStrip can help. This $20 utility from Aladdin Systems (a 15-day free trial is available) lets you organize applications, documents, projects, and Web pages into a tabbed, booklike icon that sits on your computer desktop, allowing you fast, easy access—and cleaning out that cluttered screen in the process. www.aladdinsys.com

FreeSpace

Mijenix's $40 FreeSpace (a 30-day free trial version is also available) is designed to help

you liberate hard drive space by selectively compressing folders and files. Even with today's gigantic hard drives, seldom-used applications, large graphic images, and other big-megabyte files can fill space faster than a convoy of dump trucks. Other compression utilities such as WinZip require extra steps to unzip the files, but the files that you compress with FreeSpace are immediately available with just a double-click. www.mijenix.com

WinZip

The granddaddy of file compression utilities, Nico Mak Computing's WinZip is a great utility for shrinking underused files on your hard drive or sending large files via e-mail. WinZip costs $29 for a single user, and as with most of the other shareware products here, you can try it for 30 days free of charge. It handles a wide variety of compressed files beyond the standard .zip; novices can choose a step-by-step wizard interface, while power users will want the traditional interface. www.winzip.com

Scientists have discovered the only thing more productive than NetObjects Fusion® 5.0.
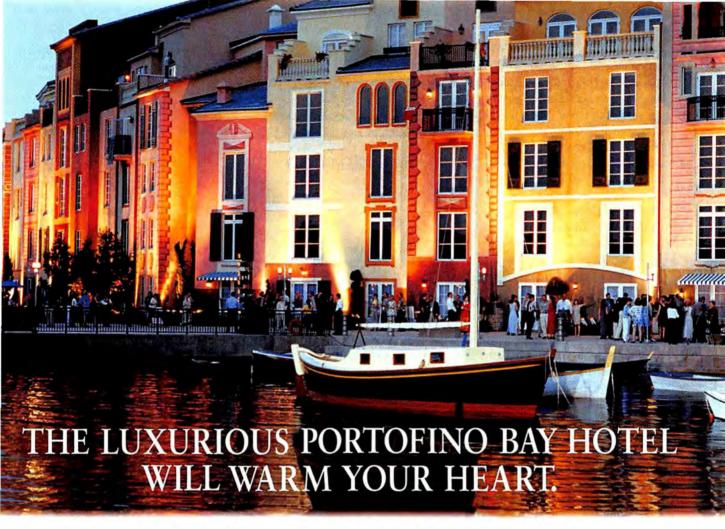
Wait 'til you see what you can do.
Map out your Web site in minutes. Quickly create a professional-looking presence. Build in advanced features without writing code. Beyond its easy-to-use tools, NetObjects Fusion now also provides instant access to a huge variety of online resources. So you don't have to go searching for the answers you need. NetObjects Fusion 5.0 helps you plan, design, build, promote, and grow your e-business. It's part of the IBM e-business family of intelligent solutions for today's business challenges. Try it today with a free download at **www.netobjects.com/trynow**. There's no telling how much your business will multiply.

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THE LUXURIOUS PORTOFINO BAY HOTEL
WILL WARM YOUR HEART.

After the theme park rides have stopped it.

There's no place more luxurious than the PORTOFINO BAY HOTEL at UNIVERSAL STUDIOS ESCAPE,™ A LOEWS HOTEL in Orlando. There you'll find all the opulence and style of the Italian Riviera. A Roman aqueduct-style pool, the Spa at Portofino Bay Hotel and all the world-class facilities you'd expect from a Loews hotel. And it's in the heart of UNIVERSAL STUDIOS ESCAPE, home of two amazing theme parks. Just a leisurely stroll from Universal Studios Florida,® the new Universal Studios Islands of Adventure™ and CityWalk.® You'll also enjoy an exclusive theme park benefits package, including early park admission* and complimentary water taxi. For more lavish details, call 1-888-U-ESCAPE or visit www.uescape.com.

Circle 241 on card or go to www.pcworld.com/productinfo

We looked at both McAfee Office and Symantec's Norton SystemWorks last August ("The Fix Is In: Top Windows Utilities," www.pcworld.com/aug99/windows_tools), but since then, both companies have released major upgrades. The current incarnations—McAfee Office 2000 ($49) and Norton SystemWorks 2000 ($60)—are better integrated, and each has one central interface.

McAfee Office 2000 includes VirusScan, UnInstaller, McAfee Utilities (formerly known as Nuts & Bolts), First Aid (a system diagnostic tool), Oil Change (for automatic software updates), and a Y2K Survival Kit—which will still be useful when you read this—for checking erroneous file dates. You can load all these programs from a single installation, whereas multiple installations were required in the past. For $20 more, you can get the Professional edition, which adds PGP Security for file encryption and the Guard Dog package for Internet privacy.

Meanwhile, Symantec packs a grab bag of products into Norton SystemWorks 2000: Norton Utilities 2000, AntiVirus 2000, CleanSweep 2000, CrashGuard 2000, and a six-month subscription to Norton Web Services, which provides Windows software updates (much like McAfee's Oil Change) and online problem solving. You also get a bonus pack that includes Zip-It for file compression; a Web-page design tool; and WinFax Basic. The Professional edition ($100) adds Norton Ghost 2000—a hard drive imaging utility—and the Norton 2000 Y2K utility.

Dueling Utilities

WE LOADED both suites on similar Pentium II-333 PCs with 128MB of RAM running Windows 98. These packages' most notable improvements since last year are their new interfaces, which tie the utilities' many functions together for single-point access. Symantec has done an especially good job with Norton SystemWorks 2000, neatly coordinating the parts of the suite so that with minor exceptions, every

FRIENDLY FRANKENSTEIN: McAfee Office 2000 sews varied pieces into an integrated interface.

app looks and behaves similarly. McAfee has also made its suite easier to use by adding single-point installation, which lets you install separate modules simultaneously, unlike in previous versions.

Unfortunately, hidden beneath McAfee Office 2000's new interface lurk sundry utilities with varied pedigrees. Network Associates, McAfee's parent company, acquired these programs at various times along with a passel of different companies. Compounding the confusion, components such as McAfee Utilities and First Aid have overlapping features. In our tests, these utilities occasionally crashed. At other times, the components seemed to clash: For example, WinGauge, the suite's PC performance monitor, and WebView, McAfee's custom Web browser, in some instances refused to run simultaneously or caused system lockups when we could get them to run together.

Norton SystemWorks 2000, on the other hand, pulls its collection of tools together seamlessly, winning the Best Buy title in a romp. Its utilities aren't as diversified as those in McAfee Office 2000,

but they're more tightly integrated—without overwhelming you with endless choices.

Slow Suite Ahead

ONE WELL-DESERVED criticism of suites is their tendency to bog down your PC, especially if you install a suite with its default modules enabled. Each component in the suite—virus scanner, system monitor, or uninstaller—eats up memory and processing power. Both suites hurt performance on our test systems, though SystemWorks did so only minimally. With McAfee Office 2000 installed and all its defaults enabled, the performance drag was far more dramatic—at times our system seemed to crawl.

Does this heavy load mean that you should not consider a suite? Not at all—though you may want to think twice if you have an older, slower system. But no matter how powerful your computer, doing some judicious planning during installation can pay dividends. Do you really need to have everything in the suite running all the time? Probably not. The features you use will depend on your particular PC, your preferences, and the tasks you typically perform with your system. Although everyone would benefit from full-time virus protection, most users don't need to run complicated system monitors (WinGauge in the McAfee package or System Doctor in Norton) nonstop.

Norton SystemWorks 2000 Street price: $60; Symantec; 800/441-7234; www.symantec.com
PRODUCT INFO NO. 730
•**McAfee Office 2000** Street price: $49; McAfee; 888/712-1477; www.mcafee.com
PRODUCT INFO NO. 731

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tip

don't go overboard

UTILITY SUITES offer a plethora of pieces that continuously monitor and protect your system. Most programs will load them all by default, eating up processing power and memory. If you have an older, slower PC, consider sticking with the essentials: full-time antivirus protection, automatic disk analysis, and defragmentation. The rest are optional. Upon installation, try selecting a compact or custom installation that will allow you to pick and choose which elements you want to load.

Diagnostics

Problems Solved

HANDS UP, NOW: How many of you *don't* have regular problems with Windows? Anybody? For most of us, crashes, lockups, reboots, and bizarre PC behavior are all part of life with Windows. Yes, we'll admit that some Windows users work day in and day out without any problems whatsoever. They're blessed. But for the rest of us, life could be better, and that's where diagnostic utilities come in handy. Microsoft has left some big holes for utility makers to fill: Windows' built-in diagnostics and performance improvements are perfunctory at best—especially in Windows 95 (see "It's in Windows," below).

Diagnostic utilities take many forms. For testing purposes, we looked at programs that troubleshoot software and hardware and aim to fix system problems, improve performance, and handle preventive maintenance. We review three offerings from the big two—McAfee's First Aid 2000 ($15), McAfee Utilities ($19), and Symantec's Norton Utilities 2000 ($50)—in addition to a promising newcomer from Iolo, System Mechanic Industrial Edition ($60).

At first glance, the two McAfee entries (both included in McAfee Office 2000) look similar: They're inexpensive and have some of the same features, especially in the system diagnostics area. But after a closer look, it becomes obvious that the two are intended for different audiences. McAfee Utilities is a comprehensive collection of diagnostic tools designed for users who want to dig deep into their systems. First Aid 2000 is designed more for general users who want to quickly analyze and tweak their systems, especially when things aren't working correctly. It lacks some of McAfee Utilities' sophisticated features, such as detailed Registry tools.

Symantec's Norton Utilities 2000 is the latest in of a long line of versions stretching back to pre-Windows days. It costs more than other diagnostic utilities (except System Mechanic Industrial Edition), but it includes many finely tuned extras. This package has four sections: Find and Fix Problems, Improve Performance, Preventive Maintenance, and Troubleshoot.

Rookie on the Force

IOLO'S SYSTEM MECHANIC, a relative newcomer to the diagnostics category, comes in three versions: Standard Edition ($20) contains basic system diagnostics; Professional Edition ($40) adds the ability to find and fix broken shortcuts, remove invalid uninstaller information, and find and remove duplicate files; and Industrial Edition ($60) adds a Registry cleaner, a Windows start-up manager, a safe installer, scheduled maintenance, and detailed logs. But even the Industrial version is nowhere near as comprehensive as McAfee Utilities or Norton Utilities, and its main focus is diagnostic. ▶

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it's in windows

IF YOU'D RATHER NOT spend the money on extra utilities, try the useful system tools in your existing Windows configuration. The tools aren't as extensive or as wide-ranging as the stand-alone packages, but they do the basic job. And you've already paid for them! Begin at *Start•Programs•Accessories•System Tools* to access these programs.
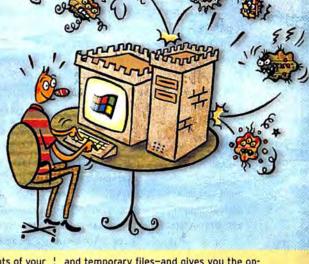
Disk Defragmenter gathers together the scattered bits and pieces of a file so your hard drive will load faster. The Windows 98 version allows you to rearrange files by placing them on the faster-access section of the drive, helping programs start more quickly. You can schedule Disk Defragmenter to run at specified intervals.

ScanDisk analyzes your hard drive for errors. You can have it run a standard (quick) check of files and folders or a thorough check that scans the entire surface, including areas that don't yet contain data. The Windows 98 version performs several advanced functions—such as checks for invalid dates and duplicate file names—but most users will be content with the default setting.

System Information (Windows 98 only) contains a wealth of information on the hardware and software components of your PC. It shows, for example, IRQ, DMA, and memory usage; detailed analysis of existing hardware settings; and which drivers, tasks, and modules are loaded. This intelligence is most useful to advanced users who want to troubleshoot problems or add new hardware.

Disk Cleanup (Windows 98 only) searches drives for temporary Internet files, downloaded program files, files in the Recycle Bin, and temporary files—and gives you the option of deleting them. It also offers a thorough explanation of each file type and tells why you might want to get rid of it. You can set Disk Cleanup to run automatically when disk space hits a predetermined low.

Maintenance Wizard in Windows 98 allows you to establish a schedule for running ScanDisk, Disk Defragmenter, and Disk Cleanup at regular intervals.

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START

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which routes it to

Your PC sends a request

to your **ISP**

through your telephone modem

DirecPC

Tread Carefully in System Waters

NOT EVERYONE is a fan of comprehensive diagnostic software. *PC World* readers, for example, have often complained about diagnostic utilities' bugginess and slow performance, and about how easy these programs make it for you to do real damage. Though diagnostic utilities have improved—the latest versions aren't quite as buggy as their predecessors—they can still cause unexpected results. This is particularly true when you're working with Windows' all-important Registry, the complex database that houses critical hardware and software settings. Fortunately, all of these packages take great care with Registry editing. McAfee Utilities lets you back up, clean, and repair the Registry and schedule it for automatic tune-ups. Norton Utilities' Registry editor backs up data and lets you work with entries; and automatic Registry cleaning and tuning are integrated into Norton's WinDoctor, a comprehensive systemwide check of software and settings. Iolo's System Mechanic comes with an automatic Registry backup feature.

All of the diagnostics we tried located minor problems on our test systems, such as pointers to nonexistent files. But trying to fix more serious problems, such as uneven performance or inexplicable Windows lockups, can lead to other difficulties, such as a completely inaccessible system. The bottom line: When working with the Registry, proceed with caution.

Beyond Basic System Tools

THE HARD DRIVE is a PC's most vulnerable and trouble-prone component. Hard drives are far more reliable than they once were, but you must still monitor yours regularly to spot developing problems.

Further, the more you use your PC, the more fragmented your hard drive becomes, with pieces of files scattered about everywhere. When such dispersion occurs, the read/write heads have to jump all over the place to access data, which slows system performance. The solution: a defragmentation utility.

HELP! Norton Utilities' WinDoctor thoroughly analyzes Windows, finds problems, and fixes them.

Both McAfee Utilities and Norton Utilities excel at analyzing and defragmenting hard drives. Both are more comprehensive than Windows' basic diagnostic tools and provide ample on-screen information as the process runs. (System Mechanic doesn't include an analysis or defragging component.) Norton Utilities' Speed Disk remains one of the fastest and most comprehensive disk defragmenters, while the latest version of McAfee Utilities is, as claimed, much faster than its

tip

set up a schedule

DIAGNOSTIC utilities can identify computer problems before they destroy data, but these programs are effective only if you run them regularly. You should schedule your utility to run its tests and checks automatically, preferably at a time when you won't be inconvenienced—say, 2 a.m.

predecessor. But the Norton product "learns" your system better than McAfee Utilities does: It tracks your use of Windows and apps, then places the files you use most often at the beginning of the drive where it can access them quickly.

The McAfee and Norton Utilities packages also include tools that take "snapshots" of your hard drive's crucial system directories. This feature, not included in Windows, can be a lifesaver, allowing you to restore an accidentally formatted hard drive to its original state. Both also offer advanced Recycle Bins that store all deleted files, even those deleted from a DOS box or older 16-bit Windows application. (Windows stores neither of these types of

deleted files in its Recycle Bin.) Both McAfee Utilities and Norton have advanced undelete features that (usually) let you recover files deleted from the Recycle Bin, though the level of success depends on how soon you begin rescue efforts after a file is deleted. Norton Utilities and McAfee Utilities handle system snapshots and undeletes equally well. System Mechanic takes a snapshot of your system and reports the changes, but it does not undo changes.

Of the four diagnostic packages we tested, we like System Mechanic's interface the best, with all basic choices displayed on the start-up screen. First Aid's interface lets you test components by clicking icons that represent them. Sometimes you must drill through layers of menus in both McAfee and Norton utilities to find what you need. (Of course, this is in the nature of a comprehensive diagnostic utility.)

Soaking Up PC Power

BOTH MCAFEE UTILITIES and Norton Utilities let you monitor system parameters. (McAfee calls this on-screen display WinGauge; Norton calls it System Doctor.) The range of information you can oversee is mind-boggling, from available disk space to memory used to such esoteric data as threads and Graphical Device Interface memory. You can set alarms to let you know when, for example, your hard drive needs defragmenting.

These displays are eye-catching, but keeping them on-screen at all times can slow your system's performance. These tools are valuable for troubleshooting, especially if you're trying to solve a periodic problem, but most users should load them only when they're needed. (Again, System Mechanic and McAfee First Aid lack these monitoring tools.) ▶

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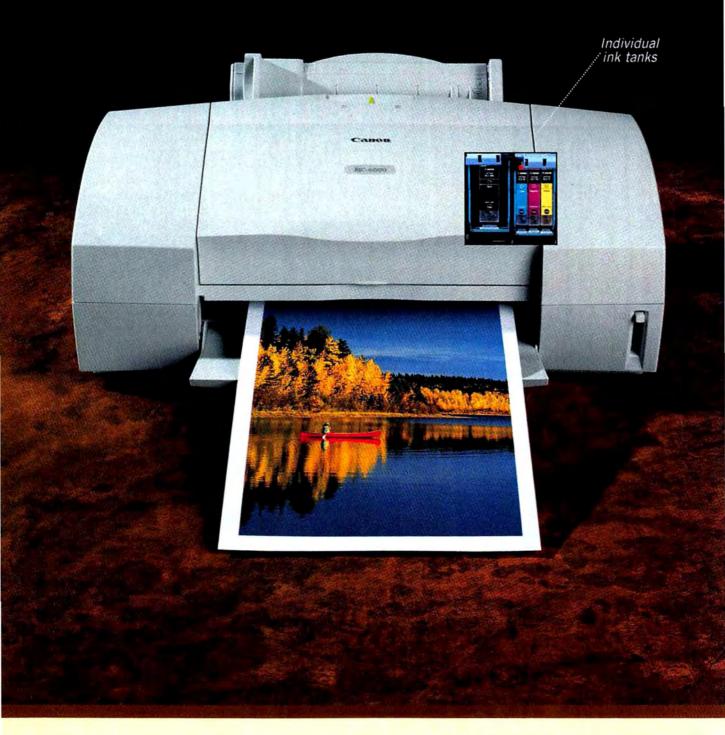
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Keeping Data Safe

MCAFEE UTILITIES has a leg up on Norton in backup and system security. McAfee's Safe and Sound utility lets you specify which directories and files should be automatically backed up if they change. McAfee's Shredder lets you overwrite private files after you erase them to ensure they can never be recovered. Similarly, Norton's WipeInfo allows you to permanently remove files from your system.

You can live without these diagnostic tools, but considering their low price and wealth of features, they make sense for most users. Norton Utilities' ease of use and excellent selection of features make it our Best Buy. System Mechanic and McAfee First Aid don't offer enough for most users, despite their pluses. Though McAfee Utilities offers a raft of features and is much improved, it still lacks Norton Utilities' integration and smoothness.

Norton Utilities 2000 Street price: $50
Symantec; 800/441-7234;
www.symantec.com
PRODUCT INFO NO. 732

•**First Aid 2000** Street price: $15; McAfee;
888/712-1477; www.mcafee.com
PRODUCT INFO NO. 733

•**McAfee Utilities** Street price: $19; McAfee;
888/712-1477; www.mcafee.com
PRODUCT INFO NO. 734

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Options   Help   Close

•**System Mechanic Industrial Edition** Street price: $60; Iolo; 877/239-4656; www.iolo.com
PRODUCT INFO NO. 735

Uninstallers/ Undoers

Resurrection of Things Past

WHEN WORKING WITH a computer, we all have moments when we'd give anything to go back in time. You know the scenario: Your system is humming along, you install a new utility or application, and—bam!—all hell breaks loose.

Sometimes new software doesn't install properly. Windows is complex, and new applications sometimes overwrite existing system files, transform the Registry, or scatter icons, shortcuts, and files across your desktop and disperse them in various directories, often without your permission. These changes can wreak havoc with a system's performance.

Microsoft insists that all applications be uninstallable from the Add/Remove utility in Windows' Settings folder, but some Windows applications don't honor that rule. In the worst cases, there's no uninstall option, or you receive only a confusing collection of cryptic messages.

Enter the broad range of system tools that uninstall applications and undo system changes—utilities that let you turn back the clock. For this review, we looked at two classic uninstallers: McAfee UnInstaller ($19) and Norton CleanSweep 2000 ($40). We also tested two utilities that qualify as undoers, meaning they don't uninstall programs but do let you restore your system to an earlier state. Wild File's Go-Back ($70) keeps a running

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backup of all the additions, deletions, and changes you make to your computer, letting you restore your machine to virtually any point in time. PowerQuest's Second-Chance ($70) creates a series of regular checkpoints—essentially snapshots of the state of your PC—and lets you return to a point before a problem developed.

Birds of a Feather

THOUGH THEIR interfaces differ slightly, both McAfee UnInstaller and Norton CleanSweep are remarkably similar. Both analyze and remove applications, including files, Registry entries, and shortcuts. The first time either utility runs, it attempts to determine which of these elements are safe to uninstall and which may be crucial to proper operation and should not be removed, except by someone with Windows Registry expertise. (Both utilities use color coding to indicate certainty about the safety of removing files or entries: Green is certain, yellow is iffy.)

The two programs monitor installations closely and quickly improve at identifying safely removable files. McAfee calls this capability BackTrack, while Norton calls it SmartSweep. (Both run small programs continuously in the background; in our tests, this activity did not affect overall system performance.) When an uninstaller detects that you're installing a new application, it keeps a log of the entire sequence, including which files are added and what changes are made to the Registry or other Windows settings. If you want to remove a monitored app or utility later, the process is essentially foolproof.

Both UnInstaller and CleanSweep have been around for some time, so they're mature and effective. On our test systems, we were able to remove both major and minor applications without difficulty, and our computers worked smoothly after the process—the real test. Both utilities keep backups of their uninstalls, so you can always reinstall anything that you happened to strip out unintentionally.

Get a Move On

UNINSTALLERS DO more than simply remove programs. Both McAfee UnInstaller and Norton CleanSweep let you archive infrequently used applications into compressed files, move applica- ▶

tions (and all their associated files) to another drive or partition, and transport applications to another PC by compressing them onto multiple floppies or removable media such as an Iomega Zip disk. Further, both utilities can clear out space on your hard drive by finding duplicate, unused, and orphan files associated with applications no longer installed. And for security purposes, UnInstaller and CleanSweep let you clear out those space-hogging Internet browser cache files and cookies that identify you when you revisit a Web site. Finally, both uninstaller packages can clean your PC's Registry of unused entries (much as similar features in McAfee Utilities and Norton Utilities can).

But in the end, CleanSweep edged out McAfee UnInstaller as our Best Buy because of its cleaner look and feel, coupled with a well-designed interface that makes the program a snap to use—even for first-time computer users.

Uninstallers aren't for everyone, but they can be immensely helpful. (We freed up hundreds of megabytes of space on our test systems.) Running an uninstaller can boost performance—especially on older, slower computers. If you seldom install new applications, don't bother with an uninstaller, but if you're always trying out new stuff, consider it essential.

One Step Back

YOUR PROBLEM may call for a less radical solution than removing programs. You may simply want to undo that latest Windows tweak and return to a time when your PC actually worked properly. We checked out two undoers—Wild File's GoBack and PowerQuest's SecondChance—that let you turn back the clock just a notch or two.

SecondChance automatically tracks all the changes made to your system. Every time you delete or change a file, the program saves copies of the originals; it also records all changes to system files and directories. At predetermined intervals, SecondChance stores a checkpoint (the default setting is once a day, although you can adjust the program settings to run checks as frequently as once an hour). You can also store checkpoints manually—before installing a new application, for example. To restore your computer to an exact point in time, you simply select a checkpoint for that time. If your system won't boot, you can start it from an emergency floppy that you create when you install Second-Chance, then run the program from DOS.

Checkpoint sizes vary considerably, depending on how much work you do on your computer. In our tests on a lightly used machine with minimal file additions and deletions, most of the checkpoints totaled less than 10MB each. But if you find that you are worried about clogging your hard drive, you can limit both the total disk size that's used for checkpoints and the number of checkpoints that are saved before the older ones are discarded.

GoBack takes the checkpoint concept a few steps further, adding fea-

tures beyond those of SecondChance. It lets you restore your PC to any point—5 minutes, 5 hours, or five days ago, or any time in between, before, or after. GoBack also lets you choose specific files to recover, rather than limiting you to full-system restores, as SecondChance does. It offers password protection for the historical information it archives, to keep prying eyes from restoring deleted files.

Unfortunately, GoBack consumes substantially more space than SecondChance does: By default, it requires 10 percent of your hard drive (although that figure can be adjusted). The program also eats up slightly more system resources than SecondChance. Still, on our Pentium II-333 test machine, we didn't notice any appreciable lag in performance.

Though uninstallers and undoers can't replace frequent backups, they're among the most useful utilities you can buy. And because we have included two distinctly different types of utilities in this category, we've decide to award dual Best Buy credit to Symantec's Norton CleanSweep 2000—a product that does a good job of ridding your hard drive of space-consuming applications and files that you no longer need—and to Wild File's GoBack, which is both truly innovative and enormously useful.

GoBack Street price: $70; Wild File; 888/945-3345; www.goback.com
PRODUCT INFO NO. 736

Norton CleanSweep 2000 Street price: $40; Symantec; 800/441-7234; www.symantec.com
PRODUCT INFO NO. 737

•**McAfee UnInstaller** Street price: $19; McAfee; 888/712-1477; www.mcafee.com
PRODUCT INFO NO. 738

•**SecondChance** Street price: $70; PowerQuest; 800/379-2566; www.powerquest.com
PRODUCT INFO NO 739

tip
use the
monitor

WHILE UNINSTALLERS EXCEL at cleaning out unwanted applications, they're most effective (and foolproof) after they've been running for a while and have observed application installations. Set up your uninstaller in the application's preferences to monitor installation of all subsequent software packages. Tracking all the initial changes, additions, and deletions makes it easier to uninstall a program later.

Stocking Your Utilities Tool Kit

HOW DO YOU DECIDE which utilities you need? Look at how you work, how experienced a user you are, and how powerful your PC is. If you rarely install new apps or utilities, or seldom change your hardware or software, you'll probably do fine with Windows' built-in utilities plus an antivirus product (absolutely essential). But if you like to check out new software and make tweaks to squeeze performance from your PC, one of the utilities reviewed here can help. For most users, the best bet is a suite like Norton SystemWorks 2000, which provides a fairly priced and eminently useful set of tools—enough to cover you in almost any situation.

Stan Miastkowski is a PC World contributing editor. Antivirus testing was performed by Joe Wells at Wells Research. ■

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BROADBAND INTERNET access has the potential to turn the current e-commerce trickle into a waterfall and open up new worlds of collaborative education, multimedia entertainment, and interactive communications.

That's no secret to anyone, least of all the phone and cable companies that promise to bring fast Web access to your door. But these industries have had monopolies over their local service areas for decades. Does that mean that soon they'll also monopolize your access to the Net?

In the past several years, a record number of acquisitions and mergers has resulted in a shrinking band of companies that dominate Internet delivery. Telecommunications conglomerates are swallowing cable giants. Long-distance carriers are hooking up with backbone operators and big ISPs. Ma Bell is morphing into Ma Net.

Today's business users and consumers still enjoy low flat-rate pricing and plenty of choices among dial-up Internet access providers. But that could change as the transition toward broadband Net access takes hold. Not only are the costs of implementing fast access higher—and thus out of reach of many small ISPs—but the broadband networks themselves are often off-limits to all but a handful of big cable and telephone companies.

The long-term result? It depends on whom you ask. According to some industry observers and open-access advocates, we can expect spotty reliability, tepid customer service, and higher rates. Others, including the Federal Communications Commission, believe that the intensifying rivalry between cable modem, DSL, and other bandwidth technologies will help jump-start the rollout of broadband access across the country, keeping rates—and service—at least as competitive as they are today.

THE NET: WHO'S IN CHARGE?

YOU'VE PROBABLY heard the Internet belongs to no one, and in many ways that's still true. In fact, the physical Net—the servers it runs on and the backbones that connect them—is far more diversely "owned" than it was a decade ago when the U.S. government and a handful of universities ran the show.

Nevertheless, the wave of consolidation among cable and telecommunications companies over the past two years threatens to change that picture. Here are some of the major deals so far:
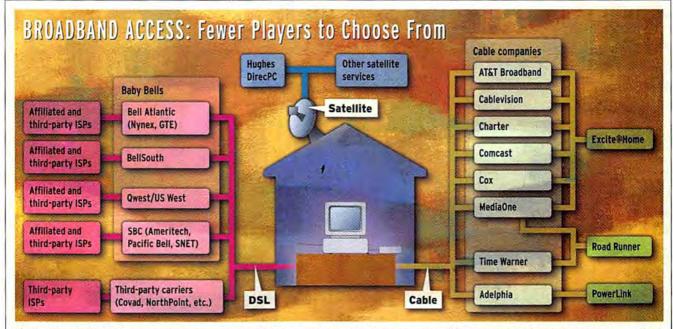
➢ AT&T acquired cable provider Tele-Communications, Inc. in 1999, renaming it AT&T Broadband and Internet Services. AT&T already owns WorldNet, the third largest dial-up ISP in the nation, and the TCI purchase gave it a controlling interest in Excite@Home, the larger of two major cable modem

> **"You're likely to see the same horrible customer service [the cable companies] provide their TV customers."**
>
> **Jeffrey Chester, executive director, Center for Media Education**

BROADBAND ACCESS: Fewer Players to Choose From

SLOW, DIAL-UP INTERNET connections are more plentiful than ever—currently, there are some 7000 ISPs—but for fast Net access, your options may be limited. Want DSL? You'll have to go through a regional Baby Bell or a third-party carrier that leases lines from the local phone company. Rather have cable? Most users will have to hook up with Excite@Home or Road Runner, both of which will be owned in whole or in part by AT&T. A third option is wireless access services such as Hughes' DirecPC satellites, but these are slower and often more expensive than DSL or cable.

access providers. The other large cable modem access provider, Road Runner, is co-owned by MediaOne Group—a company AT&T plans to acquire.

➢ WorldCom has been on a shopping spree, snapping up rival long-distance provider MCI, plus the two largest Internet backbone providers, UUNet and ANS. MCI WorldCom has also announced plans to merge with Sprint—a local, long-distance, and Internet backbone provider.

➢ SBC Communications (the parent company of Southwestern Bell) acquired West Coast-based Pacific Bell in 1997. In 1999, SBC became the largest U.S. local phone company with its $61 billion acquisition of Ameritech, the Midwestern Baby Bell.

As a result of these mergers, AT&T is expected to own the pipeline into over half of all U.S. cable households, though FCC rules will require the firm to reduce its market share to 36.7 percent. And by 2001, we're likely to have only four companies— AT&T, Bell Atlantic, MCI WorldCom, and SBC Communications—controlling 70 percent of the U.S. residential telecommunications market, according to Tele-Trend, a research firm.

The number of players in the traditional Internet backbone market is shrinking, too. Today, the major backbone providers include Cable & Wireless USA, GTE (merging with Bell Atlantic), Intermedia Communications, PSINet, MCI/UUNet, and Sprint. Most of the major network access points, which connect the various backbones, are also owned by communications giants, primarily MCI Worldcom and SBC.

But while Internet backbone ownership is consolidating, the number of alternative backbone providers is growing. Over the last year, the average cost of moving data over domestic or international lines has dropped 25 percent.

> "If **ISPs** want to stay competitive in the future, they **need** to provide **broadband. If** they **can't, we're** going to see a **shrinkage** in the ISP market."
>
> **Barbara Dooley, director, USISPA**

This is in large part due to long-haul fiber-optic carriers like Qwest and Global Crossing that provide corporations and ISPs with alternate routes. The sheer quantity of new fiber optic lines, combined with optical switching technology that increases how much data can travel over each line, means the cost of bandwidth is dropping for everyone.

At the same time, there's a widespread corporate movement toward virtual private networks that avoid the bottlenecks of the Internet at large by using dedicated, secure fiber networks among corporate branches and supply-chain customers. Satellite services are beginning to beam streaming content directly between content providers and ISPs. And a nationwide network of data hubs is being built to compete with the existing Internet infrastructure.

Thus, despite the spate of recent mergers and acquisitions, a number of competitive pressures have kept the Net backbone market wide open, preventing the dominance of just one company or industry—for now.

THE MORE ISPs, THE MERRIER

IN THE MARKETPLACE of ISPs serving business users and consumers, a paradox emerges. The ISP business has been rapidly consolidating, capped off by the recent merger between EarthLink and MindSpring. At the same time, however, the number of ISPs has been rising. Between October 1998 and July 1999, a period that saw dozens of ISP acquisitions, the number of ISPs jumped 36 percent, from 5078 to nearly 7000, according to *Boardwatch*, a magazine for the ISP community. ▶

While regional ISPs are merging and buying up local ISPs to better compete with the likes of AOL, new competitors are attracted by cheap bandwidth and lower barriers to entry. To be an ISP today, all you need to do is handle billing and customer service—you can out-source the rest to a backbone provider.

One reason smaller dial-up ISPs are thriving is the growing importance of customer service. "[Smaller] ISPs serve some important marketing and service functions that can't be served by large companies," says Andrew Jay Schwartzman, president of the Media Access Pro-ject, a public interest law firm. Smaller ISPs may be better attuned to the needs of niche industries and minorities, and they're usually better at handling the needs of individual consumers.

ISP competition has kept monthly dial-up access rates steady—and in some cases, prices have even dipped slightly (you can still find all-you-can-eat Internet access for as little as $9.95 a month). What's more, smaller ISPs that merged with bigger ones have gained more competitive features such as Web-server hosting. And the unions between larger ISPs such as EarthLink and MindSpring give the combined companies more clout to negotiate better prices for the wholesale bandwidth they buy from UUNet and other backbone providers—all of which is good news for Web surfers.

THE GAME OF MONOPOLY

CHEAP BANDWIDTH, a robust economy, and fast-changing technology have offset most of the negative effects of ▶

WHICH BROADBAND OPTION IS RIGHT FOR YOU?

CABLE MODEM, satellite, symmetrical vs. asymmetrical DSL: There's more than one way to fly at Concorde speeds on the Net. Here's a guide to your current broadband choices.

Small to midsize businesses. If you own a business in a major metropolitan area and can afford several hundred dollars per month in access fees, you're likely to find a number of DSL providers competing for your broadband needs. Companies such as Flashcom (www.flashcom.com) offer a variety of DSL services—such as symmetrical DSL, which offers transmissions at the same speed (up to 1.5 mbps) in each direction. SDSL service can cost $200 to $500 per month, but it's still cheaper than a T1 line and is a more mature technology than asymmetrical DSL (ADSL) or cable. And frequently the bandwidth can be shared among multiple users in the office.

Another option: fixed-point wireless services, such as Local Multipoint Distribution Service, which can crank bandwidth up to 2 mbps over one- to two-mile distances. With a fixed-point wireless service, voice, video, and data are converted to a microwave signal via a rooftop antenna and beamed to a base station, where the signal is translated back into a digital bitstream. But like microwave technology, LMDS has difficulty penetrating obstructions like buildings and leafy trees. So far, fixed wireless companies like Teligent (www.teligent.com) and Winstar (www.winstar.com) are aiming services at businesses, but expect MCI WorldCom to make a big push into fixed-point wireless for consumers as early as next fall.

Suburban home offices. For broadband access under $100 a month, you typically have only two options: your local cable provider, which usually charges $40 per month for download speeds up to 3 mbps and up to 128 kbps for uploads, or your local telephone company, which charges $50 to $60 per month for the typical 640-kbps (downloads) and 128-kbps (uploads) ADSL service. There are sometimes lower-cost, lower-bandwidth DSL options available for as low as $40 per month. And if you live close enough to a central phone company office, you may be eligible for high-speed ADSL service of up to 7 mbps—but that service can cost hundreds of dollars per month. If you work primarily during the day, you'll get the most bandwidth for the buck with cable modems. However, after 3 p.m. on most business days, cable performance often slows to sub-ADSL speeds (the more people that get online, the slower everyone's access becomes). Another disadvantage: interactive cable is less secure than a point-to-point DSL connection.

Rural home offices. Out in the country, you're not likely to get cable modem or DSL service for years, and in extremely remote areas you'll never see them. But don't worry: You've got satellites! Hughes Electronics' DirecPC service (www.direcpc.com) offers 400-kbps download speeds—but upload speeds are closer to the 33.6-kbps limit of your old dial-up modem. Installation costs (you'll need a satellite dish) are often pricey: about $200 and up, and monthly service ranges from about $30 to $130. By 2002, Hughes expects to offer broadband service from its Spaceway two-way low-orbit satellite project. Similar services are expected from Alcatel, Lockheed Martin, Loral, and the long-awaited Teledesic. Early services should be capable of cable modem–like speeds, with future satellite networks promising far speedier service.

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industry consolidations. But as broadband replaces standard dial-up access, those blue skies may turn gray.

Obtaining broadband Net access isn't a problem for most businesses—as long as they can afford to spend $80 per month or more per DSL line from companies like NorthPoint, which sells top-of-the-line DSL services to corporations.

For home-office users and consumers, however, affordable broadband access is probably available from only one DSL provider, such as a $50-per-month service from the local phone company, or

Point and Covad should make DSL more affordable and more widely available for most consumers. Still, compare that with the multiple ISPs you can choose from in the dial-up realm, and you can see a problem.

What's more, the big local phone companies offering high-speed access have the ability to make things difficult—if not downright impossible—for their potential ISP competitors, according to their critics. Here's a look at the state of affairs among DSL and cable modem service providers:

that run from their central offices to neighborhood homes. Just as Baby Bells must provide access to these lines to long distance companies, they also must lease them to broadband ISPs. In addition, they must also let third-party DSL providers house equipment installed in the Baby Bell's central offices.

