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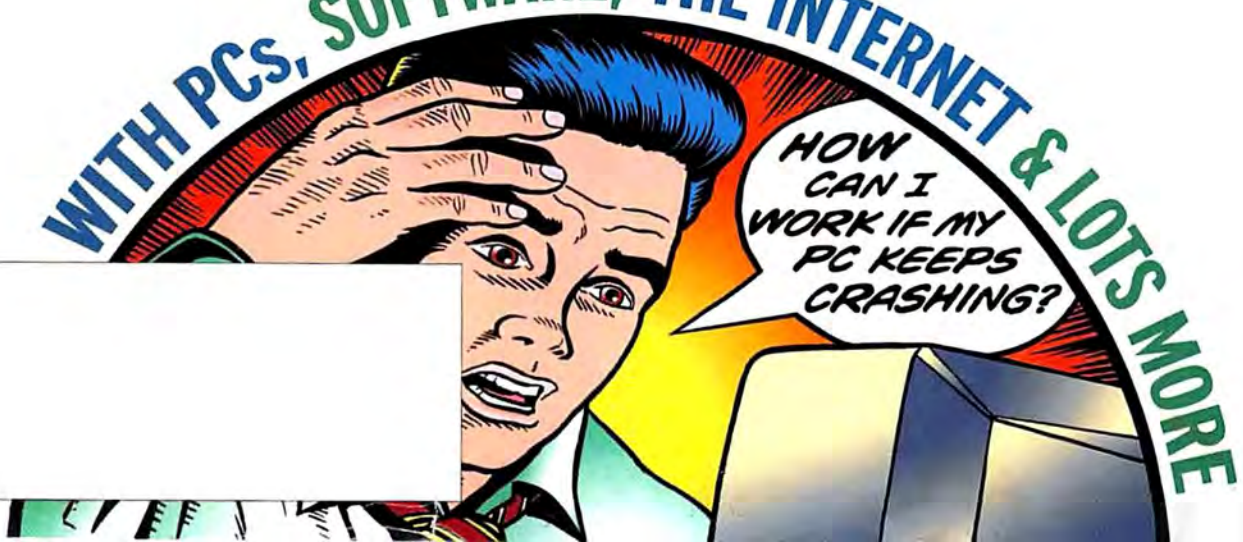

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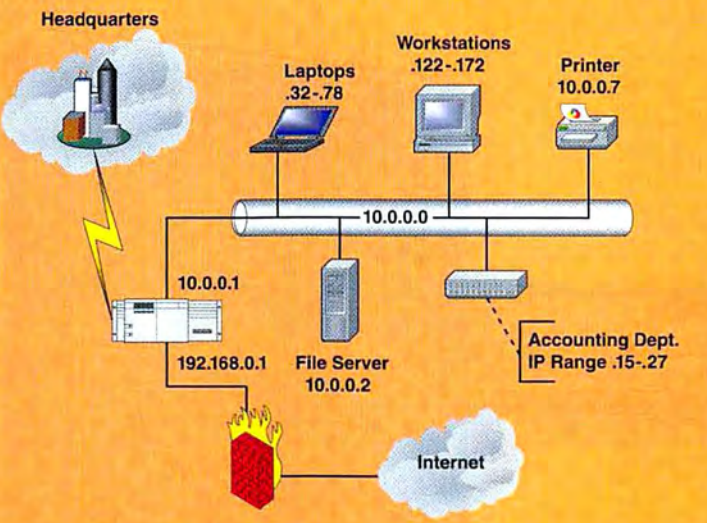