But the phone companies are charging such high fees for that access that only their own affiliated ISPs and very large competitors can afford to take the hit, according to the United States Internet Service Providers Alliance (USISPA), an organization of ISPs lobbying to rein in alleged anticompetitive behavior in the telecommunications industry.

"The pricing is predatory," says Barbara Dooley, director of USISPA. "If ISPs want to stay competitive in the future, they need to provide broadband [access]. If they can't, we're going to see a shrinkage in the ISP market."

USISPA and others also claim that phone companies engage in other anticompetitive tactics, such as filling new orders from independent ISPs much more slowly than orders that come from their affiliated ISPs.

Meanwhile, the House Commerce Committee, headed by chairman Tom Bliley (R-Virginia), has begun an investigation into claims that the big phone companies are trying to shut broadband ISP competitors out in favor of their own affiliates. For instance, Bliley's staff recently obtained an internal SBC Communications e-mail that allegedly ordered employees to destroy records relating to the rollout of SBC's broadband services.

> ## "I envision a broadband oasis, where anybody who wants to compete...should be able to do so in an unregulated or a significantly deregulated environment."
>
> **FCC Chairman William Kennard**

from one cable modem provider (for about $40 per month). A recent FCC ruling that requires regional phone companies to share existing voice lines with third-party firms such as North-

DSL. According to FCC regulations, regional phone companies can sell DSL access through their affiliated ISP subsidiaries. But they're required to lease out their "last mile," the copper wires

The internal e-mail message was "harmless and had no impact on our competition or their access to our DSL lines," counters Selim Bingol, an SBC spokesperson in San Antonio, Texas. ▶

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SBC is "giving competitors the same access and treatment we give ourselves," he adds. In addition, SBC has established a separate subsidiary, Advanced Solutions, specifically to ensure that SBC treats all of its ISP customers fairly—a requirement the FCC imposed on SBC as a condition of approving its merger with Ameritech, Bingol says.

Cable. AT&T touts the advantages of customers receiving all their communications and entertainment needs—cable television; local and long distance telephony; broadband Net access; and, in the future, videoconferencing and interactive TV—over a single line. In this scenario, the more services a consumer buys from AT&T, the cheaper those services become.

But critics say Ma Bell is getting too big and is locking potential cable modem competitors out of the market.

Until 2002, AT&T and 19 other cable providers are bound by exclusive contracts with Excite@Home, meaning that Ma Bell and the other companies must offer only Excite@Home's ISP services to their cable modem customers. (Time Warner and MediaOne are bound to similar agreements with the Road Runner service.)

These agreements are being attacked on all sides. In October 1999, GTE challenged cable modem exclusivity contracts in an antitrust case against AT&T and Comcast. In Congress, open-access activists are supporting a bill called the Markey Open Access Resolution. This resolution is similar to a recent Canadian Radio-Television and Telecommunications Commission ruling, which demanded that cable operators sell access to their cable modem infrastructure to third-party ISPs.

Meanwhile, hundreds of service providers have joined a group called the OpenNet Coalition (www.opennetcoalition.org). Led by America Online and backed by three powerful phone companies—GTE, US West, and MCI WorldCom—OpenNet claims AT&T has emerged as a dangerous broadband monopoly. The group is urging the FCC to force AT&T to open its cable pipelines to competitors.

Local governments have also been trying to force cable companies to open their networks. Cable providers won battles in San Francisco and Miami but lost in Broward County, Florida, and in Cambridge and Somerville, Massachusetts. At press time, similar disputes loomed in Portland, Oregon, and in St. Louis and Los Angeles.

All these cases are undergoing appeals. But the outcome is unlikely to have a major impact because national rulings supersede local jurisdictions, and

the FCC has taken a hands-off approach. "I envision a broadband oasis," FCC Chairman William Kennard told members of the National Association of Telecommunications Officers and Advisors in a September 1999 speech, "where anybody who wants to compete in this broadband marketplace and make the investment to deploy should be able to do so in an unregulated or a significantly deregulated environment. That is the fastest way to get broadband out to the American public."

Kennard has also said that AT&T's efforts to bundle local phone service with cable modem access and other services should create some competition in the local phone service market. But the FCC may be overly optimistic. AT&T won't be offering local phone service as a separate service, says Mark Cooper, director of research at the Consumer Federation of America. Instead, Ma Bell will "only offer cheaper local service if you also buy their long distance and cable" services, Cooper explains, "and that won't do the average consumer any good."

AT&T argues that sharing access to its cable infrastructure presents considerable technical challenges. The company also claims that it's unfair to demand that it give away the meager fruits of its ongoing, multibillion-dollar investment in cable infrastructure.

Nonetheless, it seems that AT&T isn't completely averse to sharing: At press time, it had struck a deal with MindSpring to give that ISP (currently in the midst of a merger with EarthLink) access to the AT&T cable system, once its exclusive agreement with ▶

> ## "[We are] giving **competitors** the same **access** and **treatment** we give **ourselves.**"
> ### SBC spokesperson Selim Bingol

GETTING UP TO SPEED

GOT QUESTIONS about high-speed Net access? The Web is the place to find answers. These sites can bring you up to speed on DSL, cable modems, and other access technologies—even if you surf at less than 56K.

Get DSL. To find out if you can get DSL service in your area, dial up www.dsl.com/access.htm and plug in your vital information. For reviews of nearly 700 DSL-ready ISPs, as well as a wealth of other helpful information, go to www.dslreports.com.

Get cable. For everything from checking access in your area to tips about sharing a fast Net connection, try www.cablemodeminfo.com. To get the straight FAQs on the topic, visit www.cablemodemhelp.com.

Get smart. The Center for Media Education (www.cme.org) provides thoughtful, consumer-friendly perspectives on electronic media, including high-speed Net access. Another good option: the telecommunications section of the site run by Consumers Union (www.consumersunion.org/telecom/telecom.htm), publisher of *Consumer Reports* magazine.
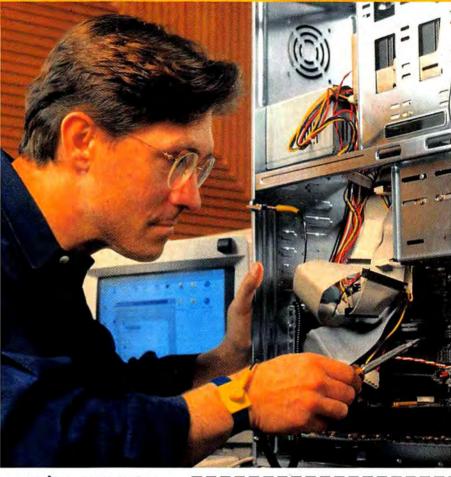
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Excite@Home expires in 2002. Ma Bell says it is willing to hammer out similar agreements with other third-party ISPs. "The Internet should be driven by consumer needs and not regulated by the government," says Mark Siegel, a spokesperson for the company.

Within several years, the closed cable argument is likely to come before the Supreme Court. But by then, the Court could be looking at a much more entrenched infrastructure. There's a danger to the FCC's wait-and-see attitude because, if this cable infrastructure does indeed become more entrenched, it will become more difficult to open up, CFA's Cooper predicts.

The FCC is also working to stimulate broadband access by making DSL expansion a requirement of mergers between phone companies. For instance, the FCC demanded that SBC Communications boost its DSL business as a condition for approving its merger with Ameritech. In October, SBC appeared to go beyond the scope of the FCC's requirements by announcing it would invest $6 billion to make DSL available to 80 percent of its customers by the end of 2002.

THE BIG PICTURE

SO WHAT EXACTLY will all the cable and telecommunications industry machinations mean to you? It's difficult to say exactly, but a few things are likely:

service). DSL isn't cost effective in areas with widely scattered populations, either, because technical limitations cause the bandwidth to decrease the farther you are from the central office. But over time, other broadband technologies, such as fixed wireless and two-way satellite services, will expand to bring fast Internet access to more users. (See "Which Broadband Option Is Right For You?" for more on existing broadband alternatives.)

Faster access can mean bigger problems— at least initially. For some of the first customers who signed up for cable or DSL access, "always-on" has turned out to be more like "mostly-on." (See "Broadband Blues" in *Top of the News* for examples of user problems.) Most cable companies don't exactly have an encouraging customer service record to start with, and if you've got only one company in your area that supplies cable modem access— which is the case in most of the country—you could be in for some headaches. "You're likely to see the same horrible customer service [the cable companies] provide their TV customers," predicts Jeffrey Chester, executive director at the Center for Media Education.

the huge bucks AT&T and others are spending to build their infrastructures. But in exchange for taking a bath now on broadband rates, giants such as AT&T can gain customers and shut out the ISPs that can't afford to incur those huge losses. And once the big guns have a lock on their customers, some analysts believe, these behemoths will then be in a better position to control pricing.

But the broadband giants are unlikely to make pricing prohibitive regardless of how little competition there is. Cable providers must compete against DSL providers, and vice versa, so for now there is competition for your broadband bucks. And if prices were set too high, the big companies would never achieve a wide—and therefore profitable—customer base. The real money, after all, will be made in cutting deals with e-commerce vendors, advertisers, and content providers. But to cut those deals, the broadband providers need to supply their partners with a crucial ingredient: a large base of subscribers. You and me, in other words.

When all is said and done, what all the big companies really want is *you*. It's not who owns the Internet that counts—it's who owns the *customer*, explains Laurie Falconer, DSL analyst at TeleChoice, a market research firm.
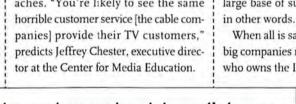
> ## "AT&T wants to own the customer—local, long distance, data, and all the applications that run over [the network]."
> ### Telecommunications analyst Laurie Falconer

Eventually, most people will have a broadband service choice. Cable modem service is still limited to selected cities and suburban areas. As the rollout continues, more business and consumer Web surfers will be able to choose between cable modem and DSL. But these technologies have their geographical limitations. In rural areas, for instance, cable networks are impractical (there aren't enough potential customers to offset the high cost of rolling out the

Meanwhile, complaints about disrupted DSL service have also increased. "The telephone industry has a phenomenal reliability record for voice calls," says analyst Gerry Kaufhold of Cahners In-Stat Group. "But when you talk about enhanced services, they don't do as well as they'd like us to think."

Broadband rates won't be cheap, but they won't be astronomical, either. Arguably, a monthly rate of $40 to $50 for broadband is a bargain, considering

"AT&T wants to own the customer," Falconer says. "They want to own local, long distance, data, and all the applications that run over [the network]."

This kind of service bundling would make it difficult, if not impossible, for other service providers to compete. And the less competition there is in an industry, the more the dominant companies win—and the more you lose.

Eric Brown is a freelance technology writer based in Boston. ∎

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They Got Game

The latest generation of graphics boards are

fast, full-featured, and cost less than $300.

We test their performance with the hottest

3D games and find ten that will make your

screen come to life. By Mitt Jones

GRAPHICS BOARDS HAVE LONG mastered the fundamentals of accelerating Windows applications, pumping up the performance of word processors, spreadsheets, and most other popular office applications. But whether you're ready to make a fast break for the latest shoot-'em-up 3D games or edit your video masterpieces like a seasoned pro, you'll need to recruit your new graphics star carefully if you want top performance with software that goes beyond the basics. You can also choose from a few boards if you want extra features such as an integrated TV tuner or built-in ▶

PUMP UP 3D GAMES:
Diamond's Viper V770 Ultra,
Creative Labs' 3D Blaster RIVA
TNT2 Ultra (center), and 3dfx's
Voodoo3 3000 deliver break-
neck speed and rich images.

support for running two monitors (even at different refresh rates) simultaneously.

For this roundup, we put 15 AGP graphics boards through a variety of tests, focusing on 3D gaming because games are the only mainstream apps that challenge their capabilities. The results varied even among our Top 10 contenders. For example, in seventh place, the Creative Labs 3D Blaster Annihilator—equipped with NVidia's GeForce 256 chip—delivered the fastest frame-rate score of 89 frames per second in Quake 3 Arena. By contrast, the number ten Matrox Marvel G400-TV, sporting the company's own G400 chip, managed only 45 fps.

Beyond speed, we also judged each board's visual quality in games. Overall, Guillemot's Maxi Gamer Xentor 32 delivered the best-looking graphics. Two others—the Creative Labs 3D Blaster RIVA TNT2 Ultra and the ELSA Erazor III Pro—also pumped out sharp, colorful images. All the rest—the 3dfx Voodoo3 3000, the ATI Rage Fury Pro, the Creative Labs 3D Blaster Annihilator, and the Diamond Viper V770 Ultra and Stealth III S540 Xtreme, and both Matrox models (the Marvel and the Millennium)—generated pleasing graphics, but not as eye-popping as those by the first three.

These boards also vary in hardware features. If you're looking for a board that lets you capture and edit video from a camcorder or other video device, consider ATI's Rage Fury Pro or Matrox's Marvel G400-TV—both of which come equipped with video-in and -out ports. Although over half of the boards here allow you to output to a TV, only the Marvel provides a TV tuner that lets you display television programming on your PC's monitor.

When it comes to memory, the amount you need depends on how you intend to use your graphics card. If you use standard office applications, 8MB of memory will suffice. If you use a big monitor and would like to get high display resolutions, go for a card with 16MB or 32MB of RAM. For performance-hungry gamers, however, we consider 16MB the minimum, and recommend 32MB.

All of the boards we evaluated support a resolution of at least 1280 by 1024 (some even go as high as 2048 by 1536, which may be useful if you work on large spreadsheets or highly detailed graphics) at a refresh rate of 85 Hz. Your monitor also must support such resolutions and refresh rates. Different feature sets among the Top 10 boards also mean varying prices, ranging from $129 to $299.

But one board emerged on top: The $199 Creative Labs 3D Blaster RIVA TNT2 Ultra earns our Best Buy award, thanks to speedy performance, vivid image quality, and a video-out port.

BEST BUY

DITCH YOUR 3D GLASSES: The Creative Labs 3D Blaster RIVA TNT2 Ultra fires up the hottest games at speeds that will make you want to play for hours. It wins our Best Buy for blazingly swift performance, video-out capability, and useful software extras.

FAST BREAK

GRAPHICS boards installed in a 4X AGP slot promise to transfer information to and from system memory at roughly 1GB

	GRAPHICS BOARDS			FEATURES COMPARISON	
				Features	
	AGP BOARD	Street price 11/5/99	Overall rating [1]	Base specifications	Extra hardware features
1	**Creative Labs 3D Blaster RIVA TNT2 Ultra** 800/998-1000 www.creative.com	$199	91	2X AGP, NVidia RIVA TNT2 Ultra chip, 32MB of SDRAM, 300-MHz RAMDAC	video-out
2	**Guillemot Maxi Gamer Xentor 32** 877/484-5536 www.guillemot.com	$200	90	2X AGP, NVidia RIVA TNT2 Ultra chip, 32MB of SDRAM, 300-MHz RAMDAC	video-out
3	**ELSA Erazor III Pro** 800/272-3572 www.elsa.com	$169	89	4X AGP, NVidia RIVA TNT2 Pro chip, 32MB of SGRAM, 300-MHz RAMDAC	n/a
4	**Matrox Millennium G400 32MB** 800/361-1408 www.matrox.com/mga	$199	89	4X AGP, Matrox G400 chip, 32MB of SGRAM, 300-MHz RAMDAC	video-out, two VGA connectors
5	**Diamond Stealth III S540 Xtreme** 800/468-5846 www.diamondmm.com	$129	89	4X AGP, S3 Savage4 Xtreme chip, 32MB of SDRAM, 300-MHz RAMDAC	n/a
6	**3dfx Voodoo3 3000** 800/234-4334 www.3dfx.com	$150	88	4X AGP, 3dfx Voodoo3 chip, 16MB of SDRAM, 350-MHz RAMDAC	video-out
7	**Creative Labs 3D Blaster Annihilator** 800/998-1000 www.creative.com	$250	88	4X AGP, NVidia GeForce 256 chip, 32MB of SDRAM, 350-MHz RAMDAC	n/a
8	**Diamond Viper V770 Ultra** 800/468-5846 www.diamondmm.com	$199	87	4X AGP, Nvidia RIVA TNT2 Ultra chip, 32MB of SDRAM, 300-MHz RAMDAC	n/a
9	**ATI Rage Fury Pro** 905/882-2600 www.ati.com	$179	87	4X AGP, ATI Rage 128 Pro GL chip, 32MB of SDRAM, 300-MHz RAMDAC	video-out, video capture, built-in hardware MPEG decoder
10	**Matrox Marvel G400-TV** 800/361-1408 www.matrox.com/mga	$299	86	4X AGP, Matrox G400 chip, 16MB of SGRAM, 300-MHz RAMDAC	video-out, two VGA ports, video capture, TV tuner, hardware MJPEG decoder

Best Buy ● Yes ○ No   n/a = not applicable   [1] Overall rating is based on performance (40%), features (30%), price (20%), and support policies (10%).

per second—twice the throughput of 2X AGP. Eight of the boards here already support 4X AGP, though they also function in an existing 2X AGP slot. Most of the latest games, however, don't use enough texture content to clog up a 2X AGP pipe. And because most graphics boards already have at least 16MB of RAM, 4X AGP may not deliver a discernable boost in performance over 2X AGP. Systems equipped with Intel's 820 chip set will be able to support the 4X AGP bus, but as we went to press, no 820-based PCs were available for review.

On the PCI front, card choices continue to dwindle. A few vendors still sell at least one similarly priced PCI graphics card in tandem with their AGP models. For the latest and greatest products, however, most companies offer only AGP. If you have a pre-Pentium II system or a PC with integrated graphics such as Intel's 810, a PCI card will be your only upgrade option.

TECHNOLOGICAL LEAPS

BOLSTERING GRAPHICS cards are two recent advancements: Chip clock speeds have been torqued to as high as 183 MHz, and dual rendering pipelines now enable those chips to process display information at the rate of two pixels per clock cycle

instead of one. Some graphics chips can now accelerate 3D effects such as transformation and lighting (the process of calculating the polygons and light values in a 3D scene), letting software developers add elements of realism in games without bogging down performance.

NVidia's GeForce 256 chip integrates transformation and lighting engines into a single processor, thereby relieving the CPU of those calculations. At press time, several manufacturers had introduced newer graphics chips, but could not provide products in time for evaluation. One of these, S3's Savage 2000 processor, like the GeForce, integrates the transformation and lighting engines within the chip. The catch with both Savage 2000– and GeForce 256–powered boards is that it may be difficult to find software (other than games) that can take advantage of their advanced features.

And 3dfx's forthcoming Voodoo4 and

VIDEO MANIA: ATI's Rage Fury Pro (left) lets you capture video, while Matrox's Millennium G400 32MB (right) also offers dual-monitor support.

Voodoo5 boards—which will be equipped with the company's new VSA-100 chip—promise to produce photorealistic effects such as motion blur in games that are developed to support such features. To carry out those effects, 3dfx will provide 32-bit rendering—a feature that its Voodoo3 cards lack, making them the only boards here ▶

Extra software features	Max 2D resolution @color depth/ refresh rate	Max 3D resolution @color depth/ refresh rate	Support policies				
			Warranty (years)	Toll-free tech support	Weekday support (hours)	Weekend support	Product info number
E-Color Colorific and 3Deep, DVD player	2048 x 1536@16-bit/ 60 Hz	2048 x 1536@16-bit/ 60 Hz	3	○	14	●	639
Interplay Kingpin: Life of Crime, UbiSoft Speed Busters, Xing DVD player	2048 x 1536@16-bit/ 60 Hz	2048 x 1536@16-bit/ 60 Hz	3	●	9.5	○	640
ELSA MainActor video editing tool	1920 x 1440@16-bit/ 75 Hz	1600 x 1200@16-bit/ 75 Hz	6	●	10	○	641
Micrografx Picture Publisher, Micrografx Simply 3D, Rage Software Expendable, DVD player	2048 x 1536@32-bit/ 70 Hz	2048 x 1536@32-bit/ 70 Hz	3	○	11	○	642
CrystalGraphics 3D Sensations for Presentations, Zoran SoftDVD player	1920 x 1440@32-bit/ 60 Hz	1920 x 1440@32-bit/ 60 Hz	5	○	14	●	643
GT Interactive Need for Speed III, GT Interactive Unreal	2048 x 1536@16-bit/ 75 Hz	1600 x 1200@16-bit/ 75 Hz	lifetime	●	12	●	644
E-Color Colorific and 3Deep, InterVideo Win DVD player	2048 x 1536@16-bit/ 60 Hz	2048 x 1536@16-bit/ 60 Hz	3	○	14	●	645
CyrstalGraphics 3D Sensations for Presentations, Zoran SoftDVD player, Fremont SE	2048 x 1536@16-bit/ 60 Hz	2048 x 1536@16-bit/ 60 Hz	5	○	14	●	646
Activision Heavy Gear 2, and GT Interactive Need for Speed IV: High Stakes	1920 x 1200@32-bit/ 85 Hz	1920 x 1200@32-bit/ 85 Hz	5	○	10	○	647
Avid Cinema, Ulead Photo Express, UbiSoft Tonic Trouble, Gremlin Interactive Wild Metal Country, Matrox DVD player	2048 x 1536@32-bit/ 70 Hz	2048 x 1536@16-bit/ 70 Hz	3	○	11	○	648

All products: 905

without that capability. And 3dfx says it will make its Voodoo5 boards with two to four VSA-100 chips and up to 128MB of RAM.

SWITCHING TEAMS

AS YOU SHOP around for your graphics speedster, you'll find a plethora of choices. But several companies are conspicuously absent. Competitive pressures and subpar performance have brought a few companies together and knocked out others. Intel recently purchased Real3D's assets and plans to use them to improve its 3D graphics technologies. Last October, card maker Guillemot acquired Hercules' assets, yet released graphics cards under Hercules' brand name. Other financial maneuvering in 1999 included chipmaker S3's purchase of boardmaker Diamond Multimedia, as well as chipmaker 3dfx's acquisition of board manufacturer STB Systems.

GET REAL

ALL OF THE graphics boards we reviewed accelerate 3D chores that can add realism to games. Bump mapping adds irregular surface textures to simulate the rivets in a sheet of metal, for example, or to imitate a bumpy surface on rocks or other natural objects. Environment-mapped bump mapping (which Matrox boards support) takes this approach one step further by producing realistic reflections and lighting effects on a 3D object regardless of the angle at which it's viewed. But these effects must be applied in the game in order for graphics cards to support them.

Diamond's Stealth III S540 Xtreme fully supports the DirectX Texture Compression (DXTC) effect, which produces realistic images by using a high level of texture information (the "skin" painted on objects to simulate photorealistic envi-

SIDELINE BANNERS: Creative Labs' 3D Blaster Annihilator (left) displayed fuzzy text on the banner ads, especially at a distance. In contrast, Diamond's Stealth III S540 Xtreme (right) produced crisp, readable detail on the banners.

TEST REPORT

AGP Boards Pump Out Eye-Popping 3D Images

High frame rates don't necessarily translate to better image quality.

	AGP BOARD	Unreal Tournament 3D gaming rates and image quality[1]			Quake 3 Arena 3D gaming rates and image quality[1]		
		800-by-600 resolution and 32-bit color depth	640-by-480 resolution and 16-bit color depth	Overall image quality score	800-by-600 resolution and 32-bit color depth	640-by-480 resolution and 16-bit color depth	Overall image quality score
1	Creative Labs 3D Blaster RIVA TNT2 Ultra*	45	48	Good	48	71	Good
2	Guillemot Maxi Gamer Xentor 32	45	49	Good	51	71	Excellent
3	ELSA Erazor III Pro	44	49	Good	44	70	Good
4	Matrox Millennium G400 32MB	45	48	Fair	40	45	Good
5	Diamond Stealth III S540 Xtreme	47[3]	50[3]	Fair[3]	39	68	Fair
6	3dfx Voodoo3 3000	49[4]	52[4]	Fair[4]	59[4]	71	Good
7	Creative Labs 3D Blaster Annihilator	38	48	Good	62	89	Good
8	Diamond Viper V770 Ultra	44	48	Good	37	52	Good
9	ATI Rage Fury Pro	47	50	Good	31	48	Fair
10	Matrox Marvel G400-TV	21	48	Fair	40	45	Good

*Best Buy

TEST PC WORLD CENTER HOW WE TEST We evaluated each graphics board on frame rate and image quality. We ran three passes to get an average frame rate on Quake 3 Arena and Unreal Tournament. For Need for Speed IV and Flight Simulator 2000, we took a spot frame rate while running each game demo. A jury panel evaluated the 3D visual quality in these games and derived an overall word score. We tested all boards in a Dell Dimension XPS T600 system with a 600-MHz Pentium III processor, 64MB of RAM, and a Windows 98 operating system. For all scores higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved. [1]Rates are measured in frames per second. [2]Gaming rates based on Need for Speed IV

ronments) without increasing memory requirements or system bus traffic.

Although the graphics boards we reviewed have the hardware support for these effects, software vendors have been slow to implement them in applications. A number of game developers are already starting to integrate these 3D effects into their next generation of games.

THE CHANGING GAME PLAN

MICROSOFT is reportedly working on an operating system that integrates 3D into the graphical user interface. For now, however, you can get Office plugins, such as Crystal-Graphics' Power-Plugs, that add 3D transition effects to PowerPoint presentations, as well as ViewPoint DataLabs' LiveArt, which lets you paste 3D clip art in Word and PowerPoint documents.

The brightest prospect for 3D business graphics may lie with Web sites for browsing through a virtual shop or to view prod-

More Reviews Online

We tested five other graphics boards that scored too low to make the chart. Visit www. pcworld.com/feb00/graphicsboards.
- 3dfx Velocity 100
- 3dfx Voodoo3 3500TV
- ATI All-In-Wonder 128
- ATI Xpert 128
- ATI Xpert 2000

ucts from any perspective. Lands End, purveyors of Your Personal Model, lets shoppers view catalog items on the body shape of their choice. But such sites are rare, partly because of limited bandwidth and a lack of solid standards. Lands End's site requires only modest 3D-rendering capabilities that don't use 3D hardware acceleration because the company doesn't want to exclude consumers lacking advanced hardware.

As streaming video becomes more popular on the Web, you might be tempted to upgrade your graphics card to improve your PC's video quality. But the biggest problem with streaming video is the quality of the video stream itself, not the quality of the graphics card. Snail-paced Internet bandwidth typically results in choppy, delayed, and pixelated video playback. We tested all the boards using RealNetworks' RealPlayer G2. Thanks to each card's hardware video scaling capability, all cards performed well in our AVI video playback test. But keep in mind that even the best graphics card can do very little to ameliorate the quality of extremely compressed images streamed at 176 by 132 resolution.

We also evaluated each card based on its ease of installation, its documentation, and the quality of its extra features. Our jury panel compared lighting and transparency effects, ambient lighting, backgrounds, textures, and level of detail. On the basis of all of these performance and usability criteria, we rank the ten best in the bunch.

Mitt Jones is a contributing editor for PC World. Joel Strauch is a San Francisco Bay Area freelance writer. Chart data produced by PC World Associate Editor Grace Aquino. Testing performed by Jeff Kuta and Elliott Kirschling of the PC World Test Center.

Need for Speed IV 3D gaming rates and Viper Racing image quality[2]		Flight Simulator 2000 3D gaming rates and image quality[1]	
800-by-600 resolution and 32-bit color depth[3]	Overall image quality score	1024-by-768 resolution and 32-bit color depth	Overall image quality score
26	Good	23	Good
25	Good	23	Good
28	Good	21	Good
16	Good	22	Good
26	Good	16	Fair
35[4]	Good	26[4]	Fair
15	Good	23	Fair
26	Good	21	Fair
30	Good	24	Good
20	Good	21	Good

because Viper Racing limits frame rates. [3]Uses Diamond's native S3 Metal application programming interface. [4]Set at its maximum color depth of 16 bit using 3dfx's native Glide API.

1 CREATIVE LABS 3D BLASTER RIVA TNT2 ULTRA

WHAT'S HOT: The $199 3D Blaster RIVA TNT2 Ultra delivers first-rate speed in games. In Quake 3 Arena, it churned out 48 frames per second running at 800-by-600 resolution and 32-bit color depth. In 16-bit mode, it jumped to nearly 71 fps. It also produced excellent image quality, though we saw some blurry textures on the walls while playing Unreal Tournament.

WHAT'S NOT: The 3D Blaster includes only E-Color's Colorific and 3Deep color calibration tools and the Creative Software MPEG-1 player (most other cards here come with a game and a DVD player). Although the 21-page manual describes the installation process well, you'll have to refer to the company's Web site for information about this card's utilities.

WHAT ELSE: The board's video-out functionality allows you to view games and other video on a television screen. What's more, the 3D Blaster TNT2 Ultra's utilities allow in-depth control over such settings as memory overclocking, the method of setting the graphics card's memory to run at a higher speed. One caveat: Excessive overclocking may overheat the chip or eventually your entire PC.
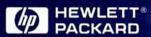
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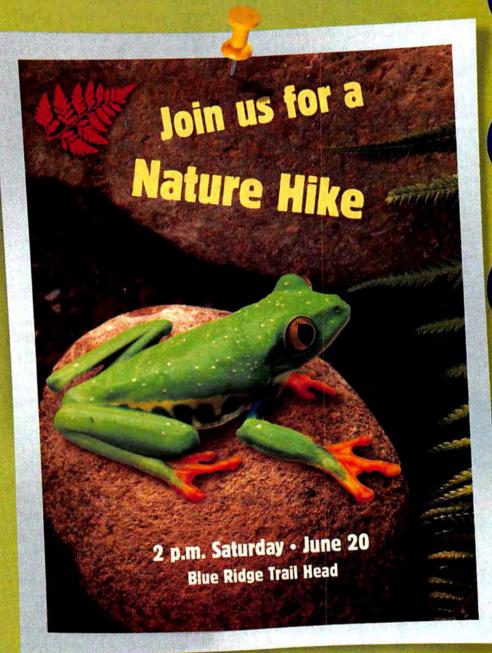
2 GUILLEMOT MAXI GAMER XENTOR 32

WHAT'S HOT: Well-tuned drivers help give the Xentor 32 terrific speed, turning in an above-average 51-frames-per-second score in Quake 3 Arena using 800-by-600 resolution and 32-bit color. It also displayed top graphics quality in Quake, with sharp backgrounds and crisp transparencies on effects such as smoke from the guns and a translucent, hovering bubble with a fading yellow cross inside it. In Unreal Tournament, it produced well-balanced lighting and realistic water effects.

WHAT'S NOT: The Xentor 32's DVD video playback was somewhat weak, show- ▶

ing jerkiness during action sequences, and we noticed slight pixelation along brightly-lit peripheries. Guillemot offers the fewest tech-support hours among all board makers here—just nine-and-a-half hours per weekday.

WHAT ELSE: Its video-out port lets you pipe games or other video from your PC onto a TV screen. It comes bundled with two games—UbiSoft's Speed Busters: American Highways and Interplay's Kingpin: Life of Crime.

BEST USE: This speedy card is great for game enthusiasts.

3 ELSA ERAZOR III PRO

WHAT'S HOT: The $169 ELSA Erazor III Pro is an all-around stellar performer. Equipped with NVidia's RIVA TNT2 Pro chip, it performs well in games, especially in Need for Speed, where it scrambled to 28 frames per second at a resolution of 800 by 600 when running at 32-bit color depth. In 16-bit mode in Quake, it achieved 70 fps. It had good color quality overall. The Erazor III Pro's bundled utilities allow separate overclocking settings for the graphics chip and the memory.

WHAT'S NOT: This board suffered from a few lackluster images in some of our 3D-gaming tests. The sky in Quake 3, for example, appeared too bright, and halos surrounded the clouds. We also noticed some pixelated water effects in Unreal Tournament. This board attempted to drive our test monitor to a refresh rate beyond the monitor's capabilities. To fix that, we had to select a non-Plug-and-Play monitor profile and disable the games' automatic refresh-rate changes. Unlike some other cards here, the Erazor III lacks DVD player software.

WHAT ELSE: It comes with ELSA's MainActor video-editing suite, though the card we tested lacked video capture and output. (Those options are available on ELSA's $149 Gloria Synergy.) The Erazor includes demo versions of 15 games, including Descent 3, Moto Racer 2, and Tomb Raider 3. Unlike most competitors, ELSA

provides toll-free technical support.

BEST USE: Solid performance and a reasonable price make it an attractive choice for game aficionados.

4 MATROX MILLENNIUM G400 32MB

WHAT'S HOT: Equipped with two 15-pin VGA connectors, the Millennium G400 lets you drive a second monitor or a TV (using an included cable adapter) without installing a second card; the two displays can run at separate resolutions and refresh rates. You can use this feature to show the same screen on two displays, or to create one big desktop so you can stretch a large spreadsheet across two screens. In our 3D image quality tests, this card rendered lighting

THE HEAT IS ON: Equipped with ultrafast processors from NVidia, ELSA'S Erazor III Pro and Creative Labs' 3D Blaster Annihilator both have a fan to help cool 'em off.

effects realistically, unlike some others.

WHAT'S NOT: The G400 slogged through a dismal 16 frames-per-second rate in Need for Speed IV. Although it's competitive in Quake 3 Arena at 32-bit color, when we dropped our calibrations to 16-bit, the card barely increased its speed. And although its dual-display feature is handy for some users, getting the card to drive a TV on the secondary connector required some tweaking, and Matrox's manual lacks in-depth instructions about this installation hiccup. Another quirk: Though Matrox's DVD player did an

excellent job with video playback, the software insisted on starting where it last left off when we reinserted our test titles.

WHAT ELSE: The Millennium's generous software bundle includes Micrografx's Picture Publisher 8 and Simply 3D, plus Rage Software's Expendable—a game with environmental scenes that displays the card's support for bump-mapping effects. Unlike many boards here, Matrox provides drivers for Windows 3.x.

BEST USE: This Matrox is a great pick if you need dual-monitor support and dabble occasionally in gaming.

5 DIAMOND STEALTH III S540 XTREME

WHAT'S HOT: At $129, the Stealth III S540 Xtreme is the lowest-priced card on our Top 10. It also made a decent showing in most of our games—it blasted through Quake 3 Arena at 68 frames per second when running at a resolution of 640 by 480 at 16-bit color.
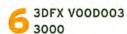
WHAT'S NOT: It mustered only 16 fps in Flight Simulator 2000—the worst showing in this game in the Top 10. It also produced a flickering line across the top edge of our screen and flat lighting in Unreal Tournament, and colors were faded in Quake. Diamond provides a scant six-page installation booklet devoid of illustrations. For the card to support 4X AGP-equipped PCs, you have to change jumper settings. Other cards we tested were capable of autodetecting 4X AGP and configuring themselves without the need to tinker with the jumpers.

WHAT ELSE: This board comes with utilities that let you adjust color and performance settings in games. The software can then automatically load your custom preferences when playing a game. You also get Zoran's SoftDVD player. Diamond offers any two of the following games via Chumbo.com for a shipping cost of $13: Asteroids, Fighter Squadron, Heretic II, Shogo Sin, or Starsiege.

BEST USE: The S540 Xtreme is a reasonable choice for budget-conscious buyers who occasionally play games. ▶

6 3DFX VOODOO3 3000

WHAT'S HOT: The $150 Voodoo3 3000 provides quick performance when driving 16-bit color. In Quake 3 Arena, it ran at 59 frames per second at 800-by-600 resolution—well above average. Plus, a video-out port lets you view graphics on a TV.

WHAT'S NOT: As with other Voodoo3-based boards, the 3000 can support only 16-bit color with 3D graphics (others here support 32-bit, which adds more realism to a scene). Although this card offers terrific speed, it generated flat lighting in Quake and poor detail on objects in Viper Racing. Using the card's Direct3D driver, it produced overly bright scenes and inaccurate colors in games. But by using 3dfx's Glide driver, it was capable of displaying much more realistic images.

WHAT ELSE: 3dfx throws in Electronic

What Every Graphics Card Owner Should Know

WHEN SHOPPING for a graphics card, the hardware always seems to be first priority. What chip set's inside? How much memory does it carry? But certain software factors should also affect your purchase decision.

DRIVER'S SEAT

USING THE LATEST DRIVER—the software that communicates between the application, the OS, and hardware—can boost a card's overall performance in office programs, as well as significantly improve the speed and image quality in 3D games.

Kathleen Maher, editor and analyst at the research firm Jon Peddie Associates, says that hardcore gamers typically pursue the most up-to-date drivers. Most board vendors update drivers to bolster performance and improve image quality. But the average user only needs a new driver when upgrading an OS, or if their monitor displays inaccurate colors when running a graphics program such as Photoshop.

In some cases, an injudicious update may harm your machine. You may experience a system crash or get error messages, Maher says.

THE LOWDOWN ON API

APPLICATION PROGRAMMING INTERFACES allow programmers to create games that take advantage of hardware features built into graphics accelerators—as long as the card also conforms to the API.

THE SOFTER SIDE

The two most commonly used APIs are Direct3D and OpenGL. Any graphics card will support these APIs. Another API, Glide, is currently supported only by 3dfx graphics boards. Aside from Unreal Tournament, few new games support Glide.

Gamers should consider using DirectX 7—it's free from Microsoft's site. Current versions of Windows and most DirectX games also include version 7, which offers enhanced 3D support and features. Peter Glaskowsky, a senior analyst for 3D and multimedia at Microprocessor Report, says developers are taking advantage of DirectX 7, but business users don't need it.

Microsoft is developing the Fahrenheit API. "If your card supports DirectX, then your card [also] supports Fahrenheit. It'll be another year before Fahrenheit talks directly to your hardware," Glaskowsky says.

OS HARDBALL

BUT THE MOST IMPORTANT software that your graphics card deals with is the OS itself. Josephine Mong, a research analyst at International Data Corporation, says, "most graphics cards support Windows 95, 98, and Windows NT." Very few support 3.x, and board vendors are still working on Windows 2000 drivers. If you use an NVidia-based card and run Linux or BeOS, you can get drivers from the NVidia site.

-Joel Strauch

BAD DRIVING: Drivers greatly affect image quality. With Direct3D drivers, the 3dfx Voodoo3 3000 generated inaccurate colors and overly bright scenes in Unreal Tournament (left). But with Glide drivers, the scene improved, producing realistic graphics and lighting effects (right).

Arts' Need for Speed III: Hot Pursuit, GT Interactive's Unreal (along with a coupon for a free copy of Unreal Tournament) and a demo of Interplay's Descent III Sol Ascent. Plus, 3dfx provides toll-free technical support and a lifetime warranty (more than any other board vendor here).

BEST USE: Pleasing speed and video-out connection suits it for most gamers.

7 CREATIVE LABS 3D BLASTER ANNIHILATOR

WHAT'S HOT: Equipped with NVidia's GeForce 256 chip, the Annihilator sprinted through Quake 3 at 62 frames per second when running at 800 by 600 resolution and 32-bit color. In 16-bit mode, it hit an astonishing 89 fps—by far the fastest Quake performer we've ever seen.

WHAT'S NOT: Quake aside, it ran Need for Speed IV: High Stakes at a disappointing 15 fps (slowest of all the graphics cards here), and the board showed some fuzzy images in Quake 3 and Flight Simulator 2000. Priced at $250, it's also one of the most expensive cards in this roundup. The 3D Blaster Annihilator comes with a skimpy software bundle, which includes E-Color's Colorific and 3Deep for color-calibrating your PC to your monitor, scanner, or printer.

WHAT ELSE: Creative Labs provides an above-average, 14 hours of weekday technical support, and it's available weekends (which most manufacturers don't offer).

BEST USE: This board would make a very expensive upgrade for hardcore gamers who are willing to pay extra for stellar Quake 3 performance.

8 DIAMOND VIPER V770 ULTRA

WHAT'S HOT: Diamond's Viper V770 Ultra shows vivid lighting effects and backgrounds when running Unreal Tournament or Quake 3 Arena. It also delivered terrific speed in Unreal Tournament.

WHAT'S NOT: This $199 card is too expensive considering the mediocre 3D-gaming performance it delivers. Compared to other boards equipped with NVidia's RIVA TNT2 Ultra chip, the Viper V770 Ultra ran sluggishly in Quake 3 Arena, posting only 37 frames per second in 32-bit mode. Unlike competitors, Diamond provides only a six-page unillustrated pamphlet as documentation.

WHAT ELSE: Diamond's easy-to-use InControl utilities automatically create a profile for each 3D game you run. You can then customize 3D options and color settings. And the card's software bundle includes a Zoran SoftDVD player and a PowerPoint graphics plug-in from CrystalGraphics. To prepare the card for a 4X AGP-equipped system, you must properly set the jumpers, as explained in a separate instruction sheet.

BEST USE: It plays an impressive game of Unreal Tournament, but other cards are speedier and somewhat less expensive.

9 ATI RAGE FURY PRO

WHAT'S HOT: ATI's Rage Fury Pro is affordable at $179. It performed expeditiously in most of our gaming tests. The card comes with useful video capabilities, including video-out, video capture, and hardware DVD decoding. It produced accurate detail in Viper Racing, and handled layered textures and lighting effects well in Unreal Tournament.

WHAT'S NOT: Although it performed quite well in other games, the Rage Fury Pro tanked in Quake 3 Arena, lumbering to only 31 frames per second in 32-bit mode. It displayed lackluster lighting effects in Quake 3, and it colored Quake's scenes with a purple and green tinge. ATI's video-editing tool is short on the features and flexibility that are necessary to put together a polished video; to do that requires a more advanced editing program, such as Avid Cinema, which comes bundled with Matrox's Marvel G400-TV.

WHAT ELSE: The company's extensive array of utilities and video-related tools, which include ATI's DVD player software, install automatically when you insert the bundled CD-ROM. The Rage Fury Pro also captured video smoothly. And it comes with a couple of games: Activision's Heavy Gear 2 and GT Interactive's Need for Speed IV.

BEST USE: If you want to push the threshold of your 3D-gaming experience and to try your hand at video editing, consider the ATI Rage Fury Pro for your next upgrade. ▶

10 MATROX MARVEL G400-TV

WHAT'S HOT: Easy-to-use video-capture and video-editing capabilities compensate for the Marvel G400-TV's high $299 price. The card's hardware Motion-JPEG compressor/decompressor enables fast, high-quality video capture and editing capabilities. The Marvel comes with the Avid Cinema video-editing program, as well as an external connector box that provides in and out ports for a TV antenna, audio, and video.

WHAT'S NOT: In our 3D-gaming tests, the Marvel performed sluggishly. In Unreal Tournament, for instance, it dragged its way through at just 21 frames per second in 32-bit mode, and it ran at 20 fps in Need for Speed IV. The G400-TV costs more than any other graphics card in our roundup, though none of the others come so well equipped. The Marvel's external connector device may contribute to cable clutter around your PC's workspace. The card supports only PCs running Windows 95 or Windows 98.

WHAT ELSE: Unlike most competitors, the Marvel lets you use a monitor and TV simultaneously with different resolutions and refresh rates. In addition to Avid Cinema, Matrox throws in its own DVD player and PC-VCR control software, plus Ulead's Photo Express image editor, and Gremlin Interactive's Wild Metal Country and UbiSoft's Tonic Trouble.

BEST USE: Though 3D gamers won't be impressed, the reasonably priced G400-TV provides an easy-to-use, full-featured solution for editing home videos. ∎

Inside Moves: Hardware That'll Take It to Overtime

WHEN CONSIDERING A GRAPHICS CARD, bear in mind expandability options, such as whether it supports digital monitors or dual displays. Choosing a board that makes it easy to add features you might want later can save you money and frustration in the long run.

If you are planning to upgrade to an LCD monitor, consider a graphics card that offers a digital connection. Most current LCD monitors accept analog signals to retain compatibility with standard graphics cards, but to accomplish that they must include their own analog-to-digital circuitry, which adds to the final cost. More important, you will get better image quality with a digital interface.

Unfortunately, buyers who want digital interface support will find few options, even among the graphics cards we tested. None of the boards comes with a digital connector as standard equipment, although Matrox's cards can accept a $59 daughtercard, the G400 Flat Panel, that adds a digital connector. ATI promises to offer a solution as well.

DOUBLE TEAMING

FOR THOSE WHO have desktop space to spare, running two displays can aid your productivity. With Windows 98's integrated support for multiple displays, you can stretch a spreadsheet across two monitors, for instance, or run your browser on one monitor while editing a document on the other. With Microsoft's Flight Simulator 2000, you might use a second display to give yourself two large views—one for the cockpit and the other for the ground beneath you. You can even run the two displays at different resolutions.

You can configure dual displays by installing two graphics cards in your system—two PCI cards or one PCI card and one AGP. Assuming the boards and their drivers were designed to work properly with Windows 98, the operating system will detect multiple display adapters and will automatically enable multiple monitor support.

HARDWARE FEATURES

However, Matrox Millennium G400's DualHead feature provides an even better solution: The board comes with two standard 15-pin VGA connectors and allows you to connect a second display without having to install a second graphics card. The board's utilities also simplify your display options. But not all Matrox boards work alike: Although the Matrox Marvel G400-TV (shown below at left) provides dual-monitor support, the second display is limited to a television monitor, which is not ideal for displaying text.

Five other cards in our Top 10 list (see page 154) provide a video-out connection, but this feature does not provide the same functionality as dual-display capability does. With video-out, you can't use the second display to stretch out your Windows desktop and applications: The monitor and television must display the same content. What's worse, the monitor must also use the same flickery 60-Hz refresh rate and the same low resolution as the television, which is usually only 640 by 480 or 800 by 600.
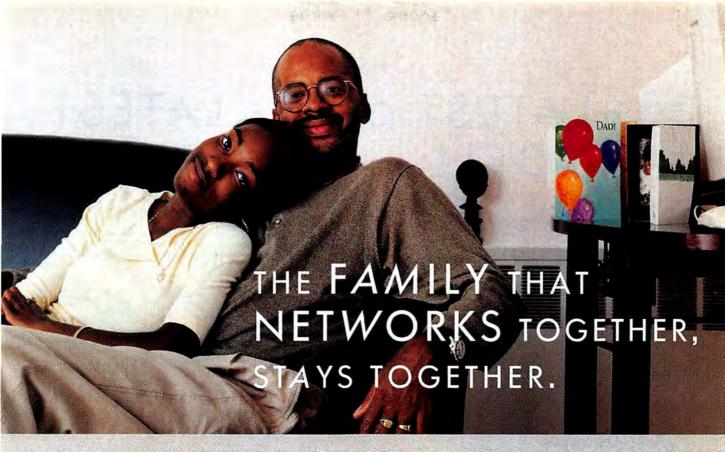
READY FOR PRIME TIME

GRAPHICS CARDS WITH TV-tuning capabilities can display standard television programming on a PC monitor. For some users this feature might come in handy: As you're typing an e-mail message or surfing the Web, you can have a small window on screen displaying the evening news or viewing your favorite sports broadcast. Certain TV tuners also provide VCR-like features, such as the capability to capture or "record" programming on your PC.

Three of the 15 boards we tested—the $249 3dfx Voodoo3 3500 TV, the $139 ATI All-in-Wonder 128, and the $299 Matrox Marvel G400-TV, which makes our Top 10 chart—come with TV tuners. The utilities from Matrox provide useful features, including the capability to search programs and notify you of words you specify.

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  Add $339 E•VALUE CODE: 03718-800132h

DELL® INSPIRON™ 3700 Notebook
Light Weight, Light Price
- Intel® Celeron™ Processor at 433MHz
- 12.1" SVGA Active Matrix Display ■ 32MB SDRAM
- 4.8GB⁴ Ultra ATA Hard Drive
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- 2X AGP 8MB ATI RAGE Mobility™-M1 3D Video
- 3D Positional Sound with Wavetable

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As low as $46/Mo., for 48 Mos.³³
E•VALUE CODE: **03718-800116**

Dell Recommended Upgrade:
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- Removable 6X Max⁴² Variable DVD-ROM Drive (Customer Installed)
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Mobile Desktop
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- *NEW* 15.4" SXGA TFT Active Matrix Display
- 128MB 100MHz SDRAM ■ *NEW* 12GB⁴ Ultra ATA Hard Drive (75GB Max⁴²)
- *NEW* Removable Combo 32X Max⁴⁷ Variable CD-ROM and Floppy Drive
- 2X AGP 8MB ATI RAGE Mobility™-P 3D Video
- 3D Positional Sound with Wavetable
- Internal PCI 56K Capable¹¹ V.90 Fax Modem

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As low as $97/Mo., for 48 Mos.³³
E•VALUE CODE: **03718-800135**

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- *NEW* HASBRO® Interactive Family Gaming 5-Pack²²
- harman/kardon Speakers
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- NEW SB Live! Value Digital with MusicMatch® Jukebox Enhanced²⁹
- NEW Harman Kardon HK-595 Surround Sound Speakers with Subwoofer
- V.90 56K Capable¹¹ PCI Telephony Modem for Windows
- 1-Year Dellnet℠ Internet Access¹⁴ Service with 20MB of Online Backup¹⁵

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E·VALUE CODE: 03718-500128

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- NEW Altec Lansing THX Certified ADA-885 Dolby Digital Speakers with Subwoofer
  Add $319 E·VALUE CODE: 03718-500132s

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- Altec Lansing ACS-340 Speakers with Subwoofer
- V.90 56K Capable¹¹ PCI Telephony Modem for Windows
- 1-Year Dellnet℠ Internet Access¹⁴ with 20MB of Online Backup¹⁵

$2299
As low as $63/Mo., for 48 Mos.²⁸
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- 48X Max⁶ Variable CD-ROM Drive
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- harman/kardon HK-195 Speakers
- V.90 56K Capable¹¹ PCI Telephony Modem for Windows

$1499
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  Add $229 E·VALUE CODE: 03718-500117v

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- Intel® 3D AGP Graphics ▪ 48X Max⁶ Variable CD-ROM Drive
- SoundBlaster 64V PCI Sound Card with MusicMatch® Jukebox Standard³⁰
- harman/kardon HK-195 Speakers
- V.90 56K Capable¹¹ PCI DataFax Modem for Windows

$1199
As low as $33/Mo., for 48 Mos.²⁸
E·VALUE CODE: 03718-500111
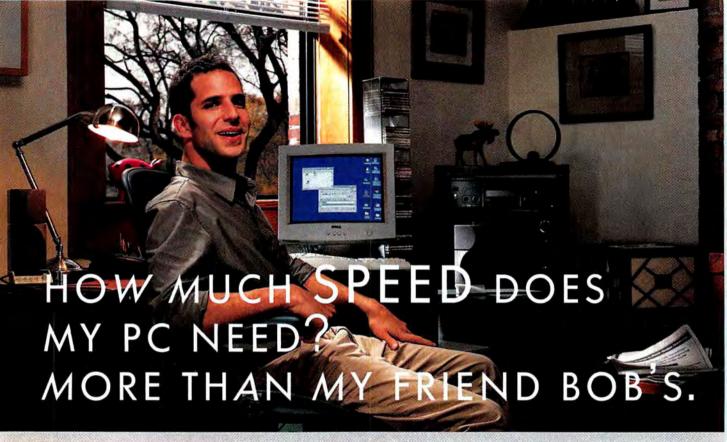
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- Altec Lansing ASC-340 Speakers with Subwoofer
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- *NEW* SB Live! Value Digital with MusicMatch® Jukebox Enhanced²⁰
- *NEW* Altec Lansing THX Certified ADA895 Dolby Digital Speakers with Subwoofer
- V.90 56K Capable¹¹ PCI Telephony Modem for Windows
- Microsoft® Works Suite 2000 with Money 2000 Basic
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- 1-Year Dellnet⁴⁰ Internet Access¹² Service with 20MB of Online Backup⁹
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is the web bad for your health?

The Internet is rife with health-related Web sites and online pharmacies. Don't trust your well-being to a cyberdoctor until you read this story.

BY BRAD GRIMES
WITH PETER J. STUART, M.D.

ILLUSTRATIONS BY
COCO MASUDA

"Please

turn your head to the side."

Point.

"Now cough."

Click.

"Again."

Click.

"Now take a deep breath and hold it."

<Enter>.

And then, faster than you can say Health Maintenance Organization, the check-up is over. But rather than sheepishly pulling on your clothes and driving home, you turn off your computer and make for the refrigerator. Can you imagine how many more people would actually go to the doctor if it were this easy?

Last year, an estimated 26 million Americans—the vast majority of them women—logged on to the growing number of health-related Web sites in search of answers to what ails them. Many found information that helped them make important decisions about their health care. Others received advice that was outdated, misleading, or even dangerous.

Like everything else online, health sites can be good or bad. The question is, how can you tell the difference?

PAGING DR. KOOP

WHEN FORMER U.S. Surgeon General Dr. C. Everett Koop forgoes a comfortable retirement to steer a Web start-up, you know health on the Internet is hot. Just as financial novices flocked to sites like The Motley Fool in search of hot stock tips, average folks with nary a recollection of Biology 101 are browsing Drkoop.com, WebMD, and other sites for medical advice. And that is cause for concern. In fact, the American Medical Association is so worried that patients might be getting bad information online that it has decided to launch its own health information site early this year.

The Web currently has more than 20,000 health-related sites, including online drugstores. Until recently, these sites went largely unmonitored, and a number of minor and major scandals ensued.

In August 1999, Dr. Sybil Biermann, a cancer specialist at the University of Michigan, published an article in a professional journal in which she raised questions about the accuracy of medical information on the Web. Dr. Biermann and her colleagues searched 371 Web sites for information about Ewing's sarcoma, a rare bone cancer that typically afflicts children and young adults. The study showed that roughly half the online material was irrelevant and 6 percent contained major errors.

In an interview with National Public Radio, Dr. Biermann described one such inaccuracy: "One site reported a survival rate of only 5 percent. Now this is a serious disease, but the survival rate has improved a lot over the last several

NO SURPRISE. The highly regarded Mayo Clinic also runs a top-notch Web site.

decades, and we're looking more at survival rates along the lines of 75 or 80 percent. One could only imagine what a patient who had Ewing's sarcoma, or the parents of a child who had Ewing's sarcoma, would think when they ran across a site like that."

Inaccuracy of information at health sites isn't the only cause for concern.

HEALTH SITES

SITE	Accessibility of information	Navigation	Search results	Community [1]	Disclaimer on front page
AllHealth.com * www.allhealth.com	Good	Good	Good	Good	●
AmericasDoctor.com www.americasdoctor.com	Fair	Fair	Good	Fair	○ [2]
Discovery Health www.discoveryhealth.com	Good	Good	Good	Fair	●
Drkoop.com www.drkoop.com	Good	Fair	Fair	Good	○
InteliHealth www.intelihealth.com	Fair	Poor	Good	Poor	●
Mayo Clinic Health Oasis * www.mayohealth.org	Good	Good	Good	n/a	○ [2]
Mediconsult.com www.mediconsult.com	Poor	Fair	Poor	Good	●
OnHealth www.onhealth.com	Good	Fair	Good	Fair	○ [2]
The Health Network www.thehealthnetwork.com	Fair	Fair	Poor	Poor	○ [2]
ThriveOnline www.thriveonline.com	Good	Good	Good	Good	○ [2]
WebMD my.webmd.com	Fair	Fair	Poor	Good	○ [2]

Sites are rated Good, Fair, or Poor.   * Recommended   ● Yes   ○ No   n/a = does not have this feature.
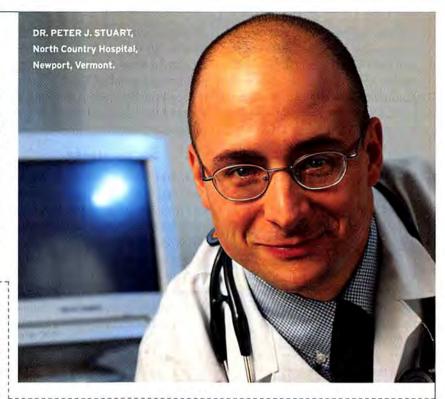
The Doctor Is In and Online

DR. PETER J. STUART,
North Country Hospital,
Newport, Vermont.

WE ASKED Dr. Peter J. Stuart to use the health sites we reviewed and tell us what he thought. Overall, he was pleased with what he found, but he had reservations. "The biggest dilemma facing health sites is the possibility that people may try to treat themselves based on advice they find online, despite posted disclaimers," he says. "People should use these sites to gather information to take back to their doctor. They are a springboard, not an answer."

Many sites hawk health-care products themselves or refer users to e-commerce partners and then take a cut of the sales. This practice raises questions about possible biases in the reporting. Last September, Dr. Koop came under fire from the *New York Times* for not disclosing receipt of commissions from companies featured on his namesake site. Dennis Upah, Drkoop.com's chief operating officer, says Koop and the site did nothing unethical and had changed the practice before the story even ran.

And finally, the entire online health field receives a black eye every time an online pharmacy prescribes drugs such as Viagra or Claritin without seeing the patient (see "Prescription for Trouble" for our experiences buying prescription drugs online). Last summer Congress heard testimony about online drug sales. And in October, the Missouri attorney general's office won the first court decision against an online pharmacy, ThePillBox.com, for selling prescription drugs illegally.

THE GOOD NEWS

NONE OF THIS is to say health sites are evil. In fact, the very doctors and experts who caution against misleading health information online often praise the Net for its potential to empower users, allowing them to make more informed decisions about their health care.

Gina Herring of Scottsdale, Arizona, was at a loss over her 3-year-old daughter Meghan's sleeping problems. Then someone recommended she read an article at OnHealth's Web site.

"I found an interview with an expert," Herring says. "Several parents asked questions, and [the expert] answered them in an intelligent and helpful manner. A couple of parents were even going through the same things we were." ▶

FEATURES COMPARISON

HON seal/ Truste seal	Runs health-related ads	Doctor Stuart's comments
O/O	●	Well organized; clearly written; accurate; up-to-date; good Q&A areas with answers in line with prevailing standards of care; encourages visitors to ask questions of their physician.
O/O	●	Confusing, does not always offer the information it claims to, one-on-one chat rooms with doctors answer very few questions, doctors' credentials unclear.
O/O	●	Good site, not too technical, helps patients figure out which questions to ask their doctor, comprehensive and easy to use, Ask the Doc section shows doctor's photo and credentials.
●/O	●	Good basic slant toward preventive medicine, distills relevant facts from boring professional articles, up-to-date information, authors' credentials not easily identifiable.
●/O	●	Comprehensive but too technical, cites studies without translating them into comprehensible English, difficult to navigate, some information outdated, doctors are well-pedigreed.
● ³/O	●	Great site, answers questions clearly and concisely, makes medical journal articles easily readable, well designed—not too busy or confusing.
●/●	O	Certain material likely to confuse users, some statements not necessarily based in fact, information not easy to find, articles not sufficiently distilled.
●/O	●	Helps visitors prevent primary health problems; discussions of disease somewhat deficient; lots of icon clicking; good Ask the Expert section; experts' credentials spelled out.
O/O	●	Easy to use and navigate, either too little or too much information about topics, experts' credentials not always apparent.
O/O	O	Many ways to retrieve similar information; multiple perspectives on issues; full descriptions of experts include their interests; good sections on fitness, nutrition, and sexuality.
●/●	O	Not as slick as others but extremely comprehensive, lists questions users can ask their own doctor to determine if a particular treatment is appropriate for them.

¹ User-to-user features such as message boards and chat rooms.   ² Link to a disclaimer on the front page.   ³ HON seal is not on the front page.

As she explored OnHealth, Herring found useful advice on other subjects important to her, including facts about another health concern. But she doesn't confine herself to one source of medical information. "The most help I received with Meghan," she says, "came from other parents on the alt.parenting.solutions newsgroup. There is just nothing like talking to someone who has been through what you are going through and who can give you firsthand advice on what works and what doesn't."

DOCTOR, GIVE ME THE NEWS

SO WHERE on the Web should you go for health-related information? And what should you keep in mind as you sift through the mountains of material? To answer these questions, we spent two months visiting a number of general health sites. We focused on the ones that researchers at Jupiter Communications, Media Metrix, and PC Data report are the most popular.

Though we can tell you what's good and bad about the way a site works, we're not medical experts. So we asked a doctor to evaluate the sites from a medical standpoint. Dr. Peter J. Stuart is an obstetrician/gynecologist and attending physician at North Country Hospital in Newport, Vermont.

At each site, we searched for specific information, paying attention to the timeliness and breadth of the search results. We also visited the sites' community centers where users discuss health topics and checked out any areas where doctors field questions.

We liked some of the sites very much. The Mayo Clinic Health Oasis (www.mayohealth.org) provides what we consider to be the most comprehensive and accessible health information online. However, it lacks the interactive tools—such as message boards and online chat sessions—found on another of our favorite sites, AllHealth.com. Another convenient

AllHealth.com feature, called My Health Records, lets registered members store encrypted medical records and prescription information online. The site will fax free copies of these records to members wherever they may need them—in the emergency room, for example.

DOCTOR MAYBE

SOME SITES we didn't like. For instance, AmericasDoctor.com has made a name for itself by providing visitors with free, one-on-one, real-time chats with doctors. But we were unimpressed.

Ironically, part of the problem stems from the site's ethical and responsible operation of these Ask the Doc online consultations. It clearly states that its online doctors cannot diagnose or prescribe treatment, only give general information. But this precaution makes the consultations no more useful than articles published on the site. What's more, users have no idea who is on the other end of the chat line. You never get a name or credentials. The site itself says simply that these health consultants are "board-certified or board-eligible physicians." The latter term doesn't mean the doctors aren't practicing, just that they haven't completed all their board tests. When we tried the live chat feature, we asked our physician if he or she was board-certified or board-eligible, but the doctor ignored the question completely.
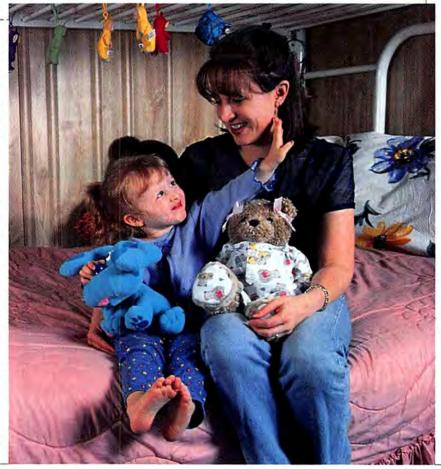
As you evaluate health sites on your own to determine where you want to turn, focus your attention on a few

Bedtime Story:

Gina Herring found plain-English advice on daughter Meghan's sleeping problems at OnHealth and in Internet newsgroups.

PHOTOGRAPH: CRAIG WELLS

general areas: ethics, content, community, and commerce. And try out several health sites before getting comfortable.

ETHICS: WHO CAN YOU TRUST?

IN GENERAL, large health sites like the ones we looked at are principled. They do not attempt to replace traditional doctor-patient care. The best sites make this point clear on their front page with language such as, "You should not rely on this information as a substitute for personal medical attention." Other sites have links to such a disclaimer, while ThriveOnline had no obvious disclaimer.

Despite efforts to disseminate information responsibly, health sites have come under fire from doctors' groups, consumers, and other watchdogs concerned that online health care be free from such questionable practices as conflicts of interest between sites and their sponsors.

Rebecca Farwell, general manager for OnHealth, welcomes the scrutiny. "Health online is different from entertainment, so sites have a greater responsibility," she says. "There's a certain amount of warranted concern when people are trying to discern good information from bad. But users are more savvy than the medical establishment lets on."

Until recently there has been little effort to establish ethical guidelines for these sites. In October, Dr. Koop called on competitors to join him in establishing a code of conduct. The following month, an alliance of health Web sites calling itself Health Internet Ethics, or Hi-Ethics, announced that it would formulate guidelines to evaluate the reliability of online health information and separate ads and information more clearly.

In the meantime, the nonprofit group Health on the Net Foundation in Geneva, Switzerland, has developed a seal of approval for health sites that choose to submit to its scrutiny. The HON Foundation's eight principles require, among other conditions, that health advice be given only by qualified professionals (or if not, that the deviation be disclosed), that information be sourced and dated, and that advertising be obvious and separate from editorial content. ▶

Prescription for Trouble

OUR REPORTER combs the Web for quick fixes—they shouldn't be this easy.

Sift through the spam in your in-box for the past few months, and you're likely to come across something like this:

"Online Viagra prescriptions! Fast! Inexpensive! Totally Confidential!"

The scary part—it's true. Buying certain types of prescription drugs online is ridiculously easy, as we confirmed while trolling a handful of the hundreds of Web sites hawking such services.

■ **It's simple:** You complete an online medical questionnaire, provide a valid credit card number, and place your order. The cyberdrugstore forwards your digital order form to an affiliated physician. Once the doc approves the prescription, your order is filled and delivered to your door, usually within 48 to 72 hours.

■ **How can this be?** Believe it or not, with certain types of drugs, it's perfectly legal for a doctor to issue a prescription to a patient whom he or she has never seen. These medicines are considered "lifestyle drugs," and they're meant to improve quality of life rather than cure disease or treat symptoms. Examples include Viagra; Claritin, for allergies; Celebrex, for arthritis pain; and Propecia, for male baldness. So long as nothing in your medical questionnaire presents a problem, these outfits take you at your word and issue the prescription. But we found that even if your questionnaire reveals you're not a good candidate for a drug, you may still be able to get it at certain sites.

We placed orders for Viagra, Claritin, and Celebrex at seven Web sites that we found in a Yahoo search. We skipped the trusted names like CVS and Drugstore.com and shopped at sites we'd never heard of but which promised great deals.

■ **First the good news:** All deliveries came exactly as ordered, the correct dosages and quantities. We even had a pharmacist verify that the drugs were real, and prices were comparable with what you'd find in a real-world drug store.

■ **The bad news:** Sadly, several of our prescription drugs came with surprisingly little documentation—in more than one case, just a half-page photocopy of directions and precautions. One site did exactly what we were afraid of: It delivered our Viagra order even though we indicated in the medical form that our "patient" had a history of ulcers. The medical fact is, patients with active stomach ulcers are generally advised not to take Viagra.

So what's being done to prevent these dangerous lapses? Precious little. In testimony before a House of Representatives subcommittee last July, the American Medical Association representative Dr. Herman I. Abromowitz testified, "Every day, patients are endangered when they are permitted to receive prescription medications via the Internet without adherence to proper safeguards that ensure good medical practice."

Some states have attempted to block online sales, but as with so many Internet issues—online gambling, for example—no laws apply directly to the situation. As of now, there is little to prevent any Web pharmacy from selling drugs to anyone who's willing to pony up the cash. In our experience, it's a fact that these drugs can get into the wrong hands. You'd best consult a real doctor before getting any prescription. —Glenn McDonald

Six of the major sites we visited carried the HONcode seal, including Drkoop.com, Mayo Clinic Health Oasis, OnHealth, and WebMD. Those that do not have the seal include AllHealth.com, AmericasDoctor.com, and ThriveOnline.

Health sites must also protect visitors' privacy. While all the sites we used have privacy policies, only two—WebMD and Mediconsult.com—had their policies reviewed and audited by Truste (www.truste.org), a group that attempts to monitor the policies of Web sites.

Should you avoid a health site that does not carry the HON or Truste logo? Not necessarily. We liked AllHealth.com and ThriveOnline, and neither site carries the seals. However, such logos demonstrate that an independent group has at least audited the site to ensure that it measures up to some standards.

CONTENT:
QUALITY OR QUANTITY?

THE BEST WAY for a health site to inspire trust is by publishing reliable content. We're not impressed when a search pulls up 536 matches, as WebMD did when we searched on *peptic ulcer*. We just want clearly presented, relevant, and timely information (which we didn't get a lot of from WebMD on the topic of peptic ulcers).

Several sites make important medical advice easily readable. One of the best is Drkoop.com, which distills esoteric professional articles to their key facts. The site's columns, including those by ▶

THE HEALTH NETWORK has links to articles that appear on its sponsor's site.

Tips for Healthy Living Online

SURFING FOR HEALTH INFORMATION is not the same as surfing for good deals on airline tickets or home electronics. This is your well-being we're talking about. So as you sort through the thousands of health-related Web sites, keep these precautions in mind.

■ **Get referrals.** Health-related newsgroups are often a good source for health sites. Start at Deja.com and search on words related to your health concern, then read what other people have to say and ask them for recommendations.

■ **Shop around.** Health sites will try to keep your attention—for instance, by letting you customize their home page. But don't get too comfy. In cyberspace it's easy to find a second or third opinion, so you should. Research various sites to form a more complete picture, and gather all the info you can.

■ **Ask questions.** If you're having trouble making sense of something at a health site, contact the site. Shoot an e-mail or look for a phone number. If you can't find a phone number, be wary about using that site.

■ **Check the date.** Like milk, some medical information goes bad over time as new research becomes available. Look for two dates on any health article you see online: the date it was published and the date it was last reviewed for accuracy. Few sites disclose the latter, so if the original publication date was four or more years ago, consider the information suspect and start looking for more up-to-date articles.

■ **Chat with care.** In chat rooms and online discussion groups, ask yourself who the other participants are. Be careful of drug companies hawking their wares, doctors promoting a procedure, or plain old loonies extolling the curing power of your toenails. If possible, learn from the Web site how it screens postings. And when you choose a screen name for chatting, don't choose one that might hint at your real identity.

■ **Check credentials.** Most of the big sites have an Ask the Doc or Ask the Experts section where you can post questions. Make sure you know who is dispensing the answers and what their credentials are. If this information isn't stated clearly, ask for it, or consider the advice suspect until you get a second opinion.

■ **Print it out.** When you find an article you think pertains to your specific condition, hit the print button and take it to your doctor at your next visit.

■ **Just say no.** Although it might save you embarrassment to buy Viagra or another prescription drug anonymously from a little-known site that merely requires you fill out a form, don't cut any corners. Remember, many people taking Viagra encounter side effects associated with preexisting conditions. You could be one of them. Always consult with a real live doctor before medicating.

■ **Stick with names you trust.** Take the time to find two or three sites where you're comfortable and you get good advice. Then stay with them. And if you're buying supplements, prescription or nonprescription drugs, or other health supplies, look for the pharmacy sites with big names like Drugstore.com, PlanetRX, and CVS.

■ **Go to a specialist.** We looked at general consumer sites that try to cover all your healthcare needs. But sometimes it's best to get in-depth information from a site that specializes in a particular area that interests you. For instance, if you want information about cancer, it's probably best to visit sites for the American Cancer Society (www.cancer.org) or the National Cancer Institute (www.nci.nih.gov). —Brad Grimes

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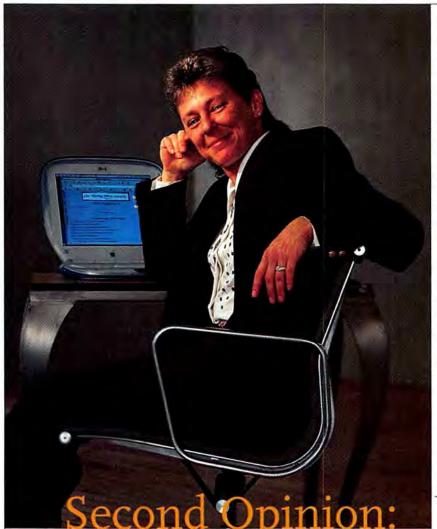
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fibrositis back in the days when they believed it to be an inflammatory disease, which it is not," she says. Despite this criticism, Porter still likes the site. "Drkoop.com uses real people to write its 'A Day in My Life' articles, including one about fibromyalgia," she explains.

HEALTH INFO GOES BAD

INFORMATION, whether prepared by the site or an outside source, should always be dated so you can tell how current it is. The source and the source's credentials should be prominently displayed.

The sites we visited generally post the date the piece was originally prepared. Some also list the date it was last reviewed (often the same date). Some, such as OnHealth, even post the publication dates alongside the search results so you can zero in on the latest information. The question—how old is too old?

At some sites, the information was disappointingly dated. ThriveOnline had some articles that went back to 1993. And in a search at WebMD, the first match was a piece from 1991. Other sites stay more current. Drkoop.com's Dennis Upah says everything at his site is reviewed annually; some topics are reviewed quarterly.

Second Opinion:

Jackie Porter takes issue with Drkoop.com's definition of fibromyalgia, a disease she suffers from—but she still finds the site useful.

SUPPORT NET

THE COMMUNITY sections of health sites, which provide user-to-user features, are ideal for sharing ideas with people like yourself and finding support. Some have chats where you can question specialists.

Dr. Koop himself and ABC News medical correspondent Dr. Nancy Snyderman, are also informative and readable.

We were surprised at how accessible the information on Mayo Clinic Health Oasis is, considering that Mayo Clinic is chock-full of doctors, not editors. InteliHealth, which also originates at a bastion of medicine—Johns Hopkins University and Health System—is not as easy for the average user to comprehend.

Many sites publish articles from outside sources. Discovery Health, which receives much of its content from InteliHealth, also takes information from sources like the National Institutes of Health. We found some of the best material at

OnHealth; it came from the Cleveland Clinic, one of several hospitals that provide OnHealth with information on specific conditions.

Not everything you read at many sites is the definitive word on health and medicine. So always research multiple sites, and never rely on any single article.

Jackie Porter of Toronto suffers from fibromyalgia, a syndrome characterized by chronic pain in muscles, ligaments, and tendons. Porter takes issue with Drkoop.com's description of fibromyalgia which the site licenses from World Book Encyclopedia.

"It says 'fibromyalgia is also known as fibrositis.' Fibro used to be referred to as

vide user-to-user features, are ideal for sharing ideas with people like yourself and finding support. Some have chats where you can question specialists.

At OnHealth, such chats happen daily. Other sites also host regular support chats, usually moderated by a frequent user whom the site has screened. Each week Drkoop.com hosts over 130 chats on topics from sleeping disorders to agoraphobia. Upah likens these chats to a hospital cafeteria, not a doctor's office. The chat leaders steer participants toward information but do not try to diagnose, suggest treatment, or argue with users. "The Internet should not be used to practice medicine," says Upah.

Not everyone with a specific ailment can be online when their topic comes up, but the transcripts from these chat rooms are often excellent sources of ideas. Andrea Frankel of Nevada City, California, says she doesn't "do chats," but she finds the transcripts at WebMD helpful. Recently she read about a drug to help with her asthma and learned that

help with migraines could be a beneficial side effect. She then combed the Web for people who'd used the drug.

The feedback she received was positive, so she asked her doctor for a prescription. "It's wonderful stuff," she says. "I can now breathe deeply." And, she adds, she can drive on the freeway without getting migraines from the car fumes.

Discussion groups where people post messages are also good sources of support. The sites normally moderate them, and users must adhere to certain rules, such as no cursing and no personal attacks.

Ian Sutcliffe, president of Mediconsult.com, says that his site takes moderating discussion groups a step further. Every message is edited before it is posted. He says criticism of a doctor, if the doctor is named, is not allowed. "We would send that person a note asking if they would repost the message without the doctor's name," says Sutcliffe. As it happens, the company operates sites for doctors, but Sutcliffe insists Mediconsult.com is not trying to protect the reputations of its other customers.