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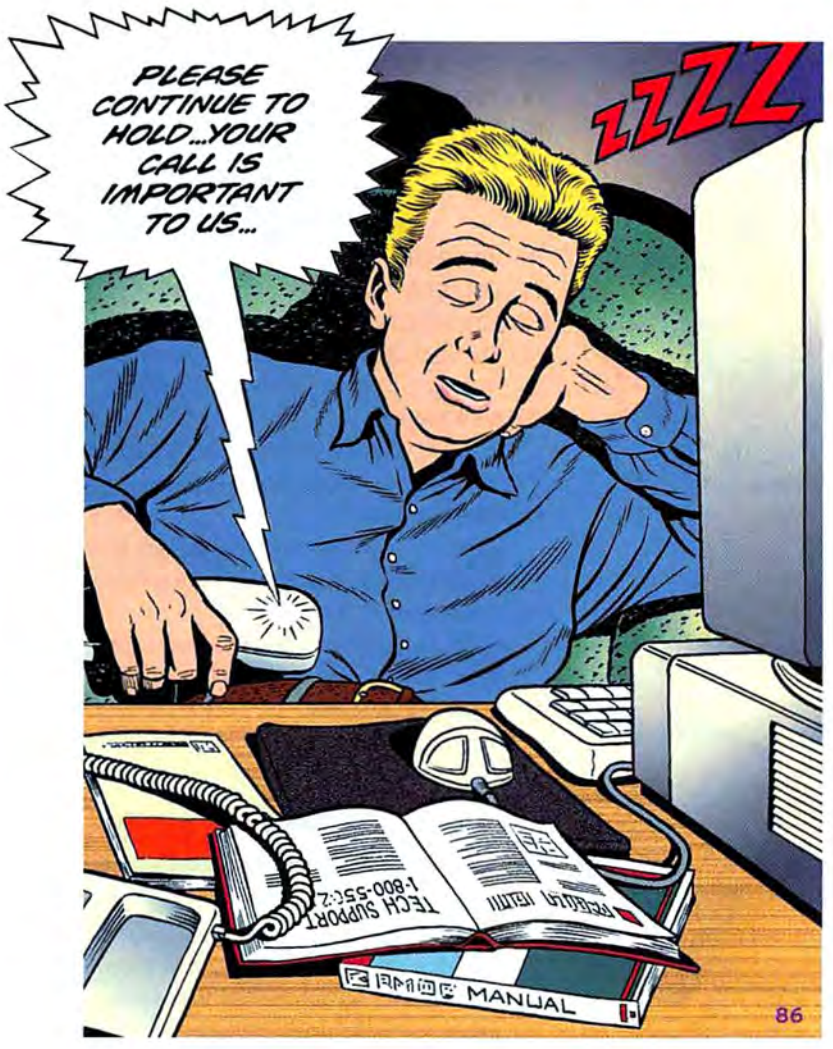

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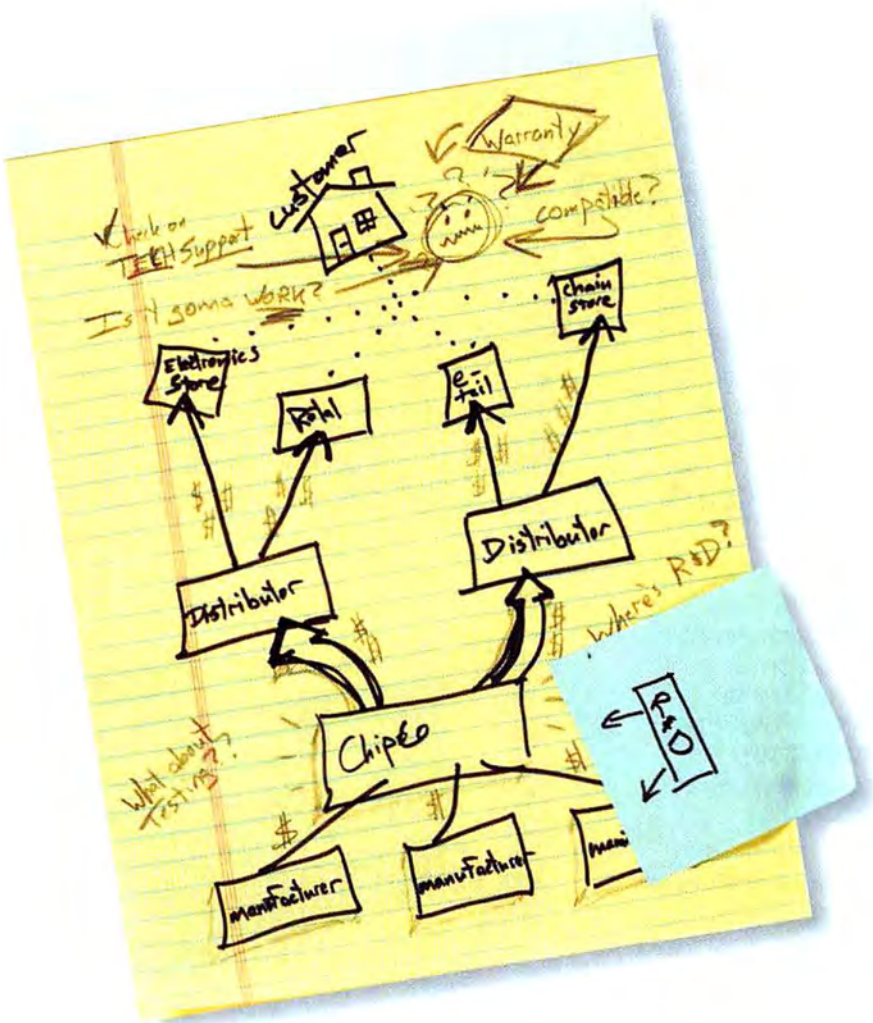