In addition, Sutcliffe says, his moderators edit posts for medical content. He

describes one post that never saw the light of day: "A woman came on with breast cancer and came back [two months later] and said she'd been drinking her own urine and the breast cancer was gone." Sutcliffe says that the site did not post the message because it was protecting users from unproven and potentially dangerous advice.

COMMERCE BREEDS CONFLICTS

IN A PRESS RELEASE last spring, Jupiter Communications analyst David Restrepo said of health sites, "Commerce is where the dollars are."

For better or worse, he's right. Every site we looked at—except Mediconsult.com, ThriveOnline, and WebMD—runs banner ads for products and services its articles may discuss. Commercials don't necessarily imply misconduct, as long as the advertising doesn't influence the editorial content. Each site we spoke to insisted its ad and edit departments are kept separate. Every site we visited except ThriveOnline also sells products or points visitors to e-commerce partners.

Finally, sponsorship is a popular element of health sites. Drkoop.com's allergies section is sponsored by Claritin, the allergy medication; LaserVision Center sponsors the Mediconsult.com eye care center; and much of The Health Network is sponsored by Tylenol. Again, each site insists that money does not influence editorial, but even the appearance of influence can taint a site and make it seem less reliable.

At The Health Network, the line between Tylenol's sponsorship and editorial content sometimes blurs. On certain pages that displayed a "Sponsored by Tylenol" logo, we clicked on links to pain-related articles, expecting to find editorial content. Instead, we found ourselves on the Tylenol Web site. Anne Russell,

The Health Network's editorial director, says she believes that the labeling is clear enough. But if we were confused more than once, other visitors might be similarly thrown off.

PROGNOSIS

FOR NOW, going to the doctor without actually seeing a doctor is still just a fantasy. But the Web can play a major role in making you a smarter, more informed patient. And despite some ethical dilemmas and the occasional shortcoming, the major health sites are excellent resources for learning about health issues and even for help in making life-and-death decisions.

But remember to explore your options as you would when dealing with any other media outlet. Learn the strengths, weaknesses, and potential biases of each site. Take the time to discover where you feel most comfortable, then make that location your home base.

Just as you would with a real live doctor, don't be satisfied with a single opin-

ion. Gather as much relevant information as you can from a variety of different sources. And of course, don't forget to make an appointment for your annual check-up.

Brad Grimes is an executive editor for PC World. *Dr. Peter J. Stuart is an attending physician at North Country Hospital in Newport, Vermont. Glenn McDonald is a freelance writer in San Francisco.* ∎

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IJ300 Printer	$99.99
A900 Printer	$349.99
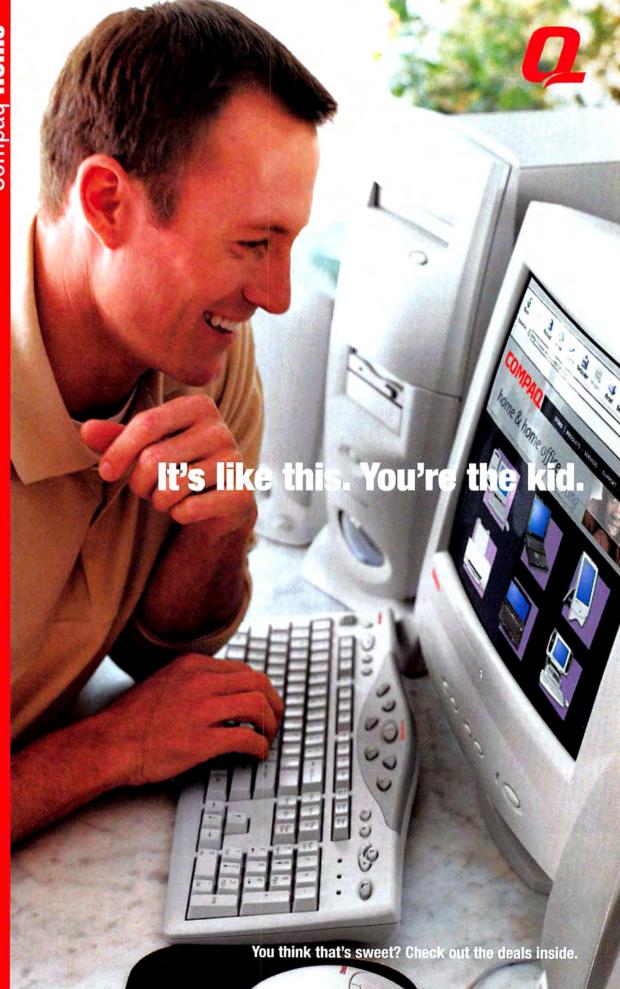
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Crucial Technology: Meeting the RAM Needs of Netizens

www.crucial.com

Desktop technology never stands still. Neither do the needs and desires of the 'Net-connected users. That's why PC upgrades—especially additional RAM—have become an essential aspect of Netizenship.

So where can you go on the Web to find the best deals on quality RAM?

Micron Technology division Crucial Technology, Meridian, Idaho, believes it has the answer. The company's Web site, http://www.crucial.com, is the only place on the Web where consumers can buy DRAM upgrades for their PCs directly from the manufacturer. In fact, Micron is the largest DRAM manufacturer in the country and one of the top three in the world. In addition to providing memory modules for their own highly respected brand, Micron Technology is also a top supplier for other industry leaders, including Compaq, Dell, Gateway, HP, and IBM.

That makes Crucial a very different source from the typical reseller operation, which either slaps someone else's chip on a board, or simply re-labels pre-assembled modules with their own logo.

"With our approach, the customer is assured of getting the same quality as the PC manufacturers themselves demand," states Rafe VanDenBerg, Crucial marketing director. "That's something you can't find anywhere else on the Web."

VanDenBerg points out that such quality has become increasingly critical as processor speeds increase, since manufacturing tolerances have become proportionally tighter. "The new chipsets and processors have critical timing and circuit requirements that mandate precision manufacturing and design," he observes. "Since Micron works directly with the top PC manufacturers, we can assure our customers that our upgrades match the exacting specifications they need to boost their system performance."

A Guide to Memory

To further ensure that customers get the right memory upgrade for their needs, Crucial's site provides even the novice users all the information they need to know about memory and upgrading their systems. The site is most notable for its unique Memory Selector, which guides customers through a simple step-by-step interface to find the exact memory they need for nearly 8,000 different desktops, notebooks, servers, printers, and routers. The site also provides a complete reference library on memory technology, manufacturing processes, and upgrade considerations. "We've really created one of the most informative and comprehensive sites on the Web related to memory," declares VanDenBerg. "Even if you're not buying from us, it's a very educational place to browse."

In addition to maintaining its full-function Web site, Crucial—which has been selling online since 1996—offers toll-free phone, fax, and e-mail ordering. Same-day shipping and overnight delivery are also available. Consumers get free technical support and a limited lifetime warranty on all products, as well as a full 30-day money back guarantee.

Just as important as the quality and service Crucial offers are its discounts for ordering online. Consumers can now save an additional 10% by ordering through Crucial.com. Crucial also provides additional value to its enterprise customers through its online purchase programs.

"With memory pricing increasing, our online discounts provide an even greater savings opportunity for our customers," says VanDenBerg. "And the more business we conduct online, the more savings we'll be able to pass on to our customers."

> **"With our approach, the customer is assured of getting the same quality as the PC manufacturers themselves demand."**
>
> Rafe VanDenBerg, marketing director, Crucial Technology

The Ultimate Streaming
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Of all the cabs you will take in your lifetime, Jon Barnes guarantees that his "Ultimate Taxi" is the one you will never forget. While you cruise about picturesque Aspen, Colo. in the back of his 1978 Checker cab, Barnes puts on a light, laser, music, and magic show that Penn Jillette (of Penn and Teller) calls "one of the greatest pieces of performance art I have ever seen." Jerry Seinfeld, Clint Eastwood, and Michael Douglas are also among the Ultimate Taxi's more famous fares.

Barnes also runs a wireless Web site from the front seat of his cab: ultimatetaxi.com. The entrepreneurial cabby streams live video to as many as 17,000 visitors weekly with software from San Diego, Calif.-based Inetcam, Inc. The software's capabilities, he says, are unparalleled. "I have really been blown away by Inetcam," Barnes says. "It helps me to put out video as good as what you see anywhere else. It's amazing that with Inetcam, my customers can get in the car and see that they have been immediately transported to the Web."

INETCAM
Live...From Anywhere!

Inetcam's server software runs on Windows 95, 98, and NT platforms. Just one copy of the software can support streaming video from as many as four different sources, without the need for plug-ins or remote viewing software on the client side. Inetcam's Java applets support any browser on any platform—even UNIX workstations.

Before he bought Inetcam, Barnes used other products to grab JPEG's from his video camera, "but I couldn't do anything that approached what Inetcam does for me," he

> **One copy of Inetcam's software can support streaming video from as many as four different sources, without the need for plug-ins or remote viewing software on the client side.**

says. "It still feels weird not having to FTP upload still images to my site."

Barnes is eagerly awaiting Inetcam's audio module, which is scheduled for release in March 2000. The module is currently being tested to make sure its underlying technology meets Inetcam's exacting standards. Inetcam is also developing a unique screen capture program (also scheduled for release in March) that uses the same simple interface as its video software. It will allow you to capture any part of your screen and transmit the image over the Internet in real time. The screen capture program should be especially valuable for users in customer service and employee training. Imagine being able to support your customers or instruct users by sending them live images of only those screen areas you select!

Both new Inetcam products can function either in concert with the video server software or on their own. Viewers will need no client software to receive Inetcam media. "Our intention is always that the viewer will not need a plug-in or special software," says Tien Nguyen, Inetcam's director of research and development.

With the help of streaming audio from Inetcam, Barnes intends to further push the boundaries of broadcasting in the digital age. "This stuff has the potential to revolutionize the broadcasting business," he says. "It won't be long before I am able to put together a weekly show live on the Web and on television—the only one in the world live from a moving car!"

Live...from Anywhere!

PC WORLD

TOP 100

Pick Your Processor:

Intel and AMD
Duke It Out
for Speed Supremacy

Edited by Michelle
Campanale-Surkan
and Stephen Lee

**POWERED BY INTEL'S new Pentium III
CPU based on the Coppermine design,
Micron's Millennia Max 733 is superfast.**

INTEL ASSERTS THAT Athlon hoopla is nothing more than media-generated hype, and that Intel remains king of the CPU hill. But AMD's Athlon has become a serious contender for the throne, vying with Intel's offerings in both price and performance. And with competition comes progress, so consumers can expect to profit from the rise of AMD.

LAND SPEED RECORD

INTEL'S LATEST SHOT across AMD's bow is its new Pentium III processor, formerly code-named Coppermine. This chip features 256KB of integrated L2 cache and "advanced transfer cache," in Intel-speak, which performs much faster than standard L2 cache. As a result, Intel claims, the PIII based on the Coppermine design offers significantly higher overall performance.

This month, the first of these new PIII systems hit our Top 10 PCs charts, and the results seem to support Intel's claim. In sixth place on our *Top 10 Power PCs* chart, the Micron Millennia Max 733, roared to a 309 on PC WorldBench 98, the highest score yet for a Windows 98 machine. Meanwhile, the Dell Dimension T700r, with a 700-MHz Pentium III running Windows NT, posted a 373, the highest NT score ever on our benchmarks.

Besides carrying new PIII CPUs, two of the Microns we tested this month ship with NVidia's new GeForce 256 graphics card. Dubbed a GPU, or graphics processing unit, the GeForce handles much of the transformation and lighting effects previously performed by the CPU.

You'll also find new 450-, 500-, and 550-MHz PIIIs in the latest line of notebook PCs. These processors provide serious portable punch. Check out our *Top 15 Notebook PCs* section to see which models made the most of Intel inside.

PACKARD BELL PACKS IT UP

THOUGH YOU'LL soon see systems from every major manufacturer packing the new PIII, you won't see any carrying the Packard Bell name. NEC, the parent com-pany recently shut down its North American Packard Bell home consumer division, and expects the Packard Bell brand (along with 1500 jobs) to vanish by early 2000. Since its 1986 inception, Packard Bell enjoyed considerable success in the low-end PC market. In recent years, however, Packard Bell was undercut on pricing by other PC makers, and consumers reported a high incidence of problems due to low-quality components.

GOOD TO GO

MEANWHILE, Dell's new Inspiron 3700 C466GT, with its flashy Tahoe Blue case, debuts at number one on the midrange segment of our *Top 15 Notebook PCs* chart. Among power portables, another Inspiron, the 7500 R500VT, beats all comers (and many desktops) with a PC WorldBench 98 score of 236. Nonetheless, Gateway captures the number one spot on the power side of the notebooks chart with its

PIII POWER: Coppermine's in the Dell Dimension 7500 R500VT.

Solo 9300LS, a PIII-450 system with a 15-inch screen for $2870—over $1200 less than the Dell Inspiron 7500 R500VT.

CLASH OF THE PRINTER TITANS

WHILE INTEL AND AMD battle for the processor prize, three ink jet printer makers struggle for supremacy on our *Top 10 Printers* chart. HP, Lexmark, and Epson have three models each on our list, while Canon—once a star in the ink jet world—lands just one model in the ranking. The two top printers remain HPs, but this month Epson makes the biggest news. The $229 Epson Stylus Color 760 lands at number seven, while its sibling, the $279 Stylus Color 860, debuts at number ten. Both produce realistic photos on glossy paper—with framable results.

Grace Aquino, Cameron Heffernan, Mick Lockey, Kalai Murugesan, Karen Silver, and Alan Stafford contributed to the Top 100 *this month. Testing was performed by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeff Kuta, and Sean Tieu of the PC World Test Center. See page 14 for contact information.* ▶

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following information should answer most of them.

How do the charts work? Each month we test a large number of PCs, printers, scanners, monitors, graphics boards, and modems, and compare them with previously reviewed products. Only the best products land on the Top 10 charts, which are refreshed monthly. System configurations are shown as tested. Vendors may have since changed components.

What does the overall rating mean? This 100-point scale reflects results from our hands-on evaluations and performance tests. A score in the 90s is exceptional, while one in the 70s is above average.

What does the PC WorldBench 98 score mean? It's a measure of how fast a PC can run a mix of common business applications as compared 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.

PHOTOGRAPHS: MARC SIMON

TOP 10 POWER PCs

	SYSTEM: $2000 AND OVER	Month tested	★ Overall rating	Street price (11/5/99)	PC WorldBench 98 performance score [1]		Base configuration
1	**Dell Dimension XPS T700r** 800/388-8542 www.dell.com	NEW	81	**Expensive:** $2659	Outstanding	373	Good: Pentium III-700, 128MB of RAM, 256KB L2 cache, 20.4GB hard drive, 17-inch monitor, Windows NT 4.0
2	**CyberMax Enthusiast A700W** 800/437-4596 www.cybermaxpc.com	NEW	79	**Average:** $2299	Very good	288	Outstanding: AMD Athlon-700, 128MB of RAM, 512KB L2 cache, 27.3GB hard drive, 19-inch monitor, Windows 98 SE
3	Compaq Prosignia 330 PIII-550 800/345-1518 www.compaq.com	Sept 99	76	**Inexpensive:** $2111	Good	246	Very good: Pentium III-550, 128MB of RAM, 512KB L2 cache, 20GB hard drive, 19-inch monitor, Windows 98
4	Quantex SM600 SE 800/896-4898 www.quantex.com	Nov 99	76	**Very inexpensive:** $2099	Good	260	Very good: Pentium III-600, 128MB of RAM, 512KB L2 cache, 18GB hard drive, 19-inch monitor, Windows 98
5	IBM PC 300PL 800/426-7255 www.ibm.com/pc	Aug 99	76	**Very inexpensive:** $2081	Satisfactory	232	Good: Pentium III-500, 128MB of RAM, 512KB L2 cache, 13GB hard drive, 19-inch monitor, Windows 98
6	Micron Millennia Max 600 800/642-7667 www.micronpc.com	NEW	75	**Average:** $2301	Good	254	Good: Pentium III-600, 128MB of RAM, 512KB L2 cache, 13.6GB hard drive, 19-inch monitor, Windows 98 SE
7	Polywell Poly 800K7-650 800/999-1278 www.polywell.com	Dec 99	74	**Average:** $2295	Very good	277	Outstanding: AMD Athlon-650, 128MB of RAM, 512KB L2 cache, 27GB hard drive, 19-inch monitor, Windows 98 SE
8	Axis Systems Orion 100A DVD 800/378-9014 www.axissys.com	Dec 99	73	**Inexpensive:** $2207	Satisfactory	241	Outstanding: Pentium III-550, 256MB of RAM, 512KB L2 cache, 22GB hard drive, 19-inch monitor, Windows 98 SE
9	Micron Millennia Max 733 800/642-7667 www.micronpc.com	NEW	72	**Expensive:** $2769	Outstanding	309	Very good: Pentium III-733, 128MB of RAM, 256KB L2 cache, 20.5GB hard drive, 19-inch monitor, Windows 98 SE
10	Sys Performance 600A 800/613-9963 www.sys.com	Nov 99	72	**Average:** $2299	Very good	345	Good: AMD Athlon-600, 128MB of RAM, 512KB L2 cache, two 9.1GB hard drives, 17-inch monitor, Windows NT 4.0

Best Buy | Percent of overall rating ▶ | Price: 15 percent | Performance: 20 percent | Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 187.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

[3] For more information about all of the products listed in this table, select number 901 on the product information card or visit www.pcworld.com/productinfo.

DRIVEN BY BEEFIER NEW processors from AMD and Intel, systems on this month's power chart live life in the fast lane. The Dell Dimension XPS 700r, powered by a Pentium III-700 CPU and running on Windows NT, sets a new PC WorldBench 98 record—and it debuts at number one. CyberMax's AMD Athlon-700–based Enthusiast A700W takes second place on the strength of swift performance, robust features, and an affordable price.

1 DELL DIMENSION XPS T700R

WHAT'S HOT: The 700-MHz Pentium III processor (based on the Coppermine design) running on NEW Windows NT 4.0 produced a record-breaking score of 373 on our PC WorldBench 98 tests. The 17-inch Trinitron-based Dell UltraScan P780 monitor adds excellent display quality to the mix. Colors in our test images appeared deep and vibrant, while text remained sharp up to the maximum resolution of 1600 by 1200. A 3Com 10/100 network interface card, a Sony CD-RW drive, and an Iomega Zip 100 drive round out the package.

WHAT'S NOT: Power and performance don't come cheap. At a hefty $2659, this Dell isn't the priciest machine on our power chart, but it'll put a noticeable spike on your credit card balance. And though the case's side panel pops off easily so you can reach inner components, getting it back on takes some finesse.

WHAT ELSE: The Dimension XPS T700r comes with a quick-setup guide and a thick system manual with detailed troubleshooting info and illustrations. The Altec Lansing ACS340 three-speaker set provides crisp sound and strong bass. Three open slots and three open bays offer fair expansion room, but an internal crossbar and cables impede access to them.

BEST USE: The Dimension's network card and its Zip drive and CD-RW drive (which together accommodate tons of data) makes this a business user's dream.

2 CYBERMAX ENTHUSIAST A700W

WHAT'S HOT: The CyberMax CX-900N 19-inch monitor displayed deep, vibrant colors in our test NEW images. The 3dfx Voodoo3 3500 TV graphics board permits television input and delivers crisp images. The Aureal Vortex 2 sound card and Altec Lansing ACS45.1W speakers generate

Extra features	Design and expandability [2]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number [3]
Very good: Diamond Viper V770 graphics board with 32MB of RAM, 4X CD-RW drive, V.90 modem, network card, Iomega Zip 100 drive	**Satisfactory:** midsize tower case, 3 open drive bays, 3 open slots	Outstanding	Good/ Good	24/7, toll-free	3/1	–
Good: 3dfx Voodoo3 3500 TV graphics board with 16MB of RAM, 8X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	**Good:** midsize tower case, 5 open drive bays, 4 open slots	Fair [4]	Good [5]/ Good	24/7, toll-free	3/1	601
Good: Diamond NVidia Vanta graphics board with 16MB of RAM, 12X-52X CD-ROM drive, V.90 modem, Iomega Zip 250 drive, Microsoft IntelliMouse	**Good:** midsize tower case, 1 open drive bay, 3 open slots	Good	Fair/ Good	24/7, toll-free	3/1	602
Very good: NVidia RIVA TNT2 Ultra graphics board with 32MB of RAM, 8X DVD-ROM drive, V.90 modem, network card, ergonomic keyboard, Microsoft IntelliMouse	**Good:** midsize tower case, 6 open drive bays, 4 open slots	Good [4]	Good [5]/ Good	24/7, toll-free	3/1	603
Good: S3 Trio Voodoo3 2000 Interactive graphics board with 16MB of RAM, 17X-40X CD-ROM drive, network card, Iomega Zip 100 drive, Microsoft IntelliMouse	**Good:** midsize tower case, 2 open drive bays, 5 open slots	Good	Good/ Good	24/7, toll-free	3/1	–
Good: NVidia GeForce 256 graphics board with 32MB of RAM, 8X DVD-ROM drive, V.90 modem	**Good:** tower case, 5 open drive bays, 5 open slots	Good	Good/ Outstanding	24/7, toll-free	Varies [5]/3	604
Good: Diamond Viper V770 graphics board with 16MB of RAM, 6X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive, Logitech three-button mouse	**Good:** midsize tower case, 3 open drive bays, 4 open slots	[4]	Fair [5]/ Fair	24/7,[6] toll-free	3/5	605
Very good: Diamond Viper V770 graphics board with 32MB of RAM, 6X DVD-ROM drive, 4X CD-RW drive, V.90 modem, Iomega Zip 100 drive, Microsoft IntelliMouse	**Good:** midsize tower case, 2 open drive bays, 4 open slots	[4]	Good [5]/ Outstanding	24/7, toll-free	3/3	606
Good: NVidia GeForce 256 graphics board with 32MB of RAM, 8X DVD-ROM drive, V.90 modem	**Satisfactory:** midsize tower case, 5 open drive bays, 4 open slots	Good	Good/ Outstanding	24/7, toll-free	Varies [5]/3	607
Good: Matrox Millennium G400 DH graphics board with 32MB of RAM, 17X-40X CD-ROM drive, network card, scroll mouse, RAID and two hard drives	**Good:** midsize tower case, 4 open drive bays, 3 open slots	[4]	Good [5]/ Good	24/7,[6] toll-free	Varies [7]/5	608
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent			

[4] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

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

[6] Support ceases to be 24/7 after the first year.

[7] Six years on CPU and main RAM, three years on other parts.

loud, clear sound with solid bass. Storage won't be a problem for quite a while, thanks to the system's 27.3GB hard drive.
WHAT'S NOT: It's not much of a knock, but this Athlon 700–based machine's PC WorldBench 98 score of 288 is only a few points above the average we've recorded for Athlon-650 systems.
WHAT ELSE: Documentation includes a decent manual—nicely illustrated with screen shots and photos—and a quick-setup guide. The 8X DVD-ROM drive, complete with software MPEG-2 decoder, autoplayed our test movie but paused while other applications were opening. With four open slots and five open drive bays, the interior offers generous expansion room; unfortunately, the bundled cabling blocks access to the RAM slots.
BEST USE: With an Iomega Zip 100 drive, a modem, and an affordable $2299 price, this Enthusiast will make any small-office user bubble with praise.

3 COMPAQ PROSIGNIA 330 PIII-550

WHAT'S HOT: The score of 246 on our PC WorldBench 98 tests is slightly above average for a PIII-550 machine running Windows 98. The system includes great multimedia extras: an Iomega Zip 250 drive, a Diamond NVidia Vanta graphics board, and a Sound Blaster Live card. The 19-inch Compaq S900 monitor offers impressive display quality: Text and images remain crisp even at 1600 by 1200 resolution.
WHAT'S NOT: Some front bezel pieces—the floppy drive faceplate and the eject button, especially—were loose on the unit we saw. Aside from the one open drive bay, you'll find a single free ISA, one open PCI, and one open combination PCI/ISA slot inside.
WHAT ELSE: The Prosignia 330 ships with Microsoft Office 97 Small Business Edi-

FULL SPEED AHEAD: Dell's Dimension XPS T700R earns the fastest PC WorldBench 98 score yet.

tion and Norton AntiVirus Deluxe, plus a vast 20GB hard drive to hold them and any other programs you want. The solidly constructed keyboard is a pleasure to use.
BEST USE: The Prosignia hits the target for small-business users who won't accept inferior or integrated components. ▶

KILL YOUR TELEVISION: Watch TV on your PC instead. CyberMax's Enthusiast A700W comes with a 3dfx Voodoo3 TV graphics card that lets users receive TV channels on the PC monitor.

4 QUANTEX SM600 SE

WHAT'S HOT: The SM600 SE is one of the fastest Win 98–based PIII-600 systems we've seen. For just $2099, it carries lots of RAM, a large hard disk, an 8X DVD-ROM drive, and an NVidia RIVA TNT2 Ultra video card. Music and movies sound great on the Altec Lansing ADA 305W satellite-and-subwoofer system, which supports Dolby ProLogic Surround Sound controlled by a USB cable. The case interior is spacious and well laid out.

WHAT'S NOT: Three thumbscrews plus an old-school, all-metal wraparound enclosure don't facilitate entry. Labels for the rear ports are inconveniently located on a separate diagram pad.

WHAT ELSE: The clear documentation includes a helpful setup poster but no hard-copy software manuals. Though the 19-inch Diamondtron monitor yielded laser-sharp text in our tests, colors looked slightly faded, and we noticed a dark patch in one corner. You get three open internal and three open externally accessible drive bays, but just one free PCI slot and three open ISA slots (a modem, a network card, and a sound card fill three PCI slots).

BEST USE: The SM600 SE is suited for any office that uses ISA peripherals.

5 IBM PC 300PL

WHAT'S HOT: At $2081, the IBM PC 300PL carries the lowest price of any system on the power chart. Its 13GB hard drive and Iomega Zip 100 drive provide plenty of storage space, though not as much as some other power PCs offer. IBM bundles its own Via-Voice dictation software and Lotus SmartSuite with the system.

WHAT'S NOT: We had varying degrees of success reaching reps during our anonymous tech support calls. When we got through, technicians were generally knowledgeable, but they sometimes seemed rather impatient.

WHAT ELSE: This midsize tower includes a built-in ethernet connection, and it has two open bays and five open expansion slots. The system's PC WorldBench 98 score of 232 matches the average for PIII-500 machines running Windows 98.

BEST USE: The PC 300PL would work well as a presentation PC or multimedia development system for business users in a networked office.

6 MICRON MILLENNIA MAX 600

NEW **WHAT'S HOT:** The Millennia Max 600's NVidia GeForce 256 graphics card joins forces with the bundled 19-inch monitor to produce radiant images. Colors appear rich and text remains crisp up to the maximum resolution of 1600 by 1200. The Millennia Max 600 also has plenty of expansion room inside its case—five open slots and five open drive bays.

WHAT'S NOT: The integrated Sound Blaster AudioPCI chip and the Advent AV009 three-speaker set produce robust bass through the subwoofer but mediocre sound from the satellites. Though the side panel pops off easily—thanks to a single handle on the back of the PC—replacing it takes more effort.

WHAT ELSE: With a 254 PC WorldBench 98 score, this machine delivers average performance for a PIII-600 system running Windows 98. Its $2301 price tag is also average for a power system. The Millennia Max 600's manual has lots of useful photos, and you get a quick-setup guide. The 8X DVD-ROM drive autoplayed our test video, and playback was smooth even with other apps open.

BEST USE: Equipped with a modem but no network interface card, the Millennia Max 600 is most appropriate for small offices. Vibrant display quality and flawless DVD playback cater to those who give lots of presentations. ▶
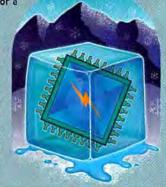
Is a True 1-GHz Desktop Just Around the Corner?

TECH TREND AS PROCESSOR SPEEDS gallop toward the gigahertz (1000-MHz) mark, you may wonder which vendor will reach that milestone first. In recent weeks, systems like the Sys Performance 700A and the CyberMax Enthusiast A700W, which sport AMD's 700-MHz Athlon processor, impressed us with their performance. Then came Intel's new Pentium III-733 chip. The Micron Millennia Max 733, based on that processor, is the fastest Windows 98 PC we've seen. So how far are we from a gigahertz CPU? In one sense, we're already there.
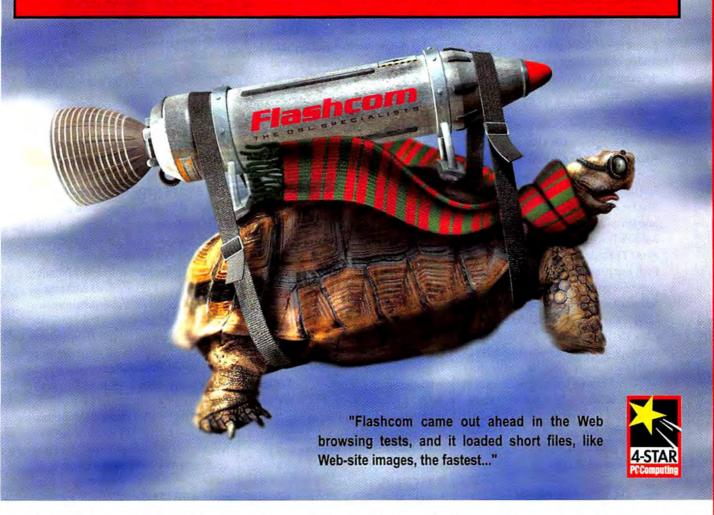
The aptly named KryoTech firm uses refrigeration to supercool its systems' processors so that they outpace their rated clock speeds. The company began shipping Super-G, a super-cooled 1-GHz computer, on December 1, 1999. Unfortunately, the components required for cooling the processor make for a very heavy PC—around 60 pounds instead of 15 to 20.

Meanwhile, other vendors are pursuing more traditional avenues in their quest to break the 1-GHz barrier. "We will provide high-performance processors—for all users—that don't require expensive add-ons [like refrigeration]," says Intel spokesperson George Alfs. For its part, AMD supports supercooling—but like Intel, it doesn't endorse overclocking. "There's no easy way to go about overclocking our systems anymore," says AMD spokesperson Drew Prairie, whose company has changed its chip design to make the chips difficult to overclock. Stay tuned.

7 POLYWELL 800K7-650

WHAT'S HOT: The Polywell's fine PC WorldBench 98 score of 277 falls a few points shy of the scores earned by other Athlon-650 systems we've tested. Inside the case, wires are neatly bundled to allow easy access to all components. The Poly offers ample expansion room, with four open slots and three open drive bays (one of the filled bays holds a Zip 100 drive).

WHAT'S NOT: The 19-inch DecaView G400 monitor produces fuzzy text and dull colors at all resolutions, though it's fine for nondemanding tasks. The silver case looks like something spray-painted at Bubba's Body Shop.

WHAT ELSE: At $2295, the 800K7-650 is fairly inexpensive for a power system. The one-piece cover opens without tools, but you must remove the whole thing to get inside. The unimpressively constructed Aiwa TS-CD40 speakers deliver adequate sound. Video playback on the 6X DVD-ROM drive is smooth, even with other applications open, but movies didn't start automatically in our tests. Polywell bundles Lotus SmartSuite 97 with the 800K7-650.

BEST USE: Even with its mediocre monitor, this powerful system should be able to drive any small office for many moons.

8 AXIS SYSTEMS ORION 100A DVD

WHAT'S HOT: The Orion packs a Zip 100 drive, a 6X DVD-ROM drive, and a 4X CD-RW drive. The ViewSonic G770 19-inch monitor displays clear text and

MULTIDIMENSIONAL MULTIMEDIA: Besides offering strong components such as an NVidia GeForce256 graphics card and Advent AV009 speakers with subwoofer, Micron's Millennia Max 600 gives users five open slots and five open drive bays.

graphics even at 1600 by 1200 resolution. The Creative Labs Sound Blaster Live audio card and classy Cambridge SoundWorks 1000 speaker system provide terrific Surround Sound. DVD video playback is great, even with other programs running.

WHAT'S NOT: Removing the case involves taking off the top and then the side panels.

WHAT ELSE: The Orion's PC World-Bench 98 score of 241 is average for a PIII-550 running Win 98. Microsoft's Natural Keyboard allows smooth typing. Rear ports are labeled but not color-coded.

BEST USE: The Orion would make a great presentation system, thanks to its formidable multimedia features.

9 MICRON MILLENNIA MAX 733

NEW WHAT'S HOT: The Micron Millennia Max 733 system zoomed to a score of 309 on our PC WorldBench 98 tests, the fastest score that we've ever recorded for a Windows 98 computer. This Micron boasts a vibrant 19-inch monitor and a graphics card built around the NVidia GeForce 256 chip. DVD-ROM playback looked smooth even when we had other applications open.

WHAT'S NOT: The midsize tower's side panel comes off easily when you pull down a handle in the back, but it goes back on less obligingly.

WHAT ELSE: The Monsoon MM-700 flat speakers deliver excellent sound in conjunction with system's Aureal Vortex 2 sound card. Four open slots and five open bays provide plenty of expansion room. And you can install or remove expansion cards without tools, thanks to a sliding rail that holds the cards. The system manual features many photos, and the quick-setup guide and Micron University tutorial CD-ROMs are nice extras.

BEST USE: With no network card, the Millennia Max 733 would be ideal for a small office in search of cutting-edge performance.

MEANT TO PRESENT: With its crisp 19-inch monitor, the Axis Orion 100A DVD makes a fine presentation PC.

10 SYS PERFORMANCE 600A

WHAT'S HOT: The Sys parlayed its 600-MHz AMD Athlon chip into a PC World-Bench 98 score of 345, beating comparable Pentium III systems running Win NT. Two 9.1GB hard drives link to a Promise UltraDMA 66 PCI card in a RAID configuration to accelerate certain disk-intensive operations. Plug two monitors into the Matrox Millennium G400 DH (for *dual head*) video card to view your desktop across both displays. Creative Labs' Sound Blaster card delivers fine audio. Sys's labor warranty is unusually long.

WHAT'S NOT: Faded colors and fuzzy text from Sys's SPM17 MS monitor sandbag the system's graphics potential. Hardware documentation consists of a single laser-printed setup sheet and component manuals for the CD-ROM drive and monitor. Sys cuts tech support from 24 hours daily to 9 hours on weekdays after the first year.

WHAT ELSE: At $2299, it's relatively inexpensive for a power system. You need a screwdriver to get inside the all-metal case, but the side panel detaches quickly and slides back on easily—the fit and finish are impressive. The soft-touch keyboard has a removable wrist rest.

BEST USE: With a better monitor (or two), the Sys would be great for 2D graphics—you could keep your work on one display and your tools on the other. ▶

Circle 254 on card or go to www.pcworld.com/productinfo

TOP 10 MIDRANGE PCs

	SYSTEM: $1200 TO $1999	Month tested	★ Overall rating	Street price (11/8/99)	PC WorldBench 98 performance score [1] ▸Faster▸	Base configuration
1	**Micro Express MicroFlex-550B** 800/989-9900 www.microexpress.net	Jan 2000	79	Inexpensive: $1299	Very good 256	Good: AMD Athlon-550, 128MB of RAM, 512KB L2 cache, 18GB hard drive, 17-inch monitor, Windows 98 SE
2	**Quantex M500** 800/896-4898 www.quantex.com	Sept 99	79	Inexpensive: $1499	Good 230	Good: Pentium III-500, 128MB of RAM, 512KB L2 cache, 13GB hard drive, 19-inch monitor, Windows 98
3	Dell Dimension L500c 800/388-8542 www.dell.com	Nov 99	76	Inexpensive: $1399	Satisfactory 214	Satisfactory: Celeron-500, 64MB of RAM, 128KB L2 cache, 13GB hard drive, 17-inch monitor, Windows 98 SE
4	Sys Performance 450K3 800/613-9963 www.sys.com	Oct 99	72	Inexpensive: $1399	Good 231	Good: AMD K6-III-450, 128MB of RAM, 256KB L2 cache, 13GB hard drive, 17-inch monitor, Windows 98
5	Micron Millennia Max 600 800/642-7667 www.micronpc.com	Dec 99	72	Expensive: $1966	Very good 250	Good: Pentium III-600, 128MB of RAM, 512KB L2 cache, 13.6GB hard drive, 17-inch monitor, Windows 98 SE
6	Axis Systems Orion 100H DVD 500 800/378-9014 www.axissys.com	Nov 99	72	Average: $1583	Good 237	Good: Pentium III-500, 128MB of RAM, 512KB L2 cache, 13GB hard drive, 19-inch monitor, Windows 98
7	NEC PowerMate ES 5250-500k 888/632-8701 www.nec-computers.com	Jan 2000	72	Average: $1687	Good 228	Good: Pentium III-500, 128MB of RAM, 512KB L2 cache, 13GB hard drive, 17-inch monitor, Windows 98 SE
8	Kingdom Pinnacle 500 800/385-3436 www.kingdomcomputers.com	Oct 99	70	Very inexpensive: $1247	Good 231	Good: Pentium III-500, 128MB of RAM, 512KB L2 cache, 13GB hard drive, 17-inch monitor, Windows 98
9	MidWest Micro Venture XP0-450 800/728-8582 www.mwmicro.com	Aug 99	70	Inexpensive: $1299	Satisfactory 211	Satisfactory: Pentium III-450, 64MB of RAM, 512KB L2 cache, 10.1GB hard drive, 17-inch monitor, Windows 98
10	IBM PC 300GL PIII-600 800/426-2968 www.ibm.com/pc	Jan 2000	69	Expensive: $1968	Very good 255	Good: Pentium III-600, 128MB of RAM, 512KB L2 cache, 13.6GB hard drive, 17-inch monitor, Windows 98 SE

Best Buy   Percent of overall rating ▸ Price: 17 percent   Performance: 18 percent   Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 187.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

[3] For more information about all the products listed in this table, select number 902 on the product information card or visit www.pcworld.com/productinfo.

THE MICRO EXPRESS MicroFlex-550B maintains its hold on the coveted number one spot this month. Meanwhile, the Quantex M500 rises to number two, thanks to its improved service rating. Dell's affordable Dimension L500c follows close behind. No new systems, however, make it onto this month's chart.

1 MICRO EXPRESS MICROFLEX-550B

WHAT'S HOT: Powered by an AMD Athlon-550 processor, the Micro-Flex-550B zipped to a PC World-Bench 98 score of 256, substantially higher than that of any Pentium III-550 PC we've tested, and higher (by a small margin) than those of most PIII-600 systems we've seen. Best of all, the system will set you back only $1299. Documentation includes a quick-setup guide and a thorough manual. The neat, well-designed interior has four open slots and four free drive bays for upgrades. The 6X DVD-ROM drive (with a software MPEG video decoder) played our test movie smoothly, even with other applications running.

WHAT'S NOT: To get inside the box, you must loosen a screw, remove the midsize tower's top, and slide off the side panel. Of course, putting the case back together requires just as many steps. The keys on the large, solid keyboard make a lot of noise when you type on them, and they're almost too big for comfortable typing.

WHAT ELSE: Color quality of the 17-inch Impression 7VX monitor is subpar, but the screen displays readably crisp, clear text at most resolutions. The Altec Lans-ing ACS44 speaker set includes powerful satellites and a booming subwoofer.

BEST USE: The well-equipped MicroFlex-550B makes a great all-around workhorse for the budget-conscious office.

2 QUANTEX M500

WHAT'S HOT: You won't find a better multimedia powerhouse for the price. The 6X DVD-ROM drive, Aureal Vortex2 sound card, and Joytech S3 Savage4 graphics board make the M500 a capable authoring station. And after work it's fine for watching movies, thanks to its 19-inch DiamondTron flat CRT monitor. In the past our anonymous calls to Quantex's tech support line yielded incomplete answers, but recently reps have been accurate and helpful. The M500 has lots of expansion room, with five free slots and five unoccupied bays.

WHAT'S NOT: Quantex's warranty on the M500 covers labor for just one year.

Extra features	Design and expandability [2]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number [3]
Very good: ATI Rage Magnum graphics board with 32MB of RAM, 6X DVD-ROM drive, V.90 modem, scroll mouse	**Satisfactory:** midsize tower case, 4 open drive bays, 4 open slots	[4]	**Fair** [4]/ **Outstanding**	24/7, toll-free	4/4	609
Good: Joytech S3 Savage 4 graphics board with 16MB of RAM, 6X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	**Outstanding:** midsize tower case, 5 open drive bays, 5 open slots	**Good** [4]	**Good** [4]/ **Good**	24/7, toll-free	3/1	610
Satisfactory: integrated Intel 810 graphics with 4MB of 3D cache, 17X-48X CD-ROM drive, V.90 modem, network card, Logitech mouse	**Satisfactory:** minitower case, 1 open drive bay, 3 open slots	**Outstanding**	**Good**/ **Good**	24/7, toll-free	3/1	–
Good: 3dfx Voodoo3 2000 AGP graphics board with 16MB of RAM, 17X-40X CD-ROM drive, network card	**Good:** midsize tower case, 5 open drive bays, 4 open slots	[4]	**Good** [4]/ **Good**	24/7, toll-free [5]	Varies [6]/5	611
Good: Diamond Viper V770 graphics board with 16MB of RAM, 8X DVD-ROM drive, V.90 modem	**Satisfactory:** tower case, 5 open drive bays, 4 open slots	**Good**	**Good**/ **Outstanding**	24/7, toll-free	Varies [7]/3	612
Good: ATI Rage Fury graphics board with 32MB of RAM, 6X DVD-ROM drive, 4X CD-RW drive, V.90 modem	**Good:** midsize tower case, 3 open drive bays, 4 open slots	[4]	**Good** [4]/ **Outstanding**	24/7, toll-free	3/3	613
Very good: ATI Rage Pro graphics board with 8MB of RAM, 6X DVD-ROM drive, network card, LS-120 drive, Logitech mouse	**Satisfactory:** midsize tower case, 3 open drive bays, 5 open slots	**Good**	**Poor** [4]/ **Outstanding**	24/7, toll-free	3/3	614
Good: APAC Multimedia Voodoo Banshee graphics board with 16MB of RAM, 17X-40X CD-ROM drive, V.90 modem, LS-120 drive, ethernet connector	**Good:** minitower case, 2 open drive bays, 2 open slots	[4]	**Fair** [4]/ **Fair**	Varies [6], toll-free	Varies [7]/1	615
Good: ATI Xpert 128 AGP graphics board with 16MB of RAM, 6X DVD-ROM drive, V.90 modem, Microsoft IntelliMouse	**Very good:** midsize tower case, 4 open drive bays, 4 open slots	[4]	**Poor** [4]/ **Outstanding**	24/7, toll-free	Varies [7]/3	616
Satisfactory: Number Nine SR9 graphics board with 16MB of RAM, 20X-48X CD-ROM drive, DVI interface	**Satisfactory:** desktop case, 1 open drive bay, 3 open slots	**Good**	**Good**/ **Good**	24/7, toll-free	3/1	–
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent			

[4] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

[5] Support ceases to be 24/7 after the first year.

[6] Six years on CPU and main RAM, three years on other parts.

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

[8] 12.5 hours on weekdays, 8 hours on Saturday.

WHAT ELSE: The M500's PC WorldBench 98 score of 230 is average for a Pentium III-500 system with Windows 98. Quantex throws in an Iomega Zip 100 drive.

BEST USE: The M500 makes a fast presentation system or a choice executive workstation for the Big Cheese.

3 DELL DIMENSION L500C

WHAT'S HOT: The Dimension L500c earned a 214 on PC WorldBench 98—just four points shy of the fastest score we've recorded for a Celeron machine running Windows 98. We had no trouble getting inside this minitower's stiff, plastic case, and ports on the rear are color-coded.

WHAT'S NOT: The L500c's integrated components save space, but they aren't of as high quality as most discrete components, and this shortcoming limits the performance of the system's otherwise solid peripherals. For instance, the 17-inch Dell M780 monitor provides passable text and images, but the integrated Intel 810 video subsystem restricts the monitor to 24-bit color and 1280 by 1024 resolution (a 4MB display-cache chip, however, should help the system's 3D graphics speed). And if you want to upgrade the system's graphics in the future, your choice will be limited to PCI video cards.

WHAT ELSE: The L500c's keyboard suffers from a slight excess of flexibility, though keystrokes are solid. The interior is small, but the power supply swings out so you can access motherboard components easily. The easy-to-configure Harman/Kardon HK195 speakers reproduce most sound faithfully, despite being limited by the integrated audio.

BEST USE: A good workstation for a small office on a budget, the $1399 L500c is backed by Dell's excellent reputation for reliability and service.

LOADED: With strong speakers and a 6X DVD-ROM drive, Micro Express's MicroFlex-550B has the goods.

4 SYS PERFORMANCE 450K3

WHAT'S HOT: The 450K3's score of 231 on our PC WorldBench 98 tests tops all other K6-III-450–based PCs, and outpoints every PIII-450 system we've tested so far. The excellent Sys SPM-17-MS 17-inch monitor, backed by a 3dfx Voodoo3 ▶

AGP 2000 card, provided crisp images at all but the highest resolution.

WHAT'S NOT: There's no overall system manual and the rear ports are identified with labels that could fall off over time.

WHAT ELSE: This large midsize tower system—with plenty of expansion room—offers great performance at a decent price.

BEST USE: The Voodoo3, a great monitor, and the Creative Labs Awe 64 sound card tailor the Sys for presentations.

5 MICRON MILLENNIA MAX 600

WHAT'S HOT: The Millennia's mammoth case opens easily—push down a handle on the back, and the side panel slides off. (To reattach the panel, push the handle again.) The 8X DVD-ROM drive starts movies automatically and plays them smoothly, even with other apps open. Micron throws in a well-illustrated user manual and CD-ROM reference materials.

WHAT'S NOT: The case's concave top is an unstable place to put items down. And despite the huge interior, cables obstruct access to the RAM slots. The 17-inch Micron 700VX monitor produces bright colors

but slightly blurry text, and it can attain a maximum resolution of 1280 by 1024 only at a very low 60-Hz refresh rate; users sensitive to screen flicker, take notice. (You can upgrade to a sharper Trinitron monitor for $99.) The Advent AV009 three-piece speaker set—especially the satellite speakers—musters weak audio.

WHAT ELSE: The Millennia Max 600's PC WorldBench 98 score of 250 is plenty fast, though average for a PIII-600. Despite the keyboard's flimsy feel, you can type on it smoothly and quietly. The system ships with Microsoft Office 2000 Small Business Edition. Accessing expansion cards for upgrades is simple: Loosen a thumbscrew on the metal rail, and you're in.

BEST USE: The Millennia Max 600 easily fills the bill as a powerful, bare-bones multimedia system that you can upgrade painlessly as your needs change.

GRAPHICS ON BOARD: Instead of using a dedicated card, Dell's Dimension L500c employs Intel's 810 chip set, which integrates graphics onto the motherboard.

Understanding Ultra ATA-66

TECH TREND YOU MIGHT expect the new Ultra ATA-66 hard drive interface to be twice as fast at data throughput as its predecessor, the Ultra ATA-33. But it's not that simple, says Steve Wilkins, strategic marketing manager for Quantum, a hard drive manufacturer.

While the interface is important, hard drive speed also depends on several other factors, such as the internal data rate (currently still at 33 MBps). "What we're doing with the [faster] interface is opening up the pipe for internal data rate speedups further down the line," Wilkins says. "With the new [Ultra ATA-66] structure in place, the interface won't be a problem as successive drive generations improve in speed." By the end of this year, internal data rates will exceed 33 MBps, and the new drives will be able to take advantage of Ultra ATA-66.

Besides doubling interface speed, Ultra ATA-66 is designed to resist voltage spikes from the power supply and other sources, improving the reliability and signal integrity of transmitted data, Wilkins says. In addition, the multiple-line IDE cable that comes with Ultra ATA-66 drives reduces signal crosstalk (the interference between data lines) more successfully than the ATA-33 drive cables do. New motherboards and chip sets that support Ultra ATA-66 have the appropriate connections built in, whereas current systems require installation of a special adapter card before they can take advantage of the new interface. So users who plan to upgrade their hard drives in the future will have their systems ready for the higher speeds.

6 AXIS SYSTEMS ORION 100H DVD 500

WHAT'S HOT: The Orion 100H DVD 500 packs a 6X DVD-ROM drive and a 4X CD-RW drive. The 19-inch monitor displays clear text and graphics even at 1600 by 1200 resolution. The Altec Lansing ACS33 speakers and subwoofer, in concert with a Creative Labs Sound Blaster Live audio card, yield terrific surround sound. DVD video playback is great, even with other programs running.

WHAT'S NOT: To open the case, you must take off first the top and then the side panels. The system's PC WorldBench 98 score of 237 is a few points below average for a PIII-500 running Windows 98.

WHAT ELSE: Rear ports are labeled but not color-coded.

BEST USE: The Orion makes a great presentation system, thanks to its formidable multimedia features.

7 NEC POWERMATE ES 5250-500K
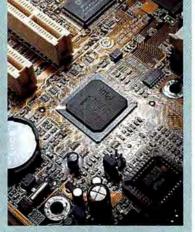
WHAT'S HOT: The PowerMate ES 5250-500k's well-designed case puts various controls at your fingertips. A silver bar at the top of the tower houses power and sleep buttons, a volume control, and a headphone jack. A front-mounted USB port sits next to the bar. Documentation includes a quick setup guide, a pamphlet on ergonomics, and a thick system manual with copious illustrations. The included LS-120 removable media drive gives users an extra storage possibility. The ▶

interior makes room for substantial expansion options, with five open slots and three open bays.

WHAT'S NOT: The 6X DVD-ROM drive autoplayed our test movie, but playback was choppy when we opened other programs in the background. Expansion cards go into the box upside down, making installation awkward, and unkempt wiring impedes access to them.

WHAT ELSE: The PowerMate ES 5250-500k's PC WorldBench 98 score of 228 is average for a PIII-500 system running Windows 98. The NEC S770 17-inch monitor produces less-saturated color and brightness than most. In our tests, text looked sharp at 1024 by 768 resolution but blurred at the maximum resolution of 1280 by 1024. The large, sturdy keyboard features an attachable wrist rest and permits quiet and smooth typing. The Power-

ADD A MODEM: IBM's PC 300GL PIII-600 works best for users who have a spare modem, or for IS managers who keep extra network cards on hand.

Mate's chassis features color-coded ports and a case lock.

BEST USE: With a price of $1687, the network-ready PowerMate ES 5250-500k will suit offices that don't need a screamer.

8 KINGDOM PINNACLE 500

WHAT'S HOT: At $1247, the Pinnacle 500 has been the lowest-priced PC on the midrange chart for three straight months. The generous software bundle accompanying the system consists of Corel's WordPerfect Suite 8, Compton's 99 Encyclopedia Deluxe, National Geographic Trip Planner Deluxe, and a demo game pack to complement the APAC Multimedia Voodoo

Banshee graphics board. The system's manuals include a thorough glossary and troubleshooting section.

WHAT'S NOT: Despite the system's stellar video card, text on the 17-inch Kingdom 77i monitor looks fuzzy even at 1024 by 768 resolution. You won't be able to open the case without using tools, and in our tests, the keys on the ergonomic Microsoft keyboard tended to stick.

WHAT ELSE: This PIII-500's score of 231 on PC WorldBench 98 matches the average for similarly configured systems running Windows 98. The Pinnacle 500 ships with a V.90 modem and an integrated ethernet connector, making it a good candidate for networked offices. You get an LS-120 drive, too.

BEST USE: Its WordPerfect Suite, three-piece MLi 450 speaker set, and excellent graphics acceleration help the Pinnacle fit well in a small-office or home-office environment.

9 MIDWEST MICRO VENTURE XPO-450

WHAT'S HOT: With an attractive price of $1299, the Venture XPO-450 is beaten on price by just one system in the midrange Top 10, the Kingdom Pinnacle 500. Another pleasant surprise at this price point: The XPO 450 carries a 6X DVD-ROM drive, albeit one with a software MPEG decoder. Four open expansion slots and four free drive bays offer users plenty of room for upgrading.

WHAT'S NOT: As its score of 211 on our PC WorldBench 98 tests indicates, the XPO 450 is no performance star by any means. Despite toolless entry, removing and replacing the case requires some work.

WHAT ELSE: The PC comes with small but powerful Altec Lansing ACS44W speakers that produce good sound and volume. Midwest Micro color-codes exterior ports so you can connect peripherals easily. Microsoft Office 97 Small Business Edition comes bundled with the system.

BEST USE: This expandable machine is a stellar choice for any small business with budget constraints.

BARGAIN OF THE MONTH: At $1247, Kingdom's Pinnacle 500 is a very affordable midrange system.

10 IBM PC 300GL PIII-600

WHAT'S HOT: Powered by a PIII-600 processor and the Via chip set, the 300GL managed a PC WorldBench 98 score of 255—a few points above the average for similarly equipped PIII-600s running Windows 98. At $1968, it costs less than most systems with similar performance capabilities. Three large thumbscrews make opening the desktop case a breeze, and the detailed system manual contains lots of excellent diagrams and troubleshooting information.

WHAT'S NOT: The low price comes at the expense of features. For example, the PC 300 GL contains neither a network interface nor a modem. The integrated speakers generate weak, tinny sound.

WHAT ELSE: The 17-inch IBM G74 monitor produces sharp text even at the maximum resolution of 1280 by 1024, but image colors look washed out. Though the Number Nine SR9 graphics card features a digital output jack (for connecting flat-panel displays), the analog monitor we received required an adapter that stuck out several inches from the system's back. The PC 300GL offers three open slots and a single open drive bay.

BEST USE: The PC 300GL is a fast, basic system for offices that have extra modems or network cards handy. ▶

PHOTOGRAPHS: KEN SMITH

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PC WORLD — WORLD CLASS — Diamond Pro 900u July 1999

Macworld — EDITORS' CHOICE — Diamond Pro 2020u June 1999

CADENCE LAB — verdict — Diamond Pro 2020u June 1999

PC — EDITORS' CHOICE — Diamond Pro 900u Jan. 19, 1999 — Best 19" upgrade March 9, 1999

1998 Eddy WINNER — Diamond Pro 900u March 1999

Desktop Publishers — Diamond Pro 900u February 1999

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TOP 10 BUDGET PCs

	SYSTEM: UNDER $1200	Month tested	★ Overall rating	Street price (11/8/99)	PC WorldBench 98 performance score [1] ▶ Faster	Base configuration
1	Micro Express MicroFlex-50D 800/989-9900 www.microexpress.net	Aug 99	81	Expensive: $1199	Outstanding 234	Very good: Pentium III-500, 128MB of RAM, 512KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 98
2	Quantex M466-2c 800/896-4898 www.quantex.com	Sept 99	79	Average: $1049	Very good 209	Good: Celeron-466, 64MB of RAM, 128KB L2 cache, 13GB hard drive, 17-inch monitor, Windows 98
3	Dell OptiPlex GX100 800/388-8542 www.dell.com	Dec 99	77	Expensive: $1160	Very good 260	Good: Celeron-500, 64MB of RAM, 128KB L2 cache, 6.4GB hard drive, 17-inch monitor, Windows NT 4.0
4	Axis Systems Orion 100C DVD 800/378-9014 www.axissys.com	Oct 99	75	Expensive: $1193	Very good 210	Very good: Pentium III-450, 128MB of RAM, 512KB L2 cache, 10.2GB hard drive, 17-inch monitor, Windows 98
5	Gateway E-1400/Celeron 500 800/315-2536 www.gateway.com	Jan 2000	75	Average: $1029	Very good 211	Satisfactory: Celeron-500, 64MB of RAM, 128KB L2 cache, 6.8GB hard drive, 15-inch monitor, Windows 98 SE
6	Nutrend Sierra LE 888/482-6678 www.nutrend.com	(NEW)	74	Expensive: $1199	Outstanding 230	Very good: Pentium III-500, 128MB of RAM, 512KB L2 cache, 13.5GB hard drive, 17-inch monitor, Windows 98 SE
7	Micron Millennia C466 800/642-7667 www.micronpc.com	Oct 99	74	Expensive: $1158	Very good 213	Good: Celeron-466, 64MB of RAM, 128KB L2 cache, 13GB hard drive, 17-inch monitor, Windows 98
8	Micro Express MicroFlex 40C 800/989-9900 www.microexpress.net	Nov 99	73	Average: $999	Very good 215	Good: AMD K6-III-400, 128MB of RAM, 256KB L2 cache, 10GB hard drive, 15-inch monitor, Windows 98
9	PC Connection Epiq BPS4000 Celeron 466 800/800-0011 www.pcconnection.com	Jan 2000	70	Average: $988	Good 206	Good: Celeron-466, 64MB of RAM, 128KB L2 cache, 6.4GB hard drive, 17-inch monitor, Windows 98 SE
10	AcerPower 4300 Celeron 500 800/733-2237 www.acer.com	(NEW)	70	Inexpensive: $875	Satisfactory 186	Good: Celeron-500, 64MB of RAM, 128KB L2 cache, 13.6GB hard drive, 17-inch monitor, Windows 98 SE

Best Buy	Percent of overall rating ▶	Price: 22 percent	Performance: 13 percent	Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 187.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

[3] For more information about all the products in this table, select number 903 on the product information card or visit www.pcworld.com/productinfo.

THE TOP OF this month's budget chart remains unchanged, as the Micro Express MicroFlex-50D and Quantex M466-2c repeat as Best Buys. But two new machines make the chart: Nutrend's Pentium III-500–based Sierra LE and Acer's AcerPower 4300 Celeron 500 debut in sixth and tenth place, respectively.

1 MICRO EXPRESS MICROFLEX-50D

WHAT'S HOT: With a PC World-Bench 98 score of 324, the $1199 MicroFlex 50D is the fastest Windows 98–based PC on the Budget chart. Text and images on the excellent 17-inch Impression 7VX remain crisp even at the maximum 1600 by 1200 resolution. Software-decoded DVD video plays smoothly, even while other applications crank away in the background. The Altec Lansing ACS-44 speaker-and-subwoofer combination produces good sound.

WHAT'S NOT: Although the corrugated side panel may have been intended to make the system easier to open, it has the opposite effect. Poorly labeled connectors on the rear of the machine may frustrate new owners during installation. To compound these problems, the system ships without a printed manual—but it does come with a quick-start setup guide and adequate documentation for the DVD-ROM drive and the monitor.

WHAT ELSE: The large interior provides ample expansion room, including four open drive bays, six free card slots, and three open memory sockets.

BEST USE: Offices that make heavy use of multimedia for presentations, videoconferencing, or training will appreciate the system's great sound and video.

2 QUANTEX M466-2C

WHAT'S HOT: Inside, you get six open slots, six open drive bays, and a tidily arranged interior.

WHAT'S NOT: Quantex's 17-inch AT897C monitor on our test system suffered from badly blurred text at its 1600 by 1200 setting and looked somewhat fuzzy even at a less strenuous 1024 by 768 resolution.

WHAT ELSE: This Celeron-466–based PC earned a 209 on PC WorldBench 98, about average for a budget chartmaker running Win 98. The 6X DVD-ROM drive accompanying the M466-2c offers smooth, uninterrupted video playback, even with other applications running.

BEST USE: A small office with budget constraints could do much worse than this quick, multipurpose system.

Extra features	Design and expandability [2]	Vendor's system reliability	Tech support quality/policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number [3]
Good: ATI Rage 128GL graphics board with 16MB of RAM, 6X DVD-ROM drive, V.90 modem, Microsoft IntelliMouse	**Outstanding:** midsize tower case, 4 open drive bays, 6 open slots	▴	**Fair ▴/ Good**	24/7, toll-free	4/4	618
Good: 3dfx Voodoo3 2000 graphics board with 16MB of RAM, 6X DVD-ROM DVD-ROM, V.90 modem	**Outstanding:** midsize tower case, 6 open drive bays, 6 open slots	**Good ▴**	**Good ▴/ Good**	24/7, toll-free	3/1	619
Good: integrated Intel 810 graphics with 4MB of 3D cache, 10X-24X CD-ROM drive, network card, Wake-on-LAN, chassis intrusion, easy-to-service case	**Satisfactory:** desktop case, no open drive bays, 2 open slots	**Outstanding**	**Good/ Outstanding**	24/7, toll-free	3/3	–
Good: Intel 740 graphics board with 8MB of RAM, 6X DVD-ROM drive, V.90 modem	**Good:** minitower case, 4 open drive bays, 4 open slots	▴	**Good ▴/ Outstanding**	24/7, toll-free	3/3	620
Good: integrated Intel 810 graphics with 4MB of 3D cache, 12X-24X CD-ROM drive, network card, Wake-on-LAN, chassis intrusion, Microsoft IntelliMouse	**Satisfactory:** desktop case, no open drive bays, 2 open slots	**Good**	**Fair/ Outstanding**	24/7, toll-free	3/3	621
Good: ATI Rage Fury graphics board with 32MB of SGRAM, 6X DVD-ROM, V.90 modem, multidirectional multimedia microphone	**Good:** midsize tower case, 4 open drive bays, 4 open slots	▴	**Fair ▴/ Good**	24/7, toll-free	3/lifetime	622
Good: integrated NVidia Riva 1282X graphics with 8MB of RAM, 17X-40X CD-ROM drive, V.90 modem, Microsoft IntelliMouse	**Satisfactory:** minitower case, 1 open drive bay, 2 open slots	**Good**	**Good/ Outstanding**	24/7, toll-free	Varies ⁵/3	623
Good: Diamond Monster Fusion graphics board with 16MB of RAM, 12X-40X CD-ROM drive, V.90 modem, Microsoft IntelliMouse	**Satisfactory:** midsize tower case, 4 open drive bays, 4 open slots	▴	**Fair ▴/ Outstanding**	24/7, toll-free	4/4	624
Satisfactory: integrated Intel 810 graphics with 4MB of 3D cache, 20X-40X CD-ROM drive, V.90 modem	**Good:** midsize tower case, 6 open drive bays, 3 open slots	▴	**Fair ▴/ Good**	24/7, toll-free	1/1	625
Good: integrated Intel 810 graphics with 4MB of 3D cache, 12X-40X CD-ROM drive, network card, intruder alert	**Satisfactory:** midsize tower case, 3 open drive bays, 2 open slots	**Fair**	**Poor ▴/ Good**	24/7, toll-free	3/3	626
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent			

▴ Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

⁵ Five years on CPU and main RAM, three years on other parts.

3 DELL OPTIPLEX GX100

WHAT'S HOT: Dell's OptiPlex GX100, one of the few Celeron-based Windows NT systems vendors have delivered to the PC World Test Center, exceeded our expectations in lab tests. Equipped with a Celeron-500 processor, the OptiPlex turned in a PC WorldBench 98 score of 260, surpassing most PIII-450 systems that run NT. The solidly constructed QuietKey keyboard permits smooth, soft typing. With an integrated network interface, a case lock, and Wake-on-LAN management features, this machine ships business-ready.

WHAT'S NOT: This system has no available drive bays, only one open RAM slot, and two free PCI slots. Its system manual scantily covers Windows NT and includes no information on the OptiPlex's hardware or on any components other than the monitor (you can find documentation for all of these things online, however).

PERFECT PRESENTATION PC: If PowerPoint is your friend, you'll love the Micro Express MicroFlex-50D.

The system uses an unimpressive notebook-style CD-ROM drive; though excusable in a portable, weight-saving environment, it's too rickety for a desktop system.

WHAT ELSE: To gain access to the interior of this smallish desktop, just press a button on each side of the rather flimsy plastic case and lift off the top. Dell's 17-inch M770 monitor displays crisp text and bright colors at the standard 1024 by 768 resolution, but the integrated video chip forces you to choose either high resolution or good color depth.

BEST USE: With its compact size, integrated network interface, and management features, the speedy OptiPlex GX100 seems destined to fill many a stall in corporate cubicle farms.

4 AXIS SYSTEMS ORION 100C DVD

WHAT'S HOT: Though this Orion lacks an MPEG decoder card, its 6X DVD-ROM player works well, automatically changing the monitor's resolution to the best setting for video or computer signals. The 17-inch ADI CM700 monitor displays crisp images. The excellent documentation includes detailed diagrams and a thorough troubleshooting section. ▶

FULLY MANAGED: With LAN management and a case lock, Dell's OptiPlex GX100 makes a solid corporate PC.

WHAT'S NOT: With a score of 210 on our PC WorldBench 98 tests, the Orion 100C DVD is marginally slower than the average Pentium III-450 machine. Manipulating the case cover requires dexterity—and the removal of four screws.
WHAT ELSE: The Orion's $1193 price tag might appeal to budget-conscious buyers searching for an expandable multimedia machine. If you want good audio, however, you'll have to spend more—the system doesn't include speakers at this price.
BEST USE: The Orion 100C DVD makes a solid presentation system.

5 GATEWAY E-1400/CELERON 500

WHAT'S HOT: This pint-size desktop takes up minimal space. And by standing it on its optional base, you can transform the E1400 into a minitower. At the press of two buttons, the case slides off easily to display a well-organized interior where almost all devices connect directly to the system board, instead of via cables.
WHAT'S NOT: You must fiddle with the case to make it fit snugly on its chassis. Despite its neat appearance, the interior offers little expansion room, with just two open slots and no free bays. The 6.8GB hard drive is small even for a budget system. The 15-inch Gateway EV500 monitor matches the rest of the system's compactness, but produces fuzzy text and dull colors at 800 by 600 resolution.

WHAT ELSE: The Cambridge Sound-Works SBS52 two-speaker set produces crisp audio. Gateway supplies adequate documentation, including quick-setup and technical support guides, but leaves out some manuals for individual hardware components. The E1400's PC WorldBench 98 score of 211 is typical of Celeron-500 PCs running Windows 98.
BEST USE: Corporate buyers looking for a compact system with management features will like the E-1400.

6 NUTREND SIERRA LE

NEW **WHAT'S HOT:** For a modest price of just $1199, the Sierra LE assembles a package of features and performance that puts a lot of midrange systems to shame. For example, it comes with a 6X DVD-ROM drive that autoplayed our test movie and maintained crisp playback even while other applications were running.
WHAT'S NOT: Though the system comes with a quick-setup guide, the skimpy system manual goes very light on troubleshooting information. Gaining access to

the interior is unduly complicated, too.
WHAT ELSE: The Sierra LE's 17-inch OptiQuest Q71 monitor produced bright and crisp colors and sharp text at resolutions as high as 1280 by 1024. The accompanying PRO-480 three-speaker set distinguished itself by pumping out powerful sound. With four open slots and the same number of open bays, this system offers plenty of expansion room; unfortunately, the interior looks messy and confusing. This Pentium III-500 system earned a score of 230 on our PC WorldBench 98 tests—average for its class.
BEST USE: The Sierra LE would make an excellent small-office addition for budget-conscious users.

7 MICRON MILLENNIA C466

WHAT'S HOT: The Micron Millennia C466 posted a 213 on PC WorldBench 98, a new high for a Celeron 466–based PC. The minitower PC features color-coded rear ports for easy setup and includes a year of training with the company's Micron University Internet service.
WHAT'S NOT: Text and images on the 17-inch 700VX monitor blurred at the ▶

Refurbished PCs: What Are They Worth?

TECH TREND WITH THE ADVENT of so-called free PCs and cheap PCs similar to those on our budget chart, you might think refurbished computers—used PCs that have been repaired—are going the way of disposable pull tabs on soda cans. But if you have the need and the budget for a low-end machine, a refurbished computer may be worth investigating.

Jim Aspinwall, coauthor of *Troubleshooting Your PC* and author of *IRQ, DMA & I/O*, says $300 buys a solid second system for Web surfing, sending e-mail, and handling other low-intensity tasks. That price covers a refurbished PC with a 100- to 180-MHz processor, a 2GB hard drive, 16MB to 32MB of RAM, and a 14-inch monitor. It won't run Quake III or fly across the Web at warp speed, but it will serve as an inexpensive and sensible dorm-room system for a PC-savvy student. Most major manufacturers sell refurbished PCs on their Web sites, as do smaller outfits such as www.computerrenaissance.com.

Spokesperson Hedy Baker of Compaq (which deals in refurbished PCs), agrees: "I think there's a market for refurbished PCs," she says. "It's a different customer set that buys them. It's users familiar with PCs, probably not your first-time buyer." Aspinwall concurs, emphasizing that buying a refurbished PC is not to be taken lightly. Such systems often have OS and upgrade issues, and since Microsoft forbids transfer of licensing on Windows, significantly upgrading an older PC isn't cost-effective. Even so, for certain penny-pinchers "refurbies" might be just the ticket.

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FINGER-FRIENDLY: Nutrend's Sierra LE sports a multimedia keyboard with lots of one-touch keys.

highest resolution of 1280 by 1024. Integrated sound and video and few openings (one PCI slot, one ISA slot, and no AGP connection) make multimedia upgrades difficult. The standard case requires a screwdriver to open.

WHAT ELSE: The software bundle offers Microsoft Office 97 Small Business Edition, Micron Easy Internet, Norton Anti-Virus, and a Micron Tutorial CD-ROM.

BEST USE: The speed and affordable price ($1158) of this system make it a decent deal for small office/home office users.

8 MICRO EXPRESS MICROFLEX-40C

WHAT'S HOT: With its AMD K6-III-400 CPU, the $999 MicroFlex-40C posted a respectable PC WorldBench 98 score of 215. The spacious midsize tower houses 128MB of RAM (most similar PCs have 64MB). The Impression 5VX monitor displays sharp images at all resolutions.

WHAT'S NOT: You don't need a screwdriver, but the case is puzzling to open. Documentation consists of a setup poster, an adequate but generic system manual, and

a CD-ROM version of the manual. The reset button looks confusingly like the wake-up button.

WHAT ELSE: Only Norton AntiVirus comes bundled with the system; all other applications are sold à la carte. For gaming, the Altec Lansing ACS44 speakers and Diamond Monster Fusion video card offer adequate sound and visuals, though the graphics board seems like overkill when teamed with the 15-inch monitor.

BEST USE: This Micro Express system has lots of power. Consider it if you're looking to replace an older and slower machine—and if you already have all the day-to-day software you need.

9 PC CONNECTION EPIQ BPS4000

WHAT'S HOT: PC Connection's Epiq BPS4000 ships with a quick-setup guide, a thick tech-support and warranty booklet, and a thorough system manual with detailed diagrams and illustrations. The interior boasts ample expansion room and includes six open drive bays and three open slots. PC Connection provides a lifetime warranty on parts and labor; and with a sticker price of $988, the Epiq BPS4000 won't break your budget.

WHAT'S NOT: You get what you pay for. The flimsy keyboard's keys rest too close together, and the Midiland Mli 691 PA speakers produce distorted sound. Most PCs (even others on the budget chart) include more storage space than the Epiq's puny 6.4GB hard drive offers. The 17-inch Epiq Pionex P708 monitor produced dull colors in our test images; headache-inducing, fuzzy text at 1024 by 768 resolution; and almost illegible text at the maximum resolution of 1280 by 1024.

WHAT ELSE: To reach the Epiq's interior, you must first remove three screws. The system earned a score of 206 on PC WorldBench 98, which is average for a Cel-

eron-466 system running Windows 98.

BEST USE: Spending a little bit more money to obtain a better monitor might make the Epiq tolerable for offices on very tight budgets, but we've seen better alternatives for the money.

10 ACERPOWER 4300 CELERON 500

NEW WHAT'S HOT: At $875, Acer's AcerPower 4300 doesn't put your wallet in intensive care. The system's thick manual contains lots of helpful information and useful illustrations for beginners. The midsize tower case opens and closes easily, aided by three large thumbscrews. The system comes with a network card.

WHAT'S NOT: With a score of 186 on our PC WorldBench 98 tests, this Celeron-500-based PC has less oomph than the average Celeron-400 system. With only two open slots and three open drive bays, it gives you limited expansion options.

WHAT ELSE: Colors appear a bit dark on the Acer 77C 17-inch monitor, and text displays remain crisp to a maximum resolution of only 1024 by 768. Acer cut costs on this budget system by omitting a set of speakers and opting for integrated graphics and audio chips.

BEST USE: With its network card, the AcerPower 4300 makes an inexpensive choice for a corporation more avid to save money than to gain performance. ▶

UNDER LOCK AND KEY:
The AcerPower 4300 Celeron 500, an affordable managed PC, boasts a few security features, including a case lock. The intruder alert notifies you when an unauthorized person accesses the PC.

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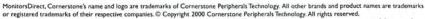
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TOP 15 NOTEBOOK PCs

POWER NOTEBOOK: $2700 AND OVER	Month tested	★ Overall rating	Street price (11/5/99)	PC WorldBench 98 performance score ⬛Faster▶		Base configuration
1 Gateway Solo 9300LS 800/315-2536 www.gateway.com	(NEW)	92	Inexpensive: $2870	Very good	216	**Very good:** Pentium III-450, 15-inch active screen, touchpad, 96MB of RAM, 6.4GB hard drive
2 Dell Inspiron 7500 R500VT 800/388-8542 www.dell.com	(NEW)	84	Very expensive: $4101	Outstanding	236	**Good:** Pentium III-500, 15-inch active screen, touchpad, 128MB of RAM, 25GB hard drive
3 NEC Versa SX 888/632-8701 www.nec-computers.com	Nov 99	78	Average: $3108	Satisfactory	192	**Very good:** Pentium II-400, 14.1-inch active screen, touchpad, 64MB of RAM, 6GB hard drive
4 Micron TransPort NX PII-400 800/642-7667 www.micronpc.com	Oct 99	78	Average: $3337	Good	202	**Outstanding:** Pentium II-400, 15.1-inch active screen, touchpad, eraserhead, 128MB of RAM, 14GB hard drive
5 Compaq Armada M700 800/345-1518 www.compaq.com	Dec 99	78	Very expensive: $3799	Satisfactory	191	**Good:** Pentium II-400, 14.1-inch active screen, eraserhead, 64MB of RAM, 6.4GB hard drive
MIDRANGE NOTEBOOK: $1700 TO $2699 Percent of overall rating ▶			Price: 14 percent	Performance: 20 percent		Base configuration: 5 percent
1 Dell Inspiron 3700 C466GT 800/388-8542 www.dell.com	(NEW)	80	Expensive: $2606	Very good	194	**Very good:** Celeron-466, 14.1-inch active screen, touchpad, eraserhead, 64MB of RAM, 10GB hard drive
2 IBM ThinkPad I Series 1480 800/426-7255 x4751 www.ibm.com/pc/us/thinkpad	Jan 2000	78	Average: $2399	Good	183	**Very good:** Celeron-466, 14.1-inch active screen, touchpad, eraserhead, 64MB of RAM, 6.4GB hard drive
3 Sony VAIO PCG-F340 888/315-7669 www.sony.com/pc	Jan 2000	77	Very inexpensive: $1799	Very good	187	**Good:** Pentium II-366, 13-inch dual-scan screen, touchpad, 64MB of RAM, 6.4GB hard drive
4 Micro Express NP7400 800/989-9900 www.microexpress.net	Jan 2000	77	Inexpensive: $1899	Very good	189	**Very good:** Pentium II-400, 14.1-inch active screen, touchpad, 64MB of RAM, 6GB hard drive
5 Dell Latitude CPi A366XT 800/388-8542 www.dell.com	May 99	76	Expensive: $2689	Good	184	**Good:** Pentium II-366, 13.3-inch active screen, touchpad, 64MB of RAM, 6.4GB hard drive
BUDGET NOTEBOOK: UNDER $1700 Percent of overall rating ▶			Price: 17 percent	Performance: 17 percent		Base configuration: 5 percent
1 HP Pavilion Notebook PC 800/322-4772 www.hp.com	Jan 2000	83	Average: $1599	Outstanding	185	**Satisfactory:** Celeron-433, 12.1-inch active screen, touchpad, 64MB of RAM, 4.8GB hard drive
2 Compaq Prosignia Notebook 150 800/345-1518 www.compaq.com	Nov 99	79	Average: $1499	Good	153	**Good:** AMD K6-2-380, 12.1-inch active screen, touchpad, 64MB of RAM, 4GB hard drive
3 Enpower ENP-313 Pro 800/997-2258 www.enpower.com	(NEW)	77	Average: $1499	Outstanding	184	**Good:** Celeron-466, 13.3-inch active screen, touchpad, 64MB of RAM, 3.2GB hard drive
4 Sceptre Soundx 5200 800/788-2878 www.sceptre.com	Nov 99	73	Inexpensive: $1339	Satisfactory 141		**Satisfactory:** AMD K6-2-380, 12.1-inch active screen, touchpad, 32MB of RAM, 4GB hard drive
5 AMS Tech Roadster 15CTA380 800/886-2671 www.amstech.com	Aug 99	67	Average: $1495	Poor 115		**Satisfactory:** AMD K6-2-380, 12.1-inch active screen, touchpad, 32MB of RAM, 4GB hard drive
🔲 Best Buy Percent of overall rating ▶			Price: 20 percent	Performance: 14 percent		Base configuration: 5 percent

¹Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.

²For more information about all the products listed in this table, select number 904 on the product information card or visit www.pcworld.com/productinfo.

³Five years on CPU and main memory, one year on other parts.

THE FIRST PENTIUM III notebooks to make the *Top 15 Notebooks* chart kick up tremendous portable performance. Dell's Inspiron 7500 R500VT becomes our new speed king with a scorching PC WorldBench 98 score of 236. It may trail newer desktop PCs, but the Inspiron performs 20 percent faster than the average PII-400 laptop. Only its $4101 price holds it to second place on our power chart, behind Gateway's $2870 PIII-450–based Solo 9300LS.

POWER NOTEBOOKS

1 GATEWAY SOLO 9300LS

WHAT'S HOT: Despite its featherweight price, the Pentium III-450–equipped Solo 9300LS posted a heavyweight PC WorldBench 98 score of 216, beating similarly configured PII-400 notebooks by about 10 percent. Unlike many other big laptop screens, the

Extra features	Design and ease of use	Battery life (hours:min)	Travel weight (pounds) [1]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number [2]
Very good: 10X-24X CD-ROM drive, V.90 modem, multipurpose bay takes second battery, lithium ion battery	**Outstanding:** smoothly designed presenter's dream	**Outstanding:** 5:13	**Average:** 8.6	Good	Good/ Good	24/7, toll-free	3/3	628
Outstanding: 6X DVD-ROM drive, V.90 modem, multipurpose bay takes second battery, lithium ion battery, Zip 100 drive	**Very good:** storage galore and a CD-RW option	**Outstanding:** 4:22	**Very heavy:** 10.4	Good	Good/ Good	24/7, toll-free	3/3	–
Satisfactory: 2X DVD-ROM drive, V.90 modem, multipurpose bay takes second battery, lithium ion battery	**Very good:** thin, light, and stylish	**Satisfactory:** 2:03	**Light:** 6.7	Fair	Fair/ Best	24/7, toll-free	3/3	629
Very good: 4X DVD-ROM drive, V.90 PC Card modem, multipurpose bay takes second battery, lithium ion battery	**Average:** accepts many add-in devices	**Satisfactory:** 2:26	**Heavy:** 9.9	Good	Good/ Fair	24/7, toll-free	Varies ³/1	630
Good: 4X DVD-ROM drive, V.90 modem, multipurpose bay takes second battery, lithium ion battery	**Average:** accepts a wide range of add-ins	**Outstanding:** 4:35	**Light:** 6.6	Fair	Fair/ Fair	24/7, toll-free	3/3	631
Extra features: 5 percent	**Design and ease of use: 10 percent**	**Battery life: 8 percent**	**Weight: 8 percent**	**Reliability: 20 percent**	**Support and warranty: 10 percent**			
Very good: 6X DVD-ROM drive, V.90 modem, multipurpose bay takes second battery, lithium ion battery	**Average:** versatile and colorful	**Outstanding:** 3:31	**Average:** 8.6	Good	Good/ Good	24/7, toll-free	3/3	–
Satisfactory: 4X DVD-ROM drive, V.90 modem, lithium ion battery	**Very good:** innovative Think-Light and covers set it apart	**Outstanding:** 3:44	**Average:** 8.1	Good	Good/ Fair	24/7, toll-free	1/1	–
Very good: 10X-24X CD-ROM drive, V.90 modem, multipurpose bay takes second battery, lithium ion battery	**Very good:** port replicator comes standard	**Satisfactory:** 2:23	**Average:** 8.1	⁴	Fair ⁵/ Good	24/7, toll-free	1/1	632
Satisfactory: 2X DVD-ROM drive, V.90 modem, lithium ion battery	**Very good:** multimedia talents, noisy keyboard	**Very good:** 3:09	**Heavy:** 9.2	⁴	Fair ⁵/ Fair	24/7, toll-free	4/4	633
Good: 10X-24X CD-ROM drive, multipurpose bay takes second battery, V.90 PC Card modem, lithium ion battery	**Very good:** easy to upgrade	**Satisfactory:** 2:15	**Average:** 7.0	Good	Good/ Best	24/7, toll-free	3/3	–
Extra features: 5 percent	**Design and ease of use: 10 percent**	**Battery life: 8 percent**	**Weight: 8 percent**	**Reliability: 20 percent**	**Support and warranty: 10 percent**			
Satisfactory: 10X-24X CD-ROM drive, V.90 modem, lithium ion battery	**Average:** all-in-one with external CD controls	**Good:** 2:42	**Average:** 7.4	Good	Good ⁵/ Poor	24/7, toll call	1/1	634
Satisfactory: 12X-24X CD-ROM drive, V.90 modem, lithium ion battery	**Very good:** superb built-in sound	**Satisfactory:** 2:19	**Average:** 8.1	Fair	Fair/ Fair	24/7, toll-free	3/1	635
Satisfactory: 12X-24X CD-ROM drive, V.90 PC Card modem, lithium ion battery	**Poor:** basic laptop, but carries a fast chip	**Satisfactory:** 2:10	**Average:** 7.2	⁴	Fair ⁴/ Fair	11/6, toll-free	1/1	636
Poor: 10X-20X CD-ROM drive, V.90 modem, NiMH battery	**Average:** CD player accessible when laptop is closed	**Satisfactory:** 2:22	**Average:** 8.1	⁴	Good ⁵/ Fair	9/5, toll-free	1/1	637
Satisfactory: 12X-24X CD-ROM drive, V.90 modem, NiMH battery	**Poor:** memory and hard drive not upgradable	**Good:** 2:35	**Average:** 8.1	⁴	Fair ⁵/ Fair	11/5, toll-free	3/3	638
Extra features: 5 percent	**Design and ease of use: 10 percent**	**Battery life: 8 percent**	**Weight: 8 percent**	**Reliability: 20 percent**	**Support and warranty: 10 percent**			

⁴ Insufficient data to give a rating.
⁵ Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.

Solo's 15-inch display feels sturdy. The unit's 12-cell lithium ion battery far outlasted other power packs in our tests, running for a record-breaking 5.2 hours. **WHAT'S NOT:** Unlike Sony's VAIO notebooks (among others), Gateway doesn't provide any video-editing software to complement its high-speed IEEE 1394 port (often used to connect digital video cameras). The Gateway's speakers are fairly loud, but they lack strong bass response and sound fuzzy at higher volumes.

WHAT ELSE: This beefy desktop replacement bulges with multimedia connections. It offers TV-in and -out ports and a Dolby jack for connecting a Surround Sound stereo system. The polished, black 9300LS also boasts easy-access audio CD buttons, and it has ▶
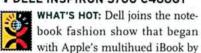
PUSH MY BUTTONS:
The Gateway Solo 9300LS's front-mounted buttons let you control its CD-ROM drive.

programmable keyboard shortcut buttons for launching applications. You can swap the floppy drive with a second hard drive of up to 10GB (which costs $499), a SuperDisk drive ($75), or a second battery ($100). And, for users constantly watching battery life, a charge indicator on the outside of the notebook is a useful feature. **BEST USE:** Presenters and digital editors will appreciate this beautifully designed, reasonably priced notebook most.

MIDRANGE NOTEBOOKS

1 DELL INSPIRON 3700 C466GT

WHAT'S HOT: Dell joins the notebook fashion show that began with Apple's multihued iBook by offering the Inspiron 3700 in a choice of two colors: Storm Grey or Tahoe Blue. The Inspiron 3700 is the first Dell notebook to come with touchpad *and* eraserhead pointing devices. The Inspiron 3700 offers a comfy keyboard, and its case allows easy memory and hard-drive upgrades. It also comes with a convenient docking connection that works with an optional $199 port replicator.

Ciao, Infrared

TECH TREND FUJITSU'S Lifebook C-6330 offers an unusual screen-mounted port that lets you use an infrared wireless mouse (a $49 option). It may not be long, however, before many notebooks follow the example of IBM's ThinkPad I Series 1480 (number two on our midrange chart) and do away with infrared altogether.

By mid-2001, a wireless technology called Bluetooth will arrive that can transmit data at 1 mbps across distances of up to 30 feet. Unlike infrared, it won't require devices to be positioned in a straight line.

Other companies are betting that wireless PC Cards will make this kind of data exchange popular. Newly available $250 PC Cards based on the IEEE 802.11 wireless ethernet standard can transmit data at up to 11 mbps as far as 300 feet. Another standard, HomeRF (the RF stands for radio frequency), will be slower than IEEE 802.11, operating at 1.6 mbps, but the products that are based on it will cost less.

PLAY IT AGAIN, HP: The Pavilion Notebook PC will play CDs even when the notebook is turned off.

WHAT'S NOT: Dell now offers only a PC Card option in place of a modem. The eraserhead's mouse buttons are concave and half the size of the touchpad's buttons, making navigation uncomfortable. **WHAT ELSE:** Compared with other Celeron-466 notebooks we've tested, the 3700 is a midrange performer. It's a hair thicker than the 3500 series it replaces. You can also swap in the DVD-ROM or floppy drive (both included) or a second battery ($119). You can use the floppy drive alongside any of these options by attaching it to the notebook's parallel port. Or, snap a dummy module into the drive bay and drop the 3700's weight to 6.2 pounds. An S-video TV-out port lets you watch DVD movies on your television, but otherwise the Inspiron 3700 skimps on audiovisual extras. The battery lasts an above-average 3.5 hours.
BEST USE: With its unique case colors, big screen, and flexibility, the Inspiron 3700 makes a fun, capable desktop replacement for small businesses.

BUDGET NOTEBOOKS

1 HP PAVILION NOTEBOOK PC

WHAT'S HOT: This versatile notebook also serves as a stand-alone audio CD player. Frontside buttons let you play CDs without turning the notebook on or even raising the screen. The stereo speakers don't sound as powerful as the Compaq Prosignia's, but they're not bad.

WHAT'S NOT: The skimpy parts-and-labor warranty on the Pavilion expires after one year. Extending the warranty to three years costs an extra $179. With a PC WorldBench 98 score of 185, the Celeron-433-based Pavilion performs no better than a typical PII-366 notebook. Also, the headphones port is awkwardly located on the back of the notebook, and the shallow CD control buttons are hard to read and press.
WHAT ELSE: The $1599 Pavilion comes loaded with software, including Microsoft Works and Money 99, and Quicken Basic 99. It's also relatively thin and light for a notebook with built-in floppy and CD-ROM drives: just 1.7 inches tall and 6.6 pounds (not including the AC adapter). The Pavilion's svelte design features a 12.1-inch active screen; a quiet, comfortable keyboard; a port replicator

GOT THE NOTEBOOK BLUES? Dell's Inspiron 3700 C466GT not only sports a snazzy "Tahoe blue" case, it comes with both eraserhead and trackpad pointing devices.

connector; and an easy-to-access interior.
BEST USE: Despite HP's stingy support, the Pavilion is a reasonably priced, well-designed notebook for home or work.

Contributing Editor Carla Thornton regularly covers notebooks for PC World. ■
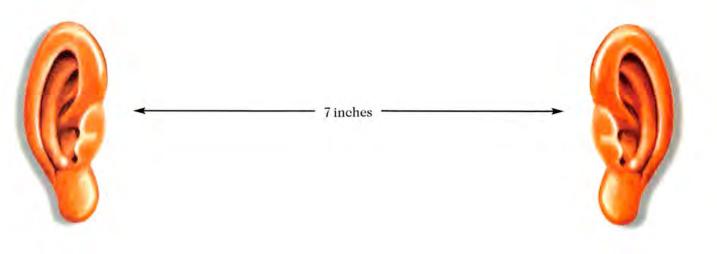
BEYOND THE TOP 15

WE EVALUATED the following systems along with the others, but they didn't score high enough to reach the Top 15 Notebook PCs chart. For write-ups, visit PC World Online (www.pcworld.com/top400).

◆ Fujitsu LifeBook C-6330
◆ Twinhead PowerSlim 600-36 TZ43

←——— 7 inches ———→

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When we say anybody, we mean ANYBODY can instantly write, play and re-write CDs at home or on the road. And from any IBM-compatible Pentium desktop or notebook. Our brainy parallel port technology offers both superior performance and universal fit. Simply plug the backpack cd-rw into your parallel printer port. Then plug your printer into the backpack cd-rewriter. As if that weren't easy enough, we're now the first and only to offer parallel port "hot pluggability," which means you can attach and detach the drive without restarting your computer!

The backpack cd-rw writes and rewrites at 4x, just as fast as internal models, so you can make a full CD in 20 minutes. It comes in two sleek versions, measuring about the same width as the average human head: the classic desktop model and the portable bantam. Our new PC Card adapter gives you the versatility of dual port connection and faster read-back speeds.

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TOP 15 HOME PCs

	POWER SYSTEM: $2000 AND OVER	Month tested	★ Overall rating	Street price (11/5/99)	PC WorldBench 98 performance score [1] ◄ Faster ►	Base configuration [2]
1	Dell Dimension XPS T650r 800/388-8542 www.dell.com	(NEW)	92	Average: $2559	Outstanding 278	Pentium III-650, 128MB of RAM, 256KB L2 cache, 20.4GB hard drive, midsize tower case, 19-inch monitor, Windows 98
2	Compaq Presario 5900Z 800/345-1518 www.compaq.com	Dec 99	85	Inexpensive: $2021	Outstanding 267	AMD Athlon-600, 128MB of RAM, 512KB L2 cache, 13.5GB hard drive, midsize tower case, 19-inch monitor, Windows 98
3	ABS All In Wonder System 1 800/876-8088 www.buyabs.com	Dec 99	84	Inexpensive: $2199	Very good 254	Pentium III-600, 256MB of RAM, 512KB L2 cache, 27GB hard drive, midsize tower case, 19-inch monitor, Windows 98
4	Axis Systems Orion 100X DVD 800/378-9014 www.axissys.com	Dec 99	83	Inexpensive: $2229	Good 246	Pentium III-600, 256MB of RAM, 512KB L2 cache, 18GB hard drive, midsize tower case, 19-inch monitor, Windows 98
5	Sony VAIO Digital Studio PCV-R539DS 888/315-7669 www.sony.com/pc	Dec 99	83	Average: $2349	Good 233	Pentium III-550, 128MB of RAM, 512KB L2 cache, 17GB hard drive, minitower case, 17-inch monitor, Windows 98
	MIDRANGE SYSTEM: $1200 TO $1999	Percent of overall rating ►		Price: 10 percent	Performance: 20 percent	
1	Dell Dimension XPS T500 800/388-8542 www.dell.com	Dec 99	92	Average: $1710	Good 228	Pentium III-500, 128MB of RAM, 512KB L2 cache, 13.6GB hard drive, midsize tower case, 17-inch monitor, Windows 98
2	Micron Millennia C500 800/642-7667 www.micronpc.com	Dec 99	89	Inexpensive: $1328	Satisfactory 199	Celeron-500, 64MB of RAM, 128KB L2 cache, 8.5GB hard drive, midsize tower case, 19-inch monitor, Windows 98
3	Quantex M500c 800/896-4898 www.quantex.com	Dec 99	87	Very inexpensive: $1299	Good 213	Celeron-500, 128MB of RAM, 128KB L2 cache, 13GB hard drive, midsize tower case, 19-inch monitor, Windows 98
4	Micron Millennia Max 533 800/642-7667 www.micronpc.com	(NEW)	87	Average: $1717	Very good 236	Pentium III-533, 128MB of RAM, 512KB L2 cache, 13.7GB hard drive, midsize tower case, 17-inch monitor, Windows 98
5	Gateway Essential 500 800/315-2536 www.gateway.com	Dec 99	86	Inexpensive: $1449	Very good 230	Pentium III-500, 128MB of RAM, 512KB L2 cache, 13.6GB hard drive, midsize tower case, 17-inch monitor, Windows 98
	BUDGET SYSTEM: UNDER $1200	Percent of overall rating ►		Price: 20 percent	Performance: 15 percent	
1	Micron Millennia C466 800/642-7667 www.micronpc.com	Dec 99	88	Average: $953	Outstanding 203	Celeron-466, 64MB of RAM, 128KB L2 cache, 4.3GB hard drive, midsize tower case, 15-inch monitor, Windows 98
2	Dell Dimension L466c 800/388-8542 www.dell.com	(NEW)	87	Expensive: $1159	Outstanding 205	Celeron-466, 64MB of RAM, 128KB L2 cache, 6.5GB hard drive, midsize tower case, 15-inch monitor, Windows 98
3	Quantex M466c 800/896-4898 www.quantex.com	(NEW)	85	Average: $999	Outstanding 209	Celeron-466, 64MB of RAM, 128KB L2 cache, 13.6GB hard drive, midsize tower case, 17-inch monitor, Windows 98
4	Sony VAIO Digital Studio PCV-R532DS 888/315-7669 www.sony.com/pc	Dec 99	81	Expensive: $1148	Very good 195	Celeron-466, 64MB of RAM, 128KB L2 cache, 10GB hard drive, minitower case, 17-inch monitor, Windows 98
5	Gateway Essential 400c 800/315-2536 www.gateway.com	Dec 99	81	Average: $999	Good 182	Celeron-400, 32MB of RAM, 128KB L2 cache, 6.5GB hard drive, minitower case, 15-inch monitor, Windows 98
	Best Buy	Percent of overall rating ►		Price: 25 percent	Performance: 15 percent	

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 187.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

SOME PEOPLE NEED SPEED—pure and simple. If this is what you're craving, check out Dell's new Dimension XPS T650r. This is our first look at a Pentium III-650-based home PC, and its stellar performance comes as no surprise, compared to other systems with older CPUs. With a PC WorldBench 98 score of 278, this speed demon sets the record as the fastest home PC we've ever tested.

POWER HOME PCs

1 DELL DIMENSION XPS T650R

WHAT'S HOT: Dell's Dimension XPS T650r boasts blistering speed—it's the top performer for this current mix of home machines. In our multimedia tests, we saw lightning-fast frame rates on AVI playback and 3D

Extra features	Setup/ease of use	Graphics	Reliability/support	Comments	Product info number [3]
Very good: NVidia GeForce 256 AGP graphics board with 32MB of SDRAM, 8X DVD-ROM, V.90 modem, Iomega Zip 100 drive	Outstanding/Very good	Good	Outstanding/Outstanding	**PRO:** Sizzling performance, top-notch reliability and support. **CON:** Tinny audio, most expensive home PC on chart.	–
Good: 3dfx Voodoo3 3500 graphics board with 16MB of SDRAM, 8X DVD-ROM drive, V.90 modem	Good/Good	Good	Fair/Fair	**PRO:** Superb speed, vibrant graphics, amazing sound system. **CON:** Drive bay cover can be a nuisance, no free ISA slots.	649
Very good: Matrox G400 graphics board with 32MB of SGRAM, 6X DVD-ROM drive, V.90 modem	Satisfactory/Good	Good	•	**PRO:** $400 price drop, gigantic hard drive. **CON:** Slight dithering on its middle-of-the-road graphics.	650
Very good: Diamond Viper V770 graphics board with 32MB of SDRAM, 6X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	Good/Satisfactory	Good	•	**PRO:** $387 price cut, monitor sports bright colors, booming audio system. **CON:** Piecemeal manuals, lacks set-up sheet.	651
Good: ATI Xpert 128 graphics board with 16MB of SDRAM, 8X DVD-ROM drive, V.90 modem, Sony 4X4X24 CD-RW drive	Outstanding/Satisfactory	Good	Good/Fair	**PRO:** Good graphics performer, lots of useful video-editing software. **CON:** Middle-of-the-road speed and sound.	652
Extra features: 15 percent	Setup/ease of use: 5 percent	Graphics: 15 percent	R & S: 35 percent		
Good: 3dfx Voodoo3 3000 graphics board with 16MB of SDRAM, 8X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	Outstanding/Very good	Good	Outstanding/Outstanding	**PRO:** Second-fastest midrange home machine. **CON:** Expensive compared to competing systems.	–
Good: integrated NVidia RIVA 128 graphics with 8MB of SGRAM, 17X-40X CD-ROM drive, V.90 modem	Good/Very good	Satisfactory	Good/Good	**PRO:** Good monitor, excellent audio, includes ethernet card. **CON:** Middling performance, only 64MB of RAM.	653
Good: integrated Intel 810 graphics with UMA, 6X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	Good/Very good	Satisfactory	Good/Good	**PRO:** Bargain price, good monitor, includes WordPerfect Office 2000. **CON:** Slow 3D graphics performance, mediocre speakers.	654
Good: Diamond Viper V770 graphics board with 16MB of SDRAM, 8X DVD-ROM drive, V.90 modem	Outstanding/Good	Good	Good/Good	**PRO:** Fastest performer here, quick setup, Microsoft Office 2000. **CON:** Small fonts fuzzy at high resolutions, lackluster audio.	655
Good: 3dfx Voodoo3 3000 graphics board with 16MB of SDRAM, 6X DVD-ROM drive, V.90 modem, ink jet printer	Satisfactory/Very good	Good	Fair/Good	**PRO:** Good speed for the price, runs 3D games well, built-in ethernet port. **CON:** Low-quality monitor.	656
Extra features: 10 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 35 percent		
Satisfactory: integrated NVidia RIVA 128ZX graphics with 8MB of SGRAM, 17X-40X CD-ROM drive, V.90 modem	Satisfactory/Good	Satisfactory	Good/Good	**PRO:** $124 price drop on fast system, multimedia keyboard. **CON:** Limited expandability, poor-sounding speakers.	657
Satisfactory: integrated Intel 810 graphics with 4MB of 3D cache, 22X-48X CD-ROM drive, V.90 modem	Good/Good	Satisfactory	Outstanding/Outstanding	**PRO:** Great performance, good-quality monitor, easy interior access, well-organized setup documentation. **CON:** Inflexible keyboard.	–
Satisfactory: integrated Intel 810 graphics with UMA, 6X DVD-ROM drive, V.90 modem, Canon BJC-1000 bubble jet printer	Good/Satisfactory	Satisfactory	Good/Good	**PRO:** Terrific value, fast, roomy interior with easy access. **CON:** Small fonts blurry, scant software bundle, simplistic manual.	658
Satisfactory: integrated Intel 810 graphics with 4MB of 3D cache, 8X DVD-ROM drive, V.90 modem	Outstanding/Very good	Satisfactory	Good/Fair	**PRO:** Has 17-inch monitor, includes Word and Adobe PhotoDeluxe. **CON:** Not enough power for digital video editing.	659
Satisfactory: integrated ATI Rage 128 graphics with 8MB of SDRAM, 14X-40X CD-ROM drive, V.90 modem, ink jet printer	Satisfactory/Very good	Good	Fair/Good	**PRO:** Clearly marked cables ease setup, price includes ink jet printer. **CON:** Scanty 32MB of RAM, messy interior.	660
Extra features: 5 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 35 percent		

[3] For more information about the products listed in this table, select number 906 on the product information card or visit www.pcworld.com/productinfo.

• Insufficient data to give a rating.

games, thanks in part to the high-end NVidia GeForce 256 AGP graphics card. Dell's 19-inch M990 monitor displayed luscious colors in our graphics tests, and it generated crisp text at 1280 by 1024 resolution, even with small fonts. Dell's version of the Microsoft Natural Keyboard Pro comes with programmable buttons, multimedia controls, and two USB ports.

WHAT'S NOT: The XPS T650r is the most expensive home PC on the chart. The swank Harman/Kardon HK595 speakers and subwoofer account for some of its $2559 cost. But the hefty black subwoofer is paired with speakers that deliver only moderate volume and slightly above- ▶

DELL'S $2559 DIMENSION
XPS T650r has a Microsoft Natural Keyboard with a row of programmable buttons at the top.

average tonal quality. Another quibble: We had to bump up the monitor's brightness to view DVDs comfortably, then return to original settings for other tasks. **WHAT ELSE:** The XPS T65or offers good expandability, with three open drive bays and three open slots. A plastic bar spanning the front of the case blocks access to several of the PCI slots, although it can easily be removed. Dell includes a clearly illustrated setup poster and a handy reference pamphlet. Plus, the well-organized reference and troubleshooting guide tackles key maintenance issues. Dell's software bundle includes Microsoft Works 4.5 and Microsoft Web Publishing.

BEST USE: A great PC for the power user who wants expandability options.

MIDRANGE HOME PCs

1 DELL DIMENSION XPS T500

WHAT'S HOT: This Dell uses a 3dfx Voodoo3 3000 card (with a TV-out port) to deliver strong graphics and a Turtle Beach Montego II sound card with Altec Lansing ACS340 speakers to produce crisp sound. An easy-to-use CD-player interface makes adjusting audio settings a breeze. The XPS T500 also comes with an Iomega Zip 100 drive.

WHAT'S NOT: At $1789, this is the most expensive midrange home PC.

WHAT ELSE: With a PC WorldBench 98 score of 228, the XPS T500 is plenty fast for most office applications. Videos played back smoothly. The system is equipped with Microsoft Works Suite 99 and even a game—Descent FreeSpace.

THE DELL DIMENSION XPS T500 offers very good performance and great graphics for a midrange PC.

BEST USE: The Dimension XPS T500 is a good all-around workhorse for office tasks and games, but the thin software bundle may disappoint first-time buyers.

BUDGET HOME PCs

1 MICRON MILLENNIA C466

WHAT'S HOT: With a Celeron-466 CPU and an integrated NVidia Riva 128ZX graphics chip, Micron's Millennia C466 is pretty fast for a budget machine, earning a PC WorldBench 98 score of 203. Its keyboard sports a handy volume knob, CD player controls, and Internet access buttons.

WHAT'S NOT: After using a screwdriver to remove the cover, you'll find only one free memory slot, one open PCI slot, and one open ISA slot. The power supply restricts access to the CD-ROM drive and the one free externally accessible drive bay. On top of that, the bundled Advent AV009 speakers sound a bit tinny and flat.

WHAT ELSE: Well-marked cables and connectors aid setup. The printed manual provides good instruction, but the text is geared for experienced users. Microsoft Works Suite 99 is the only notable bundled software.

BEST USE: With above-average speed, the Millennia C466 is an inexpensive workhorse for standard office tasks.

New This Month

WE RECENTLY tested seven new systems. Although Dell's Dimension XPS T65or earned a Best Buy, two other chartmakers are worthy of mention as well.

For a midrange PC, Micron's $1717 Millennia Max 533 is affordable and fast. The system's PC WorldBench 98 score of 236 is average for its configuration but offers lots of room to expand. Five free PCI slots, three free externally accessible drive bays, and two free internal drive bays are up for grabs. Better yet, the case sports an easy-off door and provides unobstructed access to all the PC's innards.

Good color-coding of the connectors and cables made the setup process

straightforward and very easy. Although Micron's 17-inch 700CX monitor generally displayed rich colors and clear text, small fonts looked fuzzy at resolutions higher than 800 by 600 pixels. And audiophiles will be unimpressed by the flat, tinny sound of the bundled Monsoon MC-200 speakers and subwoofer.

The Quantex M466c is a great deal for a budget system. The $999 price includes a Canon BJC-1000 ink jet printer. The M466C's PC WorldBench 98 score of 209 ranks it above average for a Celeron-466. And the roomy interior can accommodate expansion cards and extra drives

A SWEET DEAL: Micron's $953 Millennia C466 is ideal for a budget home machine—very fast and very cheap.

in its two free slots and three free bays.

On the downside, the MidiLand MLi-450 speakers and subwoofer produced mediocre sound when playing audio CDs and muddled sounds when playing a DVD movie. The 17-inch Quantex AT897C-1 monitor didn't fare so well, either. The smallest fonts looked blurry when displayed at 1280 by 768 pixels.

Kirk Steers is a contributing editor for PC World. *Joel Strauch is a freelance writer in the San Francisco Bay Area.* ∎
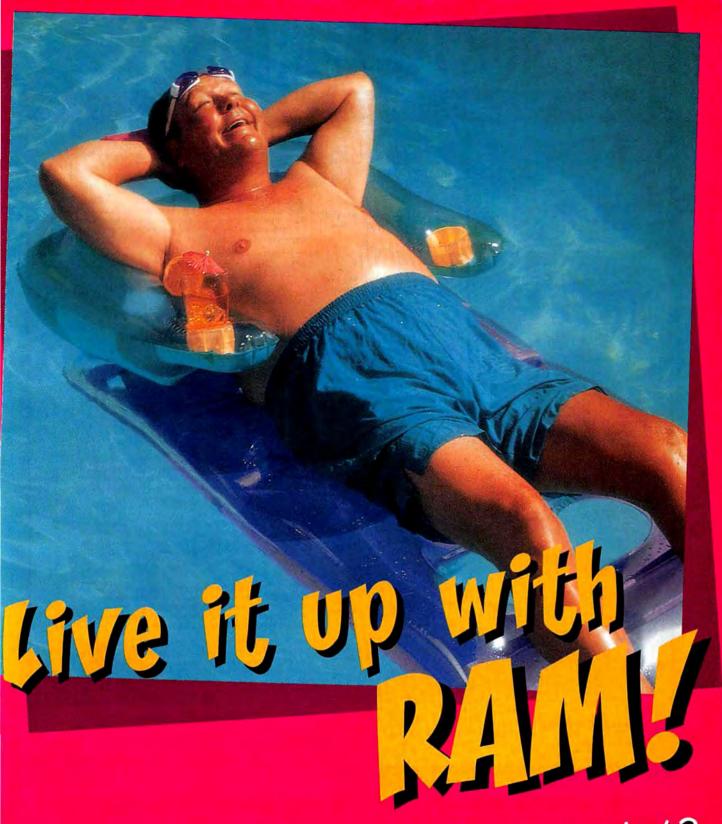
BEYOND THE TOP 15

WE EVALUATED the following systems along with the others, but they didn't score high enough to reach the Top 15 Home PCs chart. For write-ups, visit PC World Online (www.pcworld.com/top400/newhomepcs).

- ◆ HP Pavilion 8550c
- ◆ HP Pavilion 8575c
- ◆ Micron Millennia C500

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PC Computing Magazine

TOP 10 PRINTERS

	COLOR INK JET PRINTER	Street price (11/8/99)	Overall rating	Speed for plain text/full-page graphics (ppm)	Print quality for text/color graphics	Comments	Product info number
1	HP DeskJet 812C 800/752-0900 www.hp.com	$149	91	3.7/0.5	Good/ Good	**FEATURES:** Rated 5.1 ppm monochrome/3.1 ppm color. 600-by-600-dpi maximum resolution, 100 sheets input, 50 output. **SUMMARY:** Admirable print quality, especially at this price. Printer is nearly identical to the HP DeskJet 882C, but costs $100 less and is slower at both graphics and text. Consumables costs add up quickly.	661
2	HP DeskJet 970Cse 800/752-0900 www.hp.com	$399	85	4.3/0.7	Very good/ Good	**FEATURES:** Rated 6.5 ppm monochrome/5.3 ppm color. 600-by-600-dpi maximum resolution, 150 sheets input, 50 output. **SUMMARY:** Great small-office printer with built-in duplexer produces good-looking text and lines. Colors on graphics appear a bit faded, though output improves dramatically on ink-jet paper.	662
3	Canon BJC-6000 800/652-2666 www.ccsi.canon.com	$199	85	4.4/1.1	Very good/ Adequate	**FEATURES:** Rated 8 ppm monochrome/5 ppm color. 1440-by-720-dpi maximum resolution, 130 sheets input, 130 output. **SUMMARY:** This reasonably priced ink jet offers strong text print quality and optional networking, but graphics could be better. Text printing is the second-fastest on the chart.	663
4	Lexmark Z51 Color Jetprinter 800/539-6275 www.lexmark.com	$249	83	3.9/0.5	Good/ Very good	**FEATURES:** Rated 10 ppm monochrome/5 ppm color. 1200-by-1200-dpi maximum resolution, 100 sheets input, 50 output. **SUMMARY:** This small-business wonder features great extras, including a USB port, and top-notch paper-handling capabilities. Print quality is good, but speed could be better at this price. Lexmark Z31 offers a cheaper, albeit slower, alternative.	664
5	HP DeskJet 882C 800/752-0900 www.hp.com	$249	80	4.3/0.8	Good/ Good	**FEATURES:** Rated 5.1 ppm monochrome/3.6 ppm color. 600-by-600-dpi maximum resolution, 100 sheets input, 50 output. **SUMMARY:** Impressive text and graphics print quality—including realistic photographs—are the hallmarks of this small-office model. Consumables cost less with the 882C than with the DeskJet 812C.	665
6	Compaq IJ750 (NEW) 800/345-1518 www.compaq.com	$150	79	2.7/0.3	Good/ Good	**FEATURES:** Rated 7 ppm monochrome/3.5 ppm color. 1200-by-1200-dpi maximum resolution, 100 sheets input, 25 output. **SUMMARY:** A great deal for the price, this new model delivers good all-around print quality and reasonable performance on text. Images look detailed, but colors can be somewhat off.	666
7	Lexmark Z11 Color Jetprinter 800/539-6275 www.lexmark.com	$99	77	2.2/0.4	Good/ Adequate	**FEATURES:** Rated 4 ppm monochrome/2.5 ppm color. 1200-by-1200-dpi maximum resolution, 100 sheets input, 25 output. **SUMMARY:** Lowest-priced model here delivers acceptable output, particularly considering its single-cartridge design. Colors are adequate, if a bit oversaturated, and text is slightly shadowed.	667
8	Epson Stylus Color 760 (NEW) 800/463-7766 www.epson.com	$229	75	3.8/1.2	Good/ Adequate	**FEATURES:** Rated 7 ppm monochrome/6 ppm color. 1440-by-720-dpi maximum resolution, 100 sheets input, 30 output. **SUMMARY:** Epson's newest midrange ink jet debuts at number seven with sharp text and quick printing on both text and graphics. Photographs looked fit for framing when printed on glossy paper.	–
9	Epson Stylus Color 900 800/463-7766 www.epson.com	$399	74	6.8/2.2	Good/ Good	**FEATURES:** Rated 12 ppm monochrome/10 ppm color. 1440-by-720-dpi maximum resolution, 100 sheets input, 30 output. **SUMMARY:** Blazingly quick performance on both text and graphics, but still pricey compared to the $399 HP DeskJet 970Cse with duplexer. Highlights include a USB port and an overnight exchange warranty. Graphics look a tad dull.	–
10	Lexmark 3200 Color Jetprinter 800/539-6275 www.lexmark.com	$149	71	2.2/0.4	Good/ Good	**FEATURES:** Rated 6 ppm monochrome/2.5 ppm color. 1200-by-1200-dpi maximum resolution, 100 sheets input, 25 output. **SUMMARY:** Offers solid print quality for a reasonable price, but performance is somewhat slow, design could be sturdier, and the unit tends to run noisily. Offers better color graphics quality than the less-expensive Lexmark Z11.	668

Best Buy | Recommended for home | Recommended for printing photos | All products: 907

HOW WE TEST The overall rating we assign to each color ink jet printer is based on a combination of six measures, given the following weightings: 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.

ECONOMISTS SAY AN OLIGOPOLY exists when a small number of companies dominate a market. If the printers we see are any indication, *oligopoly* perfectly describes the situation among ink jet manufacturers: Canon, Epson, Hewlett-Packard, and Lexmark control the vast majority of the market, leaving little room for such contestants as Alps, Brother, NEC, Oki Data, and Xerox. Are the big four engaging in anticompetitive, market manipu-

lation? We don't think so, in part because the others' models are available, but more because, rather than colluding to keep prices high and quality low, the majors compete fiercely in both areas.

This month we retested the Xerox DocuPrint C20, which had performed miserably in February 1999. Since Xerox had a year to improve the C20, we anticipated a splash from the $699 tabloid-size model—but got a dull thud instead. Admirable text quality doesn't offset slow speeds and mediocre graphics output. Needless to say, it didn't make our chart.

Of the five new printers we tested, however, two reach the chart, including one from a company new to the market. Compaq's IJ750, really a repackaged (albeit better-priced) Lexmark Z31, takes the number six spot. Epson's Stylus Color 760, meanwhile, grabs eighth. Among newcomers that don't make the chart, the Epson Stylus Color 860 resembles the 760 in almost every way but runs faster and costs more. Similarly, HP's DeskJet 832C is a high-priced likeness of our Best Buy DeskJet 812C. The only new model that badly misses the chart is Canon's overpriced, underpowered BJC-8200.

MORE CHOICES, MORE CONFUSION

CAN'T DECIDE which to buy? That's no surprise, because printers from the same manufacturer are getting harder to distin-

guish from one another. New Epsons and HPs highlight the quandary.

Epson's $229 Stylus Color 760 turns out text at a zippy 3.8 pages per minute and color graphics at an equally impressive 1.2 ppm. On plain paper, it prints clean text, though graphics look weak. (Using coated ink-jet stock, however, it produces stunning graphics, and on glossy paper, glorious photos.) The 760 comes with a great manual and is generally easy to use, except for a complicated driver. The Stylus Color 860 is identical to the 760 in all but price and text printing speed—add $20 for 0.8 ppm of text speed.

HP's new DeskJet 832C looks like the DeskJet 812C; they even share a manual. But the 832C costs $50 more and doesn't run faster or produce better output, so we can't recommend it over the 812C. One exception: If you print a lot of black text, go for the 832C, which unlike the 812C, is capable of holding either a large-size black ink cartridge or a cheaper, small-size one. (Color costs the same on both models.)

COMPAQ'S HIGHS, CANON'S LOWS

TO PRODUCE THE IJ750, Compaq didn't do much besides change the labels on Lexmark's Z31 and replace names in the manuals. (See "Ultimate Buyers Guide to Color Printers" in the December issue, www.pcworld.com/dec99/color _printers.) The printers' performance is identical, at a leisurely 2.7 ppm on text

MAKING ITS CHART DEBUT at number eight, the $299 Epson Stylus Color 760 offers zippy printing, sharp text, and luscious photos.

and 0.3 ppm on graphics. Print quality on both is equally middle of the road, with solid black text, accurately drawn small letters, and acceptable detail but middling color quality on graphics. Unfortunately, Compaq didn't clean up the documentation—like its Z31 twin, the IJ750 manual is a frustrating mess, with "sidebars" of random facts on every page. But Compaq made the one change that counts most: It priced the IJ750 at $150—$50 less than Lexmark charged for its Z31—making Compaq's version a great deal.

Canon's new BJC-8200 costs the same $399 as HP's DeskJet 970Cse, but that's as far as the resemblance goes. Unlike the HP model's output, the Canon's text looks somewhat gray, and graphics show good texture and detail but mediocre color—unacceptable weaknesses at this price. Coated ink jet paper and glossy stock don't help much (unlike the HP). The BJC-8200 prints text at only 1.8 ppm, slower than any other model we've tested recently, and its 0.2 ppm graphics speed is even farther behind the curve. The HP's price tag also includes a duplexer; the Canon's doesn't.

Like Epson's Stylus Color 760 and 860, the Canon has special driver effects, such as the ability to print an image in sepia tones or to sharpen its focus, usually found only in photo-editing software. Although we won't complain about something extra for free, these features add complexity to their drivers, which may confuse casual users even more.

—*Dan Littman* ∎

PRINT QUALITY SAMPLES

Compaq, Epson Debut With Rich, Dark Text

COMPAQ IJ750
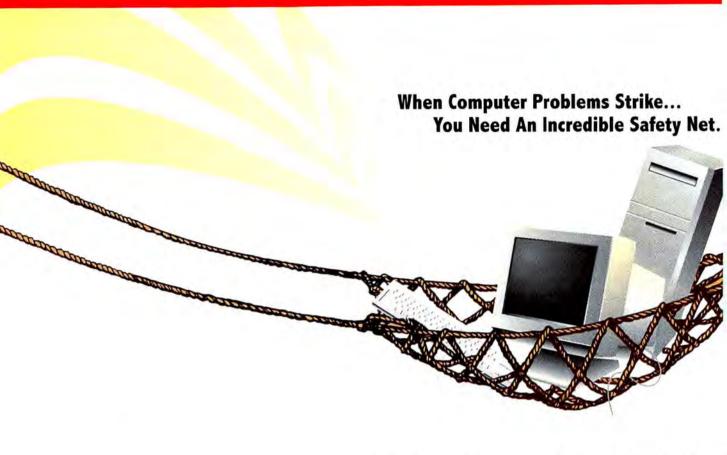
Solid text even at small sizes and detailed gray-scale and color graphics stand out on the affordably priced IJ750, though colors were a bit off on some images.

EPSON STYLUS COLOR 760

You'll get crisp text but somewhat dull graphics with this new chartmaker. For vivid, realistic photographs, try ink jet or glossy stock (not shown).

HP DESKJET 812C

Maintaining its Best Buy status, the 812C generates strong all-around output, with rich, dark letters and smooth gray-scale and full color graphics.

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TOP 10 MONITORS
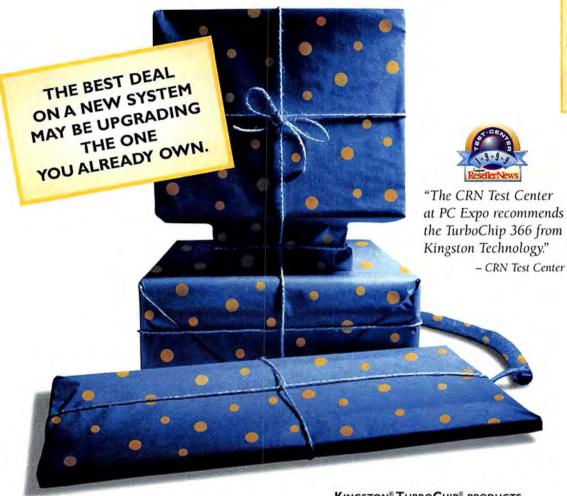
	17-INCH MONITOR	Month tested	Street price (11/15/99)	Overall rating	Quality of text/graphics	Comments	Product info number
1	**Mitsubishi Diamond Plus 71** 800/843-2515 www.mitsubishi-display.com	Nov 99	$329	90	**Excellent/ Excellent**	**FEATURES:** 15.9-inch viewable area, .25mm stripe pitch Diamondtron tube, up to 85-Hz refresh rate,[3] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 12-hour daily toll-free support. **SUMMARY:** Competitive price; best picture quality. Easy-to-navigate controls are set on retracting panel.	713
2	**Sony CPD-E200** 888/476-6972 www.sony.com/displays	(NEW)	$379	89	**Very good/ Excellent**	**FEATURES:** 15.6-inch viewable area, .24-.25mm variable stripe pitch FD Trinitron tube,[3] up to 85-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, one-year warranty, 24-hour toll-free support. **SUMMARY:** Gorgeous colors, razor-sharp text override chintzy warranty. On-screen controls accessed under front bezel.	714
3	NEC MultiSync FE700 800/632-4636 www.nectech.com	(NEW)	$279	87	**Very good/ Excellent**	**FEATURES:** 15.6-inch viewable area, .25-.27mm variable stripe pitch Diamondtron NF tube,[3] up to 97-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 11.5-hour weekday toll-free support. **SUMMARY:** Rich Web-page, photo colors. Text looks very good but lacks the Diamond Plus 71's sharpness.	715
4	Dell UltraScan P780 800/388-8542 www.dell.com	Nov 99	$374	86	**Very good/ Excellent**	**FEATURES:** 15.9-inch viewable area, .24-.25mm variable stripe pitch FD Trinitron tube,[3] up to 100-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Falls two spots, as newer models have slightly better image quality. Small type gets blurry on big spreadsheets.	–
5	Hitachi SuperScan 650 800/441-4832 www.hitachidisplays.com	Jan 2000	$329	86	**Very good/ Excellent**	**FEATURES:** 16-inch viewable area, .26mm dot pitch tube, up to 85-Hz refresh rate,[1] TCO'99 compliant, three-year warranty, 11.5-hour weekday toll-free support. **SUMMARY:** Low-priced model with space-saving design offers brisk colors and crisp text, but support hours are short. On-screen controls require extra button pressing.	716
6	Iiyama VisionMaster Pro 410 800/394-4335 www.iiyama.com	Nov 99	$429	85	**Very good/ Very good**	**FEATURES:** 15.7-inch viewable area, .25-.27mm variable stripe pitch Diamondtron NF tube,[3] up to 115-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 12-hour toll-free support. **SUMMARY:** Cheaper models with better image quality available. On-screen controls require scrolling through submenus.	717
7	Compaq P700 800/345-1518 www.compaq.com/monitors	Nov 99	$458	85	**Very good/ Very good**	**FEATURES:** 16-inch viewable area, .24-.25mm variable stripe pitch FD Trinitron tube,[3] up to 110-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Pricey, but has sophisticated, adjustable controls; excellent 3D. Support includes three years of free on-site service.	718
8	ViewSonic GF775 800/888-8583 www.viewsonic.com	Nov 99	$319	84	**Good/ Good**	**FEATURES:** 16-inch viewable area, .24-.25mm variable stripe pitch FlatTron tube,[3] up to 116-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Cheaper than most flat CRTs, but image quality trails others'. A good choice if you don't do extensive graphics work.	719
9	IBM P76 800/426-7255 www.pc.ibm.com/options	(NEW)	$429	84	**Very good/ Excellent**	**FEATURES:** 15.6-inch viewable area, .24-.25mm variable stripe pitch FD Trinitron tube,[3] up to 117-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Bold graphics offset above-average price and minuscule on-screen controls that are hard to press.	–
10	Philips 107B 877/835-1838 www.pcstuff.philips.com	(NEW)	$379	84	**Very good/ Very good**	**FEATURES:** 15.6-inch viewable area, .25mm dot pitch tube, up to 117-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 16-hour daily toll-free support. **SUMMARY:** Renders colors better than text. Short case, power switch easier to locate than on previous Philips models; back-mounted USB port.	720

Best Buy   For reviews of products that didn't make the chart, visit www.pcworld.com/t10monitors.   All products: 910

HOW WE TEST Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on text and graphics quality (25 percent each), price (25 percent), features and ease of use (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by PC World Test Center. All rights reserved. [1]Highest refresh rate at 1024 by 768 resolution. [2]Plug and Play monitors and graphics cards can communicate bidirectionally. Windows 95 does not fully utilize monitor Plug and Play. [3]Uses an aperture grille with a variable pitch smaller at the center than around the perimeter.

IT'S SURVIVAL of the flattest. Eight of our Top 10 17-inchers sport flat CRTs, including newcomers from Sony (the CPD-E200) and NEC (the MultiSync FE700). Both land high on the chart, thanks to their luscious colors—great for graphics pros. IBM's P76 finds a place on the chart due to its vibrant colors, and the new Philips 107B climbs aboard courtesy of its low price and short-depth case. Next month we scope out 19-inch monitors. ■

TOP 10 MODEMS

#	INTERNAL V.90 MODEM	Month tested	Street price (11/15/99)	Overall rating	56-kbps downloads/ 33.6-kbps transfers (min:sec per MB)	Comments	Product info number
1	**Viking 56K Windows ISA Modem** 800/338-2361 www.vikingcomponents.com	retested this month	$40	84	3:40/6:11	**FEATURES:** Supports K56flex, ISA card, Lucent chip set, V.80 video-conferencing, MNP-10 error control, MNP-10EC, distinctive ring, voice mail, QuickLink Message Center III software. **SUMMARY:** Strong performance and $20 price drop keep this controllerless modem at the top. Includes a five-year warranty and 24-hour toll-free support.	679
2	Creative Labs Modem Blaster Flash56K PCI 408/719-5180 www.creative.com	(NEW)	$40	84	3:39/5:41	**FEATURES:** Supports K56flex, PCI card, Rockwell chip set, MNP-10 error control, V.80 videoconferencing, distinctive ring, voice mail, speakerphone, ASVD, Caller ID, QuickLink Message Center III software. **SUMMARY:** Low-priced, full-featured modem with stellar download rates. Backed by 14-hour daily support and a three-year warranty.	680
3	MaxTech XPVS56P/RS NetPacer Pro Internal PCI Data/Voice/Fax Speakerphone Modem 800/936-7629 www.maxtech.com	retested this month	$35	83	3:14/5:54	**FEATURES:** Supports K56flex, PCI Card, Rockwell chip set, V.80 videoconferencing, distinctive ring, voice mail, speakerphone, Caller ID, SuperVoice software. **SUMMARY:** Fast, inexpensive soft modem comes up short on features and documentation. For a Winmodem without speakerphone, check out the MaxTech XPV56P NetPacer.	681
4	Zoom FaxModem 56K PCI Dualmode 800/631-3116 www.zoom.com	retested this month	$60	83	3:45/6:07	**FEATURES:** Supports K56flex, PCI card, Lucent chip set, V.80 videoconferencing, distinctive ring, voice mail, Communicate Lite software. **SUMMARY:** Reasonable price and attractive voice features, but like Zoom's FaxModem 56k ISA Dualmode, 33.6-kbps downloads are a bit slow. Backed by long support hours and a seven-year warranty.	682
5	3Com U.S. Robotics Winmodem PCI 800/638-3266 www.3com.com	retested this month	$60	82	3:41/5:49	**FEATURES:** Supports x2, PCI card, USR/TI chip set, V.80 videoconferencing, distinctive ring, Caller ID, RapidComm software. **SUMMARY:** Data transfer with the Ascend dial-up server could be better, but this model still turns in solid performance. 3Com offers a lifetime warranty but tech support calls are not toll-free.	683
6	Creative Labs Modem Blaster Flash56II ISA Controller-Based Modem 408/719-5180 www.creative.com	(NEW)	$70	81	3:22/5:42	**FEATURES:** Supports K56flex, ISA card, Rockwell chip set, MNP-10 error control, V.80 videoconferencing, distinctive ring, voice mail, speakerphone, ASVD, Caller ID, QuickLink Message Center III software. **SUMMARY:** Controller-based model, establishes reliable connections. Three-year warranty and weekend support, but no toll-free calls.	684
7	Boca Research 56K WinStorm Modem 561/997-6227 www.bocaresearch.com	retested this month	$40	80	4:27/5:46	**FEATURES:** Supports K56flex, PCI card, Rockwell chip set, MNP-10EC, V.80 videoconferencing, distinctive ring, voice mail, speakerphone, DSVD, Caller ID, QuickLink Message Center III software. **SUMMARY:** Competitive price, but scores low on connections with different line types. Comes with a five-year warranty but no toll-free support.	685

#	EXTERNAL V.90 MODEM	Month tested	Street price	Overall rating		Comments	Product info number
1	**Diamond Multimedia SupraExpress 56e** 800/468-5846 www.diamondmm.com	retested this month	$100	78	3:20/5:41	**FEATURES:** Supports K56flex, Rockwell chip set, V.80 videoconferencing, distinctive ring, voice mail, Caller ID, permanently attached serial cable, FaxTalk software. **SUMMARY:** Fastest external modem on the chart, small and portable, offers easy installation and a high connect rate, and is backed by long support hours.	686
2	Boca Research 56K Tidalwave Modem 561/997-6227 www.bocaresearch.com	retested this month	$100	75	3:35/5:41	**FEATURES:** Supports K56flex, Rockwell chip set, MNP-10 error control, serial cable, V.80 videoconferencing, distinctive ring, voice mail, ASVD, DSVD, Caller ID, QuickLink Message Center III software. **SUMMARY:** Solid performer with many features, a good software bundle, and a five-year warranty but no toll-free support.	687
3	Viking 56K USB Modem 800/338-2361 www.vikingcomponents.com	retested this month	$120	75	3:32/5:44	**FEATURES:** Supports K56flex, Rockwell chip set, MNP-10EC, V.80 videoconferencing, USB cable, distinctive ring, voice mail, QuickLink Message Center III software. **SUMMARY:** Stylish but bulky shark-fin shape. Above-average 56-kbps downloads, around-the-clock support, and simple USB setup make this a solid choice for home users.	688

Best Buy   For reviews of products that didn't make the chart, visit www.pcworld.com/t10modems.   All products: **908**

TEST PC WORLD CENTER 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. In the File Type test, we send a mix of four files—graphics, text, program, and compressed—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.

AFTER A TWO-MONTH hiatus, our Modems chart is back! While prices continue to drop, top dogs Viking and Diamond hold onto number one spots. Two new models from Creative (which no longer identifies its modems by the Digicom brand name) round out the internal chart with first-rate performance and features. The external chart retains its October hierarchy, despite assaults from USB competitors Actiontec, Multi-Tech, and Zoom. ∎

Circle 84 on card or go to www.pcworld.com/productinfo

BELKIN

Think about it.
Why should you have to buy a USB hub, then hang stuff off of it until it looks like something out of *Edward Scissorhands*? Why fumble around under your desk every time you want to plug in another device? Instead, try this: A modular, stacking system of USB hubs, with adapters for serial, SCSI and Ethernet ports. Neat. Compact. And, oh yeah... drop dead gorgeous.

magine that. Smart and beautiful.
Okay, we admit it. A lot of plastic is involved.)

BELKIN **PIP** *Participants*

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HERE'S HOW

WINDOWS TIPS   SCOTT DUNN

Make Quick and Easy Keyboard Shortcuts

IF YOU FREQUENTLY open certain applications, documents, folders, Control Panel applets, or Web addresses, you can avoid digging through several levels of menus to find them by assigning a unique keyboard sequence to each. Here's how to get the most from this useful (and woefully underused) feature.

Get started. You can assign a key sequence only to a Windows shortcut, not to any other type of file. If you don't have a shortcut to the item you want to open, create one by using the right mouse button to drag and drop its icon at a convenient location (more on that later), and choose *Create Shortcut(s) Here*. The shortcut must be located either on the desktop or in a folder within the Start Menu folder (found in your Windows folder). Right-click the shortcut and choose *Properties* (or select the shortcut and press **<Alt>-<Enter>**). Make sure the Shortcut tab is in front. Click the *Shortcut key* box and press your desired shortcut key combination. If you want to use a key on the main portion of keyboard, your shortcut must begin with **<Ctrl>-<Alt>**, **<Ctrl>-<Shift>**, **<Alt>-<Shift>**, or **<Ctrl>-<Alt>-<Shift>**. Unfortunately, you can't use the Windows key (assuming your keyboard has one); Windows substitutes <Ctrl>-<Alt> if you try to use that key. Once you see your shortcut displayed in the box, click *OK* and away you go!

Make shortcuts even shorter. If pressing a bunch of keys at once isn't your idea of speed, here are two alternatives. First, if your shortcut key sequence uses a function key (one of the numbered <F> keys along the top or side of your keyboard), the modifier keys <Ctrl>, <Alt>, and <Shift> are optional. Second, if you never use your numeric keypad, you can assign a single key from the numeric keypad for one-key launching. Just open a shortcut's Properties sheet to the Shortcut tab, click the *Shortcut key* box to make the cursor active there, and press the numeric key or function key of your choice. Numeric keys appear in the box as "Num 1," "Num 2," and so on. Just remember that numeric shortcut keys won't work unless you activate Num Lock on your keyboard. Also bear in mind that the key sequence you assign to a shortcut overrides the same sequence in any application that uses it.

Keep it together. Your shortcut key may seem easy to remember and intuitive to you right now, but you might get confused later on as you add more shortcut keys or install applications that use those key sequences. Remembering the key sequence for the shortcut you want can be difficult if you have a lot of shortcuts, if you maintain duplicate shortcuts in multiple folders, or if you use shortcut keys to launch obscure batch files.

To avoid such confusion, you must be organized: Keep all shortcuts that have a shortcut key assigned to them in a single folder. For example, right-click the *Start* button and choose *Explore*. Select the *Programs* icon in the tree pane on the left to

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open that folder. Right-click in an empty area in the right pane and choose *New• Folder*. Name it something like **Keyboard Shortcuts** and press **<Enter>**. From now on, make sure that the shortcuts with shortcut keys are stored only in that folder. If you need shortcuts to these items in other places, make duplicates—but remove the shortcut key from the Properties sheet. **Make it obvious.** For easier remembering of shortcut keys you assign and the shortcuts you allocate them to, make the key se-
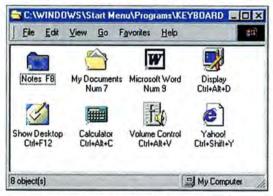
FIGURE 1: KEEP TRACK OF CUSTOM shortcut keys by adding their names to the shortcuts they launch.

quence part of the shortcut name. For example, if you assign <Ctrl>-<Alt>-C to a Calculator shortcut, select the shortcut icon and press **<F2>** to rename it. Type something like **Calculator Ctrl+Alt+C** and press **<Enter>**. See **FIGURE 1** for examples. **Undo it.** If you decide to remove a shortcut key sequence from a shortcut, open its Properties sheet to the Shortcut tab as before, click the *Shortcut key* box, and press **<Delete>** or **<Backspace>**. Then click *OK*.

UNIQUE FOLDER ICONS

WHEN I WROTE that Windows doesn't let you assign a different icon for each folder (see "Tell Me What Icon Do," www.pcworld.com/ sep99/wintips_icon), a number of you responded, pointing out utilities that do just that. It turns out, if you have Win 98, or Win 95 with Internet Explorer 4's Desktop Update installed, you can do the job yourself using little more than Notepad.

To confirm you have Win 98, or Win 95 with IE 4's Desktop Update, open the folder whose icon you want to customize. Choose *View• Folder Options*, click the *View*

tab, make sure *Show all files* is selected under 'Hidden files', and click *OK*. Look for a file named Desktop.ini (the extension won't be visible if that option is turned off). This file is created any time you customize a folder, such as with a background picture. Double-click *Desktop.ini* to open it in Notepad. If you don't see Desktop.ini, just start Notepad.

If you opened a previously existing Desktop.ini file, look for the line '*[.Shell-ClassInfo]*' and add a carriage return at the end of that line. If you don't see it, or if you started with an empty Notepad window, type **[.ShellClass-Info]** at the top of the file and press **<Enter>**. On the next line, type **IconFile=** followed by the full path and name of the file containing the icon you want to use—for example **IconFile=c:\windows\system\ shell32.dll**. Press **<Enter>** again. Since some files (such as the shell32.dll file that comes with Windows) may contain multiple icons, you must indicate which icon you want by specifying its order number in the file. To find out an icon's number, right-click any shortcut and choose *Properties*. Click the *Change Icon* button. Type the path to the file that contains the icon you want, or use the *Browse* button to select it from its folder location. When you see the icons displayed in the Change Icon dialog box, count—starting from zero (the number of the first icon in any file)—from top to bottom, left to right. When you get the right number, click *Cancel* twice and return to Notepad. Then add this line: **IconIndex=0** (replace o with the number of your icon). If your file contains a single icon (as is the case with .ico files), leave this setting at o or omit the line entirely.

Now choose *File• Save*. If you started with an empty Notepad window, a dialog box will prompt you for a name and location. Navigate to the folder whose icon you want to change. In the 'File name' box, type **"desktop.ini"**, including the quotation marks so Notepad won't add its default .txt extension. Click *Save*.

There is still one more step. This trick only works with folders that have the

attribute that marks a folder as a "system file." To add it, first locate the icon for your folder in Explorer (or on the desktop). Choose *Start• Run* and type **attrib +s**. Leave the Run box open, and drag and drop your folder from Explorer (or the desktop) into the Open box of the Run box. The text should look something ▶

FIGURE 2: MAKE FOLDERS stand out with custom icons that you apply by editing the Desktop.ini file.

like: **attrib +s "c:\My Documents"** (the path to your folder will, of course, differ). Click *OK*. A DOS box will flash momentarily on screen as it applies the system attribute to your folder. Finally, select your folder and press **<F5>** to refresh the display. You should see your new icon. If you view it in a two-pane Explorer tree, the icon in the left (file tree) pane may not look as it should, but this should be corrected the next time you start Windows (see **FIGURE 2**). As a final touch, if you created a desktop.ini file, you might want to hide it when hidden files aren't displayed: Right-click the file and choose *Properties*. Check the *Hidden* box and click *OK*.

If this sounds like too much trouble, try a utility. I like the easy-to-use Change Icon by Pierre-Marie Devigne, available on File-World or home.nordnet.fr/~pmdevigne. The author calls this "e-mailware"—if you like it, just drop him a line.

TOOLBAR HIDE AND SEEK

I USE WINDOWS 98 and like to display the Task Bar-accessible Address bar at the top of the screen. I use the 'Always on top' and 'Auto hide' features (by right-clicking the Task Bar) so the Address bar appears when needed and disappears when not in use. But a problem aris-

es when I use IE. I want to turn off IE's Address bar and just use the Windows 98 version at the top of my screen, but I can't get this to work. Any suggestions?

Christopher Salnoske
Hampton, Virginia

YOU'RE ASKING two apps to be on top of everything else—and in this case, IE wins. But you can still have your Address bar and hide it too, if you don't mind futzing with some work-arounds.

Go with the flow. Naturally, your first option is to use IE's Address bar. Unfortunately, in full-screen view the Address bar, the Menu bar, and the other bars that come with IE all appear crammed together in a single row. So to use this strategy, right-click the toolbar and uncheck any items you don't need. If you have IE 5 or Windows 98 SE, you can save more space by right-clicking the toolbar and selecting *Customize*. In the list on the right, select any buttons you don't use and click *Remove*. Then click *Close*. Finally, drag the dividers between the various bars to see the items you want and to give the Address bar maximum room.

Hitch your wagon to the Task Bar. Unlike the Address bar, the Windows Task Bar will pop in front of IE, even if the latter is running in full screen. To impart this ability to the Address bar, combine it with the Task Bar. Drag the long edge of the Task Bar toward the center of the screen to make it thicker, which will allow the Address bar to have a line of its own. (Note: This may take some experimentation, so don't give up if the first attempt fails). If necessary, right-click the Task Bar and choose *Properties*. Make sure *Always on top* is checked. (You don't need to check *Auto hide* unless you want the Task Bar hidden

FIGURE 3: TO JUMP TO A WEB ADDRESS, use one of the three methods described below (and illustrated above).

on other occasions as well.) Now when you run IE full screen, the Task Bar and its Address bar will pop into view when you move the pointer into its location.

Use the keyboard, part I. If you prefer to keep your IE toolbar hidden until it's needed, follow the same steps as in the preceding method, then right-click the IE toolbar and choose *Auto Hide*. If you keep the Windows Task Bar at the top of the screen, it won't pop into view automatically (and potentially obscure the IE toolbar), but you can force it to appear by pressing **<Ctrl>-<Esc>, <Esc>** (the combo keystroke makes the Start menu appear).

Use the keyboard, part II. And now to the easiest solution: Since you're autohiding the Address bar anyway, you probably don't long for it to be visible at all times to show the current Web address. So don't worry about displaying the Task Bar in IE. Just use your current configuration and press **<Ctrl>-O** each time you need to enter a Web address manually. This command summons your browser's Open dialog box, which works the same way as the Address bar and even has the same autocomplete feature. Type your URL, press **<Enter>**, and you're off (see **FIGURE 3**).

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WINDOWS TOOLBOX

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See More and Do More With Multiple Monitors

SO YOU'VE TAKEN up day-trading. You're also scrounging up MP3 files for the ultimate road-trip collection and updating your rotisserie baseball site. Meanwhile, you have to get some real work done.

You need a second monitor. Windows 98 makes it fairly easy to spread your desktop over multiple displays, and, fortunately, graphics adapters and monitors are downright cheap these days. Alas, NT 4.0 is less flexible than Windows 98 in its handling of multiple displays (the latter allows you to mix and match as many as eight graphics adapters using standard drivers). Depending on which adapter is already installed on your system, however, you can add a second fairly easily.
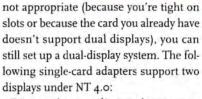
The secret is to install two identical cards (see **FIGURE 1**), and download a driver that supports dual-display mode. Many dual-display drivers also require that you first install Service Pack 3 or later, something you should do anyway. (Download this from www.microsoft.com/windows/servicepacks.) Though a few vendors (ATI chief among them) have no dual-display drivers, most offer them for at least some of their adapters. Here are two leading offerings that work in dual-display mode with Windows NT 4.0:

• Matrox (www.matrox.com/mga/drivers/home.htm): the Millennium, Millennium 2, Mystique, Mystique 220, Millennium G200, and the Productiva G100.
• Number Nine (www.nine.com/support/drivers/rev3ddrv.html): the Imagine

Series 2 (not the original Imagine 128) and the Revolution 3D.

If installing a second card in your system is not appropriate (because you're tight on slots or because the card you already have doesn't support dual displays), you can still set up a dual-display system. The following single-card adapters support two displays under NT 4.0:
• Diamond (www.diamondmm.com): FireGL 2000/3000
• Matrox (www.matrox. com): the Millennium G400, G400-TV
• Appian (www.appian. com): the Jeronimo Pro, Jeronimo 2000
• STB Systems (www.stbmvp.com/mvppro.htm): the MVP Pro

CLEAN DRIVES AUTOMATICALLY

WHAT'S THE BEST way to clean up unwanted temporary files on a Windows NT system? I have about 400MB of junk files on the hard disk.

Robert Blackmon, Los Angeles

LIKE WINDOWS 98, Windows NT and the applications running under it use temporary files. Programs create these files—usually in the c:\temp folder—but don't always remove them. After a while, the folder starts to fill up.

If you don't have any data files open, the temporary files are useless and you can delete them. To divest yourself of the lingering temporary baggage, first close all applications. Then choose *Start•Find•Files or Folders*, enter ***.tmp** in the Named field, and click *Find Now*. To delete those files, choose *Edit•Select All*, and press **<Delete>**. Don't worry that you're deleting sensitive files—if one of them is in use by a program, Windows NT won't let you delete it. If you have multiple user accounts on the

machine, log off and then back on as each user in turn, and repeat the process.

You can also clear the main temporary file repository automatically each time you log on, by using a batch file. To create the file, right-click the desktop, choose *New• Text Document*, double-click the new document to open it, enter

```
rd /s /q c:\temp
md c:\temp
```

as the document contents, and then save the file as **d:\Winnt\Profiles\All Users\Start Menu\Programs\Startup\cleartemp.cmd**, where *d*: is the drive NT is installed on. Now, whenever you log on to NT, cleartemp.cmd will flush the Temp folder.

Send your NT-related questions and tips to nttips@spanbauer.com. We pay $50 for published items. Scott Spanbauer is a PC World contributing editor. ■

ILLUSTRATIONS: RICHARD DOWNS (LEFT); JEFFREY PELO (RIGHT)

FIGURE 1: SPREAD YOUR DESKTOP over two displays with the right pair of graphics adapters.

YOUR QUESTIONS ON: Diminishing memory ◆ Cleaning up the Context menu

How to Bring Old Apps to a New Computer

I'M PLANNING to buy a new computer. I've customized my apps quite a bit over the years. How do I transfer these configurations to my new PC?

Arthur R. Manuel
Ouderkerk aan den Ijssel,
Netherlands

WINDOWS PROGRAMS store configuration information all over the hard drive, making it tricky to find them. I'll give you general advice about moving applications, plus specific instructions for Microsoft Office 97 and 2000.

When you install an updated version of an application onto your new computer, first install the old version (the one on the old computer), follow the steps below, and *then* upgrade the application on the new computer. If the new version is already on the new computer, upgrade the old computer with it first, then follow the steps below.
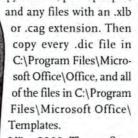
Most Windows apps store configuration data in the Registry. Launch the Registry Editor by selecting *Start•Run*, typing **regedit**, and pressing **<Enter>**. Navigate in the left pane to HKEY_CURRENT_USER\Software. Find and open the folder for the application's vendor (Microsoft, Lotus, or whatever). Within this folder, click the folder for the program—for example, HKEY_CURRENT_USER\Software\Microsoft\Office. Now select *Registry• Export Registry File* (see **FIGURE 1**). Save the file to a temporary folder or a floppy, naming it after the app you are moving. Be sure to retain the .reg extension.

Windows programs do not invariably store *all* configurations in the Registry. Important settings could hide almost anywhere on your hard disk. Let's look at the files and locales that you'd need for Microsoft Office configurations.

Office 97: From C:\Windows, copy user.acl, powerpnt.pcb, and any files with an .xlb or .cag extension. Then copy every .dic file in C:\Program Files\Microsoft Office\Office, and all of the files in C:\Program Files\Microsoft Office\Templates.

Office 2000: The configuration files are stored in C:\Windows\Application Data\Microsoft and its subfolders.

Other applications: After launching an app, change your configuration—select new options, change a toolbar, create a macro, and so forth. When you finish, exit the application. Select *Start•Find•Files or Folders*. On the *Name & Location* tab, make sure that your hard drive is selected in the 'Look in' field. Click the *Date* tab, select *during the previous 1 day(s)*, and then click *Find Now*. When the search is done, maximize the Find window and click the *Modified* column header. The files that have been changed in the last few minutes—with the exceptions of user.dat and system.dat—are the ones you'll need to back up.

A Good Start With Outlook

DO YOU USE Outlook as a calendar or an address book but not as an e-mail program? Then tell it to launch without the Inbox view. To change this setting in Outlook 97, select *Tools•Options* and click the *General* tab. In Outlook 98 or 2000, select *Tools•Options*, click the *Other* tab, then the *Advanced Options* button. There you'll find a 'Startup in this folder' pull-down menu from which you can select the start-up view that's best for you. Click *OK* (twice in 98 or 2000) to return to Outlook.

Don't move any installation files to the new computer until the applications are installed onto it. To add an application's old Registry configuration to a new installation, launch Regedit. Select *Registry• Import Registry File*, and load the .reg file from the floppy disk. For the rest of the configuration, simply copy the files from the old PC into the same location on the new one, copying over any existing files with the same names.

A MONITOR WITHOUT A DRIVER

I HAVE AN OLD monitor with no drivers available. I'm running it with one of Windows' default drivers, but I can't set the refresh rate. How can I set a monitor's refresh rate without a driver for that particular monitor?

Steven Talbott, Plano, Texas
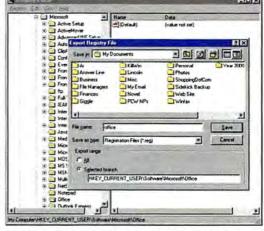
FIGURE 1: EXPORT YOUR CONFIGURATION, or at least part of it, through the Registry Editor.

THE EASIEST TOOL for this job is MultiRes, a free program available from EnTech Taiwan (you can find MultiRes at www.entechtaiwan. com, or download it from FileWorld). When you launch the program, it puts a resolution-changing icon into your system tray.

To change the refresh rate, click that icon, then select *Refresh rate* and the desired rate. MultiRes plays it safe: After it changes the setting, the program asks for confirmation. If you don't provide it—perhaps your monitor is now unreadable—it returns to the original setting so that your monitor works again. The change remains after you reboot, even if you don't run MultiRes.

WHERE DOES ALL THE MEMORY GO?

A BENCHMARK program indicated that with no programs running, Windows is using nearly 70MB of my physical memory. How is that possible?
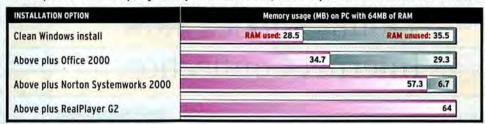
Robert Seyler, Dracut, Massachusetts
YOU'D BE AMAZED how many programs are actually running when all you've done is boot up Windows (a memory hog in its own right). Every hardware driver, plus every program displayed in your system tray is using memory. What's more, many applications launch unbeknownst to you when Windows starts. In the case of an antivirus program, which must vigilantly guard against incoming infections, this makes sense. But other programs that you don't necessarily need may be running in the background, all taking up memory.

How bad can this get? See **FIGURE 2** for an example. This table shows what can happen as you install (but not run) software on a computer with 64MB of RAM. By the time I had installed Office 2000, Norton SystemWorks, and RealPlayer, I had almost no RAM left—despite a fresh boot and my not having intentionally launched any applications.

There are some things you can do to increase available RAM. Look at your system tray to see if there's anything you

How Much Memory Does Windows Use?

It depends on what programs you've installed, even if you haven't launched them.

INSTALLATION OPTION	Memory usage (MB) on PC with 64MB of RAM		
Clean Windows install	RAM used: 28.5		RAM unused: 35.5
Above plus Office 2000	34.7		29.3
Above plus Norton Systemworks 2000	57.3		6.7
Above plus RealPlayer G2	64		

FIGURE 2: MY MEMORY ISN'T WHAT IT USED TO BE. If your system seems to suffer from diminishing memory, even though you haven't launched any application yet, the culprit may be a hidden utility launched at start-up.

don't need. Most applications have some way to turn off the autoloading modules. And Windows 98 has a central control that lets you specify which programs start with Windows: Select *Start• Programs• Accessories• System Tools• System Information*. Select *Tools• System Configuration Utility*. Click the *Startup* tab and click (or uncheck) next to the applications that you don't wish to load at start-up.

HOW MANY BAD CLUSTERS ARE TOO MANY?

BOTH SCANDISK and Norton Disk Doctor told me my hard drive was accumulating bad sectors. At one point this drive, which is less than a year old, had 229,376 unusable bytes. I reformatted and got the number down to 57,344 bad bytes. I've heard that every hard drive has bad sectors, but what's an acceptable total?

Kevin Dooley, Morris Plains, New Jersey
IF YOUR HARD DRIVE is reporting *any* bad sectors (and I do mean bad sectors, not lost clusters or any other problem), replace it immediately. And if it's under warranty, make sure the manufacturer pays for that replacement.

Yes, all hard drives have bad sectors. But with today's drives, you should never see them. Modern drives are built with spare sectors that it can use to transparently replace the bad ones. If ScanDisk reports a bad sector, it means the drive has so many that it's run out of spares.

But why did the number of bad sectors shrink when you reformatted your drive? A borderline sector could go either way, appearing bad one day and good the next.

When Format found sectors previously marked as bad to be good, it did not do you any favors—a borderline sector is still a dangerous place to put your data.

CLEAN UP THE CONTEXT MENU

AFTER UNINSTALLING an old antivirus program, I find that it still pops up as an option when I right-click a file. (Of course, the option doesn't actually do anything.) How do I get rid of the option on that menu?

Don Cauble, Portland, Oregon
IF AN UNWANTED OPTION appears on the pop-up menu of every file you right-click, you will have to edit the Registry to remove that option. That means you'll have to back up the Registry first: In any folder, select *View• Options* (or *View• Folder Options*). Click the *View* tab. Select *Show all files*, and then click *OK*. Open the Windows folder and find the files user.dat and system.dat. Right-drag these files to another folder, selecting *Copy Here* on the pop-up menu.

Now launch Regedit. In the left pane, navigate to HKEY_CLASSES_ROOT*\shellex\ContextMenuHandlers, and click the folder's plus sign to view its folders. Still in the left pane, delete the folder below ContextMenuHandlers that's named for the program you want removed.

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Understand ICQ security ◆ Track your connection speed ◆ Foil Net intruders

Troubleshoot a Slow Internet Connection

DOES YOUR INTERNET connection ever seem unusually slow? The problem may stem from your PC (buggy software, for example); a bad phone line; an oversubscribed ISDN, DSL, or cable system; system trouble at your ISP or the high-speed service it connects to; or a poorly configured router thousands of miles away. More often, however, slow connection rates are due to a swamped Web or file server at the other end of the connection.

Unlike problems with your computer, your ISP, and even the phone company's equipment, which you have some power to fix, busy servers and similar problems are usually beyond your control. But how do you know where the problem is coming from? No one tool can pinpoint the cause, but Microsoft's Bandwidth Speed Test page (www.computingcentral.com/topics/bandwidth/speedtest500.asp) is a good place to start. Besides displaying your current download speed in kilobits and kilobytes per second, the page provides information on factors that can affect your connection speed (see **FIGURE 1**). Speed information in kbps (kilobits per second) is useful for comparing your current connection speed to the rated maximum for your modem or your connection type. KBps (kilobytes per second) info is useful for estimating how long downloading a file will take.

If Microsoft's site suggests that your download speed is what it should be, the culprit is probably a slow connection or server somewhere between your ISP

and the page you want to view—and unfortunately, you can't do anything about it. But if Microsoft's site confirms that something *is* restraining your connection, you need to find out whether the problem is with your ISP, your computer, or some element in between.

First, select *Start• Programs• MS-DOS Prompt* to open an MS-DOS Prompt window. Next, use the Ping command to compare speeds inside and beyond your ISP: Type **ping www.pcworld.com** (or another remote Web site) to see how long it takes data packets to reach PC World Online's Web server in San Francisco. Ping reports the time (in milliseconds) a data packet takes to travel to the site and then return to your computer. A time of a few milliseconds indicates a fast connection. But anything over a couple hundred milliseconds is suspect, and time-outs (which occur when Ping gives up on re-

ceiving the return packet after an extended length of time) signify a problem.

Next, type **ping www.**myisp.com where myisp.com is your ISP's domain name. If the ISP's Web server pings much faster (that is, returns a much lower number) than the external site did, your ISP is probably having trouble with its connection to the Internet. If so, ping a few different sites (and ping each site more than the default number of four times), save the data to a text file, and e-mail it to your ISP's tech support; this information will likely help your ISP's support staff figure out what's wrong, so you'll probably get a swifter response. For example, use the command **ping -n 25 www.pcworld.com >c:\test.txt** to ping PC World Online's Web server 25 times, and then save the results in a file called test.txt.

If the Ping numbers are roughly the same for external sites as for your ISP's site, the trouble probably lies in the connection between you and your ISP. The ISP's modems might not be getting along with yours (something you can check with the ISP), or your modem and serial ports may be configured incorrectly. To check for the latter in Windows 9x, choose *Start• Settings• Control Panel*, double-click the Modems icon, and make sure that the modem driver listed there matches the hardware you have installed. If the right driver is installed, click the *Properties* button
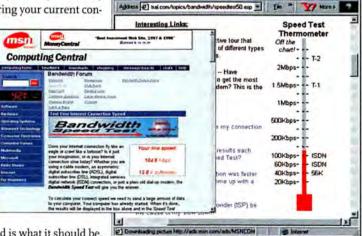
FIGURE 1: CHECK YOUR CONNECTION speed instantly using Microsoft's free Bandwidth Speed Test site.

ILLUSTRATION: JEFFREY PELO

and then the *General* tab, and confirm that the value selected for 'Maximum speed' is fast enough for the type of connection you have. Pick 57600 for 33.6-kbps modems, 115200 for 56-kbps modems, and 230400 or faster for ISDN transfers.

If your ISP and your modem setup check out, the problem may be with your phone or cable company. Standard phone service slows when line quality degrades or when the phone company multiplexes several households onto a pair of wires. Cable Internet access is prone to slowdowns because everyone on the line shares the available bandwidth. And DSL and ISDN connections can degrade due to phone company snafus, too. As with your ISP, you'll probably get snappier repair service if you document the slowdowns.

ICQ'S UNLOCKED DOORS

AMERICA ONLINE'S ICQ chat tool provides lots of features other chat programs don't offer. But the more capabilities a Net-connected program has, the less secure it is. The ICQ disclaimer warns that the chat program is "vulnerable" and should be considered "unsecured." Specifically, its users may be subject to "spoofing, eavesdropping, sniffing, spamming, breaking passwords, harassment, fraud, forgery, imposturing, electronic trespassing, tampering, hacking, nuking, system contamination including...viruses, worms, and Trojan horses causing unauthorized, damaging or harmful access and/ or retrieval of information and data on your computer and other forms of activity

FIGURE 2: PRESERVE YOUR ICQ PRIVACY by closing some of the doors the program leaves open in its default settings.

that may even be considered unlawful."

Still want to chat? Go ahead, but protect yourself from the foregoing list of threats. First, regard every file attachment as a potential attack. As in your e-mail program, executable files (files with the .exe, .com, .dll, and .bat extensions) transferred through a chat program may contain viruses; and Word and Excel files may harbor macro viruses. Before you open any attachment, save it to your hard disk and scan it with an updated antivirus program. Recently, a password-stealing ICQ Trojan horse fooled hundreds of users by masquerading as an image file.

Second, as elsewhere online, the less you reveal about yourself, the better. When starting out with ICQ, you need to disclose only your ICQ number and possibly your e-mail address. True, ICQ does offer you the chance to share your enchantment with pre-Columbian kitchen utensils, so you may prefer to ignore this advice. To lower your ICQ profile, click the program's *ICQ* button, select *Add/ Change Current User• View/Change My Details*, and remove personal information.

To block spam (see **FIGURE 2**), click the *Main* tab and choose *Don't publish my Primary email address, use it for password retrieval purposes* option. Don't share your addresses and phone numbers either. Anyone who needs to reach you can use ICQ, right?
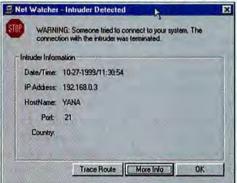
Next, click the *ICQ* button, and select *Preferences & Security• Security & Privacy*. Click the *Security* tab, check the *Do not publish IP address* option, and make sure the *Allow others to view my online presence on the World Wide Web* option below it is unchecked. Do coworkers, kids, or roommates have physical access to your computer? If so,

select *High* in the Security Level area to prevent unauthorized use of your account. If you start to get ICQ pager spams, try turning off the service by clicking the *Ignore List* tab and checking *Do not accept WWPager messages*. You can also screen out normal ICQ messages that contain certain words or strings (such as 'sex' or 'XXX') by clicking the Words List tab, then the Unlock button. After entering your ICQ password, add likely spam keywords to your filter list by clicking the Add button. Check *Discard events with objectionable words* under Filter Action.

For more information on this subject, go to www.icq.com/features/security/security-tutorial.html.

Find files from this article at www.fileworld.com/magazine. Send your questions and tips to nettips@spanbauer.com. We pay $50 for published items. Scott Spanbauer is a contributing editor for PC World. ∎

Convert uppercase to lowercase ◆ Use hanging indents ◆ Print booklets

Take Your Customized Word Processor With You

Fix Bizarre Tab Behavior in WordPerfect 8

IF YOU'VE NOTICED some odd formatting behavior in WordPerfect 8 when you press <Tab> inside a paragraph, you're not alone. The program's QuickIndent feature is trying to set up its own default indentation. If that's not what you want, turn this feature off by selecting *Tools•QuickCorrect*. Under the *Format-As-You-Go* tab, clear the *QuickIndent* check box and click *OK*. The <Tab> key will then revert to its normal operation.

IF YOU'RE LIKE most users of Microsoft Word or WordPerfect, you've personalized your copy of the program with fonts, format styles, toolbars, and macros to suit your own work needs. So it can be quite disconcerting when you have to work on someone else's PC and use their customized setup. Why not take your preferences, styles and all, with you when you travel or work temporarily at another computer? It's easy, since all that customizing is stored in a single file—your program's default template.

The technique I describe here preserves your personal preferences, but won't rudely change someone else's favorite options. And as a bonus, you can use your portable preference disk as a backup. If your PC crashes and requires hard disk reformatting and reinstallation of your favorite programs, you can instantly restore your word processing preferences. (Learn how to save your other Windows settings in this month's *Answer Line*, page 234).

Set up a portable preference disk: Insert a blank, formatted floppy disk in drive A. Then from the Windows Desktop, select *Start•Find•Files or Folders*. For Word, type **normal.dot** in the Named field of the Find dialog box. For WordPerfect 8, you'd type **wp8us.wpt**. Click *Find Now*. (**Note**: If you use a different version of WordPerfect, substitute the version number in the file name.) Once the file appears, double-click first the *My Computer* icon, then your floppy disk's icon. Drag the file from the Find dialog box to the floppy disk's window. In the disk's window, right-click on the file, and select *Rename*. Then type in a new name, such as **myword.dot** or **mywp.wpt**, and press <Enter>. Remember to label the floppy so you can identify it as your portable version of the program.

Use the portable preference disk: Insert your disk into the floppy drive of the computer you're "visiting." Double-click on the *My Computer* icon, then the floppy drive icon. Next, drag your customized template file onto the desktop and drop it there. To run the program with your customized template, just double-click the template icon on the desktop.

When you have finished using the computer, click the template file icon on the desktop once, press <Delete>, and then confirm the deletion.

Restore the custom template after a crash: After reinstalling your word processor, determine the location of the default template file. In Word, select *Tools•Options* and look under the *File Locations* tab. In WordPerfect 8, select *Tools•Settings*, double-click the *Files* icon, then look under the *Templates* tab. Note the name of the default template and the directory where it's stored. Using the Windows Explorer, locate and delete the default template file. Copy your customized template file from the disk to the directory that you noted, then rename your copy to match the default template name.

SET UP ALTERNATING MARGINS

CREATING THE PAGE setup for a document that will be printed on both sides and bound like a book can be tricky. You'll need to set unequal left and right margins to allow for binding dimensions, then alternate the margins on odd and even numbered pages. It's easy to do, but can be confusing for many users.

Word 7 through 2000: Select *Print•Page Setup*. Set left and right margins as desired for odd pages. Choose *Whole Document* from the 'Apply to' list (see **FIGURE 1**). Select *Mirror margins*, and click *OK*.

WordPerfect 8: Select *Format•Page•Page Setup*. Under the *Page Margins* tab, set

FIGURE 1: YOU CAN SWITCH LEFT AND RIGHT margins on alternating pages for proper binding of two-sided print jobs.

FIGURE 2: TO ADD MARGIN space for binding two-sided printing, WordPerfect uses a measurement setting.

equal left and right margins, even though you'll want uneven margins for binding. Under the *Two-Sided Settings* tab, select *Flip on long edge* for book-style binding (see **FIGURE 2**). Select *Inside margin*, and change the 'Margin to adjust for binding' measurement to add the required margin space for your binding method. Click *OK*.

GET THE HANG OF HANGING INDENTS

HANGING INDENTS, where second and subsequent lines of a paragraph are indented, are a popular form of paragraph formatting, particularly for résumés, lists, and other kinds of slick-looking documents. Although this format is easy to create, there's more to it than you might immediately be aware of. Here are some tips to help you get the most out of it.

Word 7 through 2000:

• To format one or more paragraphs with a hanging indent, just place the cursor in the paragraph, or select multiple paragraphs, and then press **<Ctrl>-T**.

• To increase the amount of indentation, Press **<Ctrl>-T** again. Each time you do this, the indent will increase by one tab stop.

• To reduce the amount of paragraph indentation, or to remove just a single hanging indent, press **<Shift>-<Ctrl>-T**.

• To adjust the amount of indentation with your mouse, click and drag the tab marker on Word's ruler that corresponds with the indentation. **Hint:** Holding down **<Alt>** while you do this will allow you to see the actual measurement in Word's ruler.

• For more precise control of hanging indents, select *Format• Paragraph*, choose *Hanging* in the 'Special' drop-down list, and then set your desired amount of indentation in the 'By' field (see **FIGURE 3**).

• Since bulleted and numbered lists use hanging indent formatting, these tips

apply to those kinds of paragraphs as well, but note that indentation changes will apply only to second and subsequent lines of each item.

WordPerfect 8:

• To format a paragraph or paragraphs with a hanging indent, place the cursor at the beginning of the paragraph or select multiple paragraphs, then press **<Ctrl>-<F7>** (or select *Format• Paragraph• Hanging Indent*). **Hint:** Since this type of formatting does not carry forward to the next paragraph when you press **<Enter>**, save some valuable time by first formatting all paragraphs that require a hanging indent.

• Alternately, simply position your cursor at the beginning of the second line, or any subsequent line, and press **<Tab>**.

• To remove a hanging indent from a paragraph, position the cursor at the beginning of the second line of the paragraph and press **<Backspace>**.

• To adjust indentation using the mouse for a single paragraph or multiple selected paragraphs, click and drag the first tab marker on the ruler to a new position. Hold down **<Shift>** as you do so to view the exact measurement on WordPerfect's ruler.

FIX CAPS LOCK ERRORS

YOU'RE TYPING AWAY with your head down, and then you look at the screen and see that you have accidentally hit the <Caps Lock> key, so all your text is now in the wrong case. Although Word normally fixes case errors automatically, many users turn off this "autocorrect" feature. You could go back and retype the selection, but that's a waste of time. To fix the problem fast in Word 6 through 2000, select all the text with the wrong capitalization and then press **<Shift> <F3>** up to three times to cycle through the various case change options (initial caps, all lower case, and so on). Alternately, you can select *Format• Change Case*, choose *tOGGLE cASE* in the Change Case dialog box, and confirm it by clicking *OK*. **Hint:** Want to solve the problem forever? Select *Tools• AutoCorrect*, and mark *Correct accidental usage of cAPS LOCK key* under the AutoCorrect tab, then click *OK*.

WordPerfect 8: By default, WordPerfect 8 will automatically correct Caps Lock errors as you type them. But if, for some reason, WordPerfect stops doing this for you, select *Tools• QuickCorrect*, and under the *Format-As-You-Go* tab, mark the *Caps-Fix* option to correct the problem.

PRINT COLORED TEXT AS BLACK

BECAUSE OF THE growing popularity of color printers, many Word users are adding colored text to their documents. That's great, but when you have to print such a document on a black and white printer, some colors show up too light to read. Fortunately, Word offers a little-known way to print all colored text as pure black. To turn on this feature in Word 7, 97, and 2000, select *Tools• Options*, then

FIGURE 3: YOU CAN CUSTOM SET the indentation in any paragraph formatted as a hanging indent.

click the *Compatibility* tab. Scroll down in the Options list and select *Print colors as black on noncolor printers*. Click *OK*.

This setting normally applies only to the current document. If you want to make it the default in Word, click *Default* on the Compatibility tab after setting the Compatibility option, then confirm.

You can find additional word processing tips at www.pcworld. com/heres_how.com. We welcome your questions and tips and pay $50 for published items. George Campbell (george_campbell@pcworld.com) is a contributing editor for PC World. Visit his Web page at www.osomin.com. ∎

Share Your Spreadsheets on the Web

EXCEL 2000 MAKES it easier than ever to save a workbook in HTML format. After creating your workbook, use the *File•Save as Web Page* command. Specify what you want to save (a single worksheet or the entire workbook) and click the *Save* button. The result will be an HTML document and, possibly, a directory containing ancillary files; the number of such files varies with the complexity of your workbook. These files contain information, such as graphics and macros, that can't be stored in standard HTML format. When you post the HTML file on a Web server, you must include the files in the associated directory. You'll find that the HTML file survives "round-tripping." In other words, if you reopen the HTML file in Excel 2000, every element will be intact.

Alternately, you may save your workbook (single sheet only) in HTML format with "interactivity." When you open the HTML file in a compatible browser (IE 4.01 or later, not Netscape Navigator), you can interact with the Web page: enter
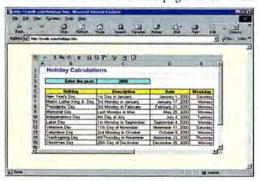
FIGURE 1: AN EXCEL WORKSHEET saved as HTML retains its interactivity within a Web browser.

data, recalculate formulas, update charts and pivot tables, and so on. Before you get too excited, however, realize that this feature has some serious limitations. Many common formatting options are not retained, and features like array formulas, macros, and outlining aren't supported.

FIGURE 1 shows a simple interactive HTML document I created. This worksheet calculates the dates for various U.S. holidays, using the year entered in cell C3. I used the *File•Save as Web Page* command to save the workbook in HTML format. In the Save As dialog box, I checked the box labeled *Add interactivity*.

To try out this example, point your browser to www.j-walk.com/holidays. htm. When the page loads, you'll be able to enter a different year in cell C3, and the formulas will display the calculated dates. The sheet isn't protected, so you can even examine the formulas. Because there's no formula bar, you will have to press <F2> to view the formula in the active cell.

To view an interactive Excel file, you need Internet Explorer 4.01 or later, and Microsoft Office Web Components (included with most versions of Office 2000) must be installed on your system.

Note: If you have Excel 2000 installed on your system and you receive an error message when attempting to view an interactive spreadsheet on the Web, check your version of the software. For reasons known only to Microsoft, the Office Web components aren't included with the Small Business Edition of Office 2000 or with the stand-alone version of Excel 2000. In other words, your copy of Excel 2000 may be lacking one of the key selling points of the product. According to Microsoft, you can legally install the Office Web Components if you own Office 2000 Small Business Edition and if someone in your organization has a license for Microsoft Office 2000 Premium, Professional, or Standard, or

Microsoft Access 2000. If you have only the stand-alone version of Excel, you cannot install the Web Components.

THOUSANDS WITHOUT ZEROS

IS THERE A WAY to display thousands without zeros? For example, I would like 52,000 to appear as 52.

Cedric D'Souza, Mississauga, Ontario

FIRST, SELECT THE CELLS to be formatted, then choose *Format•Cells*. Click the *Number* tab. Select *Custom* from the Category list, and in the Type box enter **0,** (that's a zero followed by a comma).

When this number format is applied, the cells will retain the correct numerical values, but they will be displayed without the last three digits. To display values in millions, insert an additional comma at the end of the format string (**0,,**). Another possibility is to display one or more decimal places—for example, 52,100 as 52.1. To do this, include a decimal point in your format string (**0.0,**). You can also use these number formats in charts. To do so, double-click the chart axis to display the Format Axis dialog box. Then click the *Number* tab and specify the desired format.

In Excel 2000, the Scale tab of the Format Axis dialog box lets you specify the unit scaling directly. Just choose *Millions* from the 'Display units' drop-down box.
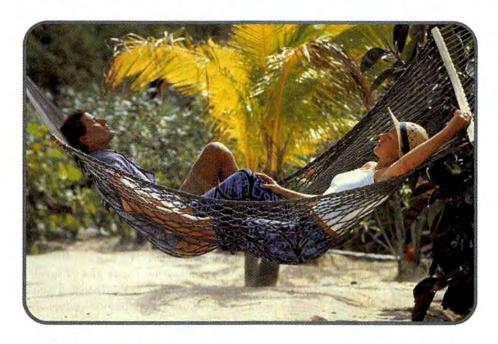
Send your questions and tips to john@ j-walk.com. We pay $50 for published items. Contributing Editor John Walkenbach is the author of Excel 2000 Bible *(IDG Books, 1999) and maintains The Spreadsheet Page (www.j-walk.com).* ∎

ILLUSTRATION: JEFFREY PELO

Watch television while you work ◆ Better treble, no trouble ◆ Power primer

The Nuts and Bolts of PC Power Supplies

ELECTRICITY IS THE lifeblood of your PC. It courses through your motherboard and CPU in miles of circuits that can be narrower than 1/100th the width of a human hair. To run smoothly, your PC needs a constant flow of precisely monitored electricity pumped through these tiny channels. Even small fluctuations can lead to lost data or system crashes. Accordingly, you need to know how to regulate your PC's power supply.

First, the basics. Your PC subsists on a diet of direct current, the kind produced by a typical flashlight battery. DC flows with a uniform force, or voltage, much like the flow of water through the pipes in your house.

The voltage of electricity coming from a wall outlet, on the other hand, continually fluctuates. This alternating current changes from highest voltage to lowest, then back to highest, 60 times (or cycles) per second. Your PC's power supply must convert the wall socket's fluctuating AC to the uniform DC your system needs.

The most common power-related PC problems come from errant voltages in your wall outlet's AC. When a fallen tree brings down a power line or lighting strikes a little too close for comfort, the resulting voltage spike—in thousands of volts—can flash from your wall outlet and fry the sensitive circuits in your PC.

Your best defense against a voltage spike is a good surge protector. Expect to pay at least $40, and beware of cheap power strips that claim they have surge protection but really don't. Make sure the unit meets the Underwriters Laboratories UL1447 standard—if it does, it'll say so clearly on the device.

Another important feature to look for: an indicator light that shows the unit is still working. Many low and moderately priced surge protectors use metal-oxide varistors, which can lose their capability to protect against excess current after a single high-voltage or multiple moderate-voltage surges, and the indicator is the only way to tell if the device is still functioning. If you're using a cheap surge protector with no indicator light, it's wise to replace the unit once every 12 to 18 months—or more frequently if you live in an area prone to lightning or other electrical disturbances.

Some surge protectors also feature a resettable circuit breaker, which lets you correct small interruptions with a quick flip of a switch instead of having to replace a fuse. Surge protectors with this feature often cost more but are worth it.

When protecting your PC against voltage spikes, don't forget about your modem's phone lines; they're just as susceptible. Many good surge protectors these days come with one or two RJ-11 telephone connectors. You can also buy such a connector separately.

For a good selection of quality surge protectors, visit power equipment specialist APC's Web site at www.apc.com.

Too little voltage can be just as harmful

Higher Highs, Lower Lows

THE SMALL SPEAKERS that come with a typical system usually produce less-than-symphonic sound. And even the more expensive, better-quality speakers need a little tweaking now and then.

To adjust the bass and treble on your PC—assuming your sound card supports that capability—open Windows' volume control by double-clicking the *Speaker* icon in the System Tray and then, if it's there, clicking the *Advanced* button. That brings up the bass and treble controls.

to your computer as too much. Brownouts and blackouts can shut down your system improperly, damaging files or causing data loss. The solution is an uninterruptible power supply—basically a bunch of batteries—that will keep your system running long enough for you to save important files and shut down properly. APC's Back-UPS Office 280 costs only $99.

POWER SUPPLY AND DEMAND

THE POWER supply is the heart of your PC. Though it requires almost no maintenance—except the occasional check for excessive dust around the fan's air intake vents—it can still fail. Keep alert for the following warning signs:

Smoke. It sounds obvious, but if you smell smoke, turn off your system and see if the smell subsides. Then turn it on and see if it returns. If it does, open up the PC's case and investigate.

No fan noise. If your power supply's fan is quiet, your power supply may need replacing. Turn off your system immediately to avoid any damage from overheating.

Intermittent memory error messages. Your PC's RAM is very intolerant of power fluctuations. If you consistently get the same error messages at the same memory locations, you most likely have a problem with your RAM. Erratic error messages, on the other hand, may be due to a problem with your power supply.

Blank screen with noisy computer. If you get a blank screen but can still hear your

FIGURE 1: IF YOUR PC HAS ACPI enabled, you'll see ACPI listings in Device Manager.

hard disk and fans running, your power supply may be on the fritz. (Of course, first make sure that your monitor hasn't just slipped into power-saving mode.) The power supply sends a constant signal to the delicate motherboard indicating that power output is normal. When an abnormality occurs, the signal stops and the motherboard shuts down in an act of self-preservation.

Problems at start-up. If you notice any unusual behavior or problems—such as memory errors or a distorted video display—appearing at start-up but not on subsequent "warm" restarts, you may have a power supply problem.

If you conclude you do need a new power supply, be sure to get the right one for your PC. The two most popular types are ATX and AT, corresponding to the PC's motherboard form factor. But to meet design needs, some PC manufacturers use a nonstandard power supply, so always check your system documentation before buying a replacement.

And make sure the new unit can handle your PC's power demands. Capacity rat-

Back-UPS Office 280

Street price: $99; American Power Conversion; 800/877-4080; www.apc.com

PRODUCT INFO NO. 689

WinTV-USB

Street price: $99; Hauppauge Computer Works; 800/443-6284; www.hauppauge.com

PRODUCT INFO NO. 690

ings for power supplies are measured in *watts*, or maximum energy output. Most PCs have a rating of 180 to 300 watts, with 200- to 250-watt power supplies. You should find your power supply's rating written on the outside of the unit's case.

If you're planning to add any new devices to your PC, consider buying a power supply with a higher rating than the one that originally came with your system, since additional cards and drives can cause an overload.

EVERY LAST DROP

ALL NOTEBOOK and laptop PCs come with power-saving modes that shut down various combinations of devices to extend battery life. You can select modes from the CMOS setup program, keyboard, or even Windows. Most systems today offer power-saving modes through at least partial support of the Advanced Power Management standard.

The five APM modes of operation range from full-on to full-off, with three states of hibernation in between. *Standby* allows for the quickest return to work by keeping current data in RAM and shutting down only a few components. *Suspend* shuts down more components, and *Sleep* actually writes the current data to hard disk and cuts off power to RAM. Unfortunately, because different vendors implement APM in different ways, conflicts and incompatibilities can occur. For example, many APM systems allow settings to be selected in both CMOS and software. So if your settings under the Power Management icon (in Control Panel) don't work, your Power Management may be conflicting with settings in the CMOS setup program. Other settings that fix APM incompatibilities can be found in Device Manager: Select *Start•Settings•Control Panel*, double-click *System*, select the *Device Manager* tab, scroll down to and double-click *System devices*, double-click *Advanced Power Management support*, and select the *Settings* tab.

Many notebooks—and desktops—now come with the successor to APM, the Advanced Configuration and Power Interface. ACPI allows a SoftOff option, which lets your PC, even in sleep mode, respond

to events like incoming faxes or quickly get your PC up and running.

But ACPI has gotten off to a rocky start, and conflicts abound. To find out if your PC has ACPI, look under 'System devices' in Device Manager. You should see several listings with ACPI in the title (as in **FIGURE 1**). If you know that your new PC supports ACPI, but you don't have it installed, you can manually install it (see article Q195218 in Microsoft's Knowledge Base.Support.microsoft.com). But check with your manufacturer first—there's probably a good reason it's not there.

GETTING TUBULAR

I'M LOOKING FOR a PC for my daughter who's about to leave for college. Since she's traveling across the country, I want her to get a laptop, but she wants a desktop system so it can double as a TV set. Is there any way that you can watch TV on a laptop?

Karen Elliott, Atlanta

IF YOU BUY a laptop with a USB port, you can indeed watch TV. Hauppauge's WinTV-USB is a cable-ready TV tuner that plugs into a USB port and comes with software that lets you watch TV full screen or in a window on any USB-

FIGURE 2: BUSINESS OR PLEASURE? Install WinTV and you can watch Regis while you work.

equipped PC (see **FIGURE 2**). If a coaxial cable TV connection port isn't available, you should be able to buy an antenna at your local electronics store for under $30.

Send your questions and tips to kirk_steers@pcworld.com. We pay $50 for published items. Kirk Steers is a PC World contributing editor. ∎

Connect PCs Without Wires

IF YOU WANT TO NETWORK your Windows 9x PCs or notebooks, but don't want to string network cables through your walls, wireless networks offer a tidy alternative. Though less expandable and slower than cables, they work within a radius of about 150 feet through walls, ceilings, and floors, so you can sit on the deck with your notebook and get files from your desktop, or send files to a printer in your home office. Add Internet-sharing software, and you can even surf the Internet.

To install a wireless network, you'll need an ISA or, better, a PCI wireless network card for each desktop, and a PC Card for each notebook. You can buy the necessary components separately or in kits, which usually handle two PCs or one PC and one notebook. Wireless networks are a bit more expensive than wired networks; prepare to pay $100 to $150 per PC.

Most wireless networks operate at the leisurely speed of 1 to 2 mbps. Although that's much slower than the 10- or 100-mbps speeds of wired networks, it's still good for casual use and for going online.

The steps involved in installing a wireless network vary by manufacturer, but here's an overview of the process for both desktops and notebooks.

Stan Miastkowski is a contributing editor for PC World. ∎
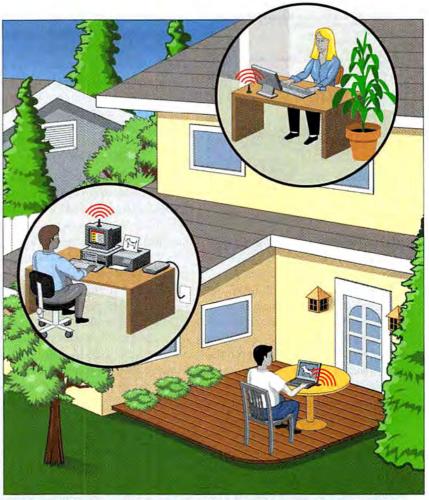
1 Plan network device placement. Consider the range limits of your wireless network connections as you decide where to place each desktop PC. Specifically, make sure that the PCs with resources that you want to share, such as a printer or an Internet connection, are within range of the desktop PCs that need to access those resources.

If you include a notebook in your wireless network, make sure that the notebook will always be within range of one of its network peers whenever you want to use the network.

2 Buy the right network adapters. You'll need one add-in card for each desktop PC and one PC Card for each notebook. For the desktops, use PCI cards if they're available and your PC has a free PCI slot. PCI cards offer the easiest and most reliable Plug and Play setup.

Unlike wired networks, which let you mix and match add-in cards and PC Cards from different manufacturers, wireless networks need matched cards from the same manufacturer.

PHOTOGRAPHS: KEVIN CANDLAND; INFOGRAPHIC: K. DAN CLARK

3 **Install the wireless add-in card.** Turn off your PC and unplug it from the wall. I recommend you wear an anti-static wrist strap (available from electronics stores such as Radio Shack) to prevent static damage to your PC. Locate a free PCI or ISA slot (depending upon which type of card you purchased), and remove the metal cover at the rear of the slot.

Carefully insert the wireless card, seating it securely in the slot, and fasten it with a screw. Depending on how the slots are oriented in your computer, you may want to turn its chassis on its side so you can push down while inserting the card.

If your wireless network card uses an external antenna (like the Proxim Symphony card shown here), connect the antenna to the rear of the card, and place the antenna on a nonmetallic surface as high as possible for maximum range.

4 **Install the wireless PC Card.** Procedures for installing a wireless PC Card in a notebook vary by manufacturer, but in general you simply power down your notebook, insert the card into a free PC Card slot, and attach a small antenna. Read your own card's or kit's setup manual.

5 **Install the driver.** Plug your PC back in and turn it on. With both desktop and notebook PCs, Windows 9x should automatically detect the network card and ask you to locate the software for it. Read the on-screen directions carefully, since the exact procedure depends on which version of Windows you're running. Your wireless network cards should come with drivers on a floppy disk or CD-ROM. At some point, you'll be asked to insert your original Windows 9x CD-ROM.

Depending on the brand of wireless network add-in cards or PC Cards you're using, you may be asked to enter other information, including a unique network name for the PC or notebook. Some setups enter this information for you automatically.

You'll need to restart your PC when prompted (sometimes more than once).

6 **Install additional software.** Beyond the basic driver installation, you may need to tweak the Windows networking settings and install any additional software (such as Internet-sharing software) that comes with your wireless network.

Check to see that file and printer sharing is enabled (select *Start•Settings•Control Panel•Network*, and click the *File and Print Sharing* button). If your setup software didn't help you select the drives or folders to share with other network users, double-click *My Computer*, right-click the drive or folder to share, select *Sharing*, click the *Sharing* tab, and fill in the correct blanks.

If a PC on your wireless network will use a printer elsewhere on the network (and the installation software hasn't set this up), double-click *My Computer*, open *Printers*, click *Add Printers*, and follow the on-screen directions. Don't know the path to the network printer? Click the *Browse* button.

7 **Test your wireless network.** Test your new network by connecting to each PC's drives and printers from the other network peers. If you purchased Internet sharing software, try connecting to the Internet and surfing from each PC and notebook.

If the PCs don't recognize each other, double-check the obvious possibilities, such as antenna connections. Also, make sure you really have sharing enabled (reread Step 6). If those steps don't help, go to *Start•Settings•Control Panel•System* and click the *Device Manager* tab. If, under Network Adapters, the icon for your new wireless network adapter is shown with an exclamation point next to it, there might be a conflict with another device, preventing the adapter from working properly. Select *Start•Help*, search for "networks, troubleshooting," and follow the directions.

If the PCs still aren't communicating, it's time to call tech support.

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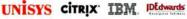
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FASTLANE

A Brief Personal History of PC Bugs

FRUSTRATED BY THAT obnoxious bug that bit you last week? It's nothing new. I was first stung when the PC was but a baby. The Thursday before Memorial Day weekend in 1982, I sped home with a brand-new IBM PC, complete with DOS 1.1, 64KB of RAM, and the first pair of double-sided IBM floppy drives in New York. Gleaning information from the gorgeously linen-boxed manuals, I quick-

ly taught myself how to copy files and format disks. With the deadline for a mammoth project looming, I expected to be ready to process words within a day or two.

The next morning, FedEx dropped off a freshly minted copy of MicroPro's WordStar. I backed it up according to the instructions and put the new disk in the drive. It didn't work.

A few minutes later I had my first encounter with the concept of technical support. And I do mean concept. As I quickly deduced from a call to California on my dime, MicroPro's policy was simple: End users didn't deserve the company's help. That was supposed to come from my dealer. But when I phoned him, I discovered that his technical prowess didn't extend much beyond filling out a FedEx form.

When I found someone at MicroPro who was grudgingly willing to talk to someone as plebeian as a mere customer, he dimly recalled something about DOS 1.1 being the problem. With DOS 1.0, everything might work fine. Maybe.

It was now 4 p.m. The IBM Product Center would close at 5 p.m. for the long weekend. After a frantic rush-hour drive, I convinced a salesman to give me a bootleg version of DOS 1.0.

Back home, I put the DOS disk in one drive and WordStar in the other. It worked. Until MicroPro repaired the problem (which took months), my double-sided drives had to be used at half-capacity in single-sided mode with WordStar.

This first of many maddening incidents set the ugly pattern for all those that followed. Company creates problem. Company

> Microsoft still reports **issues** (its **charming term** for bugs) with products it has been **selling for years.**

arrogantly refuses to deal with problem, much less fix it in a timely fashion. Customer limps along with work-around and curses company. Customer later pays for upgrade, because the alternatives are even less palatable.

LEARNING THE HARD WAY

HARDWARE BUGS have their own long history. The awful IDS Prism was my first printer. The first one came dead on arrival, and its replacement had every design defect imaginable. The color ribbon jammed. The printer overheated so badly that pieces of plastic inside came unglued. Software support involved writing your own Basic programs to change fonts.

The low point came when the company sent a gear and spring assembly for the horrible ribbon transport mechanism. Removing the old one required an odd-sized Allen wrench that was impossible to find. In the end, a tech-support person took pity on me and sent the tool I shouldn't have needed in the first place.

Not long after, I reviewed a program called Memory Shift. In theory, it could load several programs into RAM at once, and let you switch among them. In practice, it didn't work. When I slammed it in print, one of its handlers claimed it was a gamma test version—even though it was the same version that went to paying customers.

Flash forward: Some products today have been around to the point of omega testing—and still don't work right. Microsoft still reports "issues" (its charming term for "bugs") with products it has been selling for months or years. Drivers still cause problems. Plumbing that's been around as long as QuickTime is still prone to failure.

Tech support has come full circle. Getting to a live human is harder than ever. The current mantra is "Let them eat downloads" from the Web—when and if the fixes appear. Only a few vendors, mostly involved with hardware for graphical output, compete on quality.

Which is why every time I open a box or install a download, I feel the shudder of trepidation that I learned back on the second day of using my very first personal computer. Is there any other industry where virtually every new product makes you wonder, "Will it wreck my machine? Will it actually work?"

PC World *Contributing Editor Stephen Manes is the cohost of* Digital Duo, *a series appearing on public television stations nationwide. For program information, see www.digitalduo.com.* ∎

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