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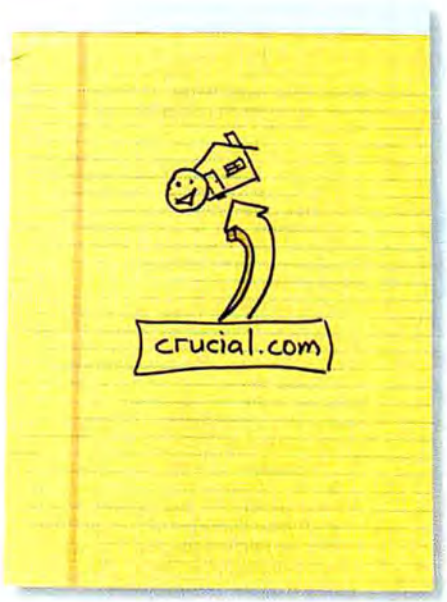

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TO CONTRIBUTE TO A WORTHY cause like cancer research, you used to have to part with something you might miss—like your cash. That's no longer the case. You can now donate something that would otherwise be wasted—your CPU's unused processing power—to any number of important scientific or medical projects. But should you? And if so, which project should you choose?

The questions are especially timely now that Intel has thrown its weight—and $1 million—behind one such endeavor, the United Devices cancer research program, developed in conjunction with Oxford University.

The Intel program, launched in April, hopes to recruit 6 million people to download its client software from www.intel.com/cure. Their PCs will provide 50 terraflops of collective processing power (1 terraflop equals 1 trillion floating-point computations per second). "That's ten times bigger than the world's largest supercomputer...for less than 1 percent the cost," says Pat Gelsinger, Intel's chief technical officer.

Say so long to "flying windows" screen savers and use your CPU's idle power for some worthwhile work.

The Intel project is one of several that work like this. You install client software on your PC, where it runs in the background either as a screen saver or during the CPU's so-called "idle" cycles. It grabs problems from the Web site and reports back results over the Internet. And the collective power of thousands of screen savers at work gives such distributed computing networks their supercomputer-like muscle.

The similarity ends there. Distributed computing works best on "embarrassingly parallel" problems, those that can be broken down into many small *independent* calculations. It's less effective when individual calculations affect each other. It fails, for example, at weather forecasting, where a perturbation in one part of the atmosphere disturbs its neighbors. Many other supercomputer problems—like modeling airflow around a wing or the physics of a bomb blast—lie beyond distributed computing's reach.

Of course, plenty of important work remains. SETI@Home (setiathome.ssl.berkeley.edu), the granddaddy of distributed computing projects with nearly 3 million participants, is searching for intelligent life in space. United Devices (www.ud.com), which wrote the Intel client, is also investigating the human genome. And Entropia (www.entropia.com), a key competitor, is seeking treatments for AIDS and clues to stock market volatility.

Distributed computing can also help solve many stubborn problems of allocating scarce resources—like scheduling fleets of container ships or salespeople. "Nobody thinks of container-ship modeling as a classic problem for distributed computing, but it works well nonetheless," says Marc Hedlund, cofounder of Popular Power (www.popularpower.com), which earlier this year closed its doors as a commercial entity but still conducts flu vaccine research.

How do you decide which project to support? First, ask yourself whether you want to support commercial distributed computing projects, like those run by United Devices and Entropia. (At United Devices, you can indicate that you want to do only scientific work.)

Security is another concern. The distributed computing client software, like any program that communicates over the Internet, could be a target for hackers. Your best protection may be to stick with well-established firms.

Leaving security aside, the best way to choose a charity is to put your CPU where your heart is. Senior Associate Editor Richard Baguley, whose mother died of cancer last year, has set up a *PC World* team on the Intel cancer research site (for Richard's list of this and other projects, see www.pcworld.com/june2001/charity). Others may be drawn to the AIDS project, to SETI, or to something else. Wherever you place your bet, though, expect distributed computing to keep growing. "I hope it eventually becomes so common that we take it for granted, so that the portfolio analysis you run on your desktop may use 20,000 other computers for an hour," says Scott Kurowski, Entropia's founder. "That could be the most powerful Internet resource ever created."

COMING UP IN JULY

Best Products of 2001: Our 19th World Class Awards honor the winners in 58 categories, including Product of the Year.
Suite Talk: Should you move to the new Office? Here's the lowdown on Office XP—decide if upgrading makes sense for you.
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Kevin McKean is editorial director of PC World. ■

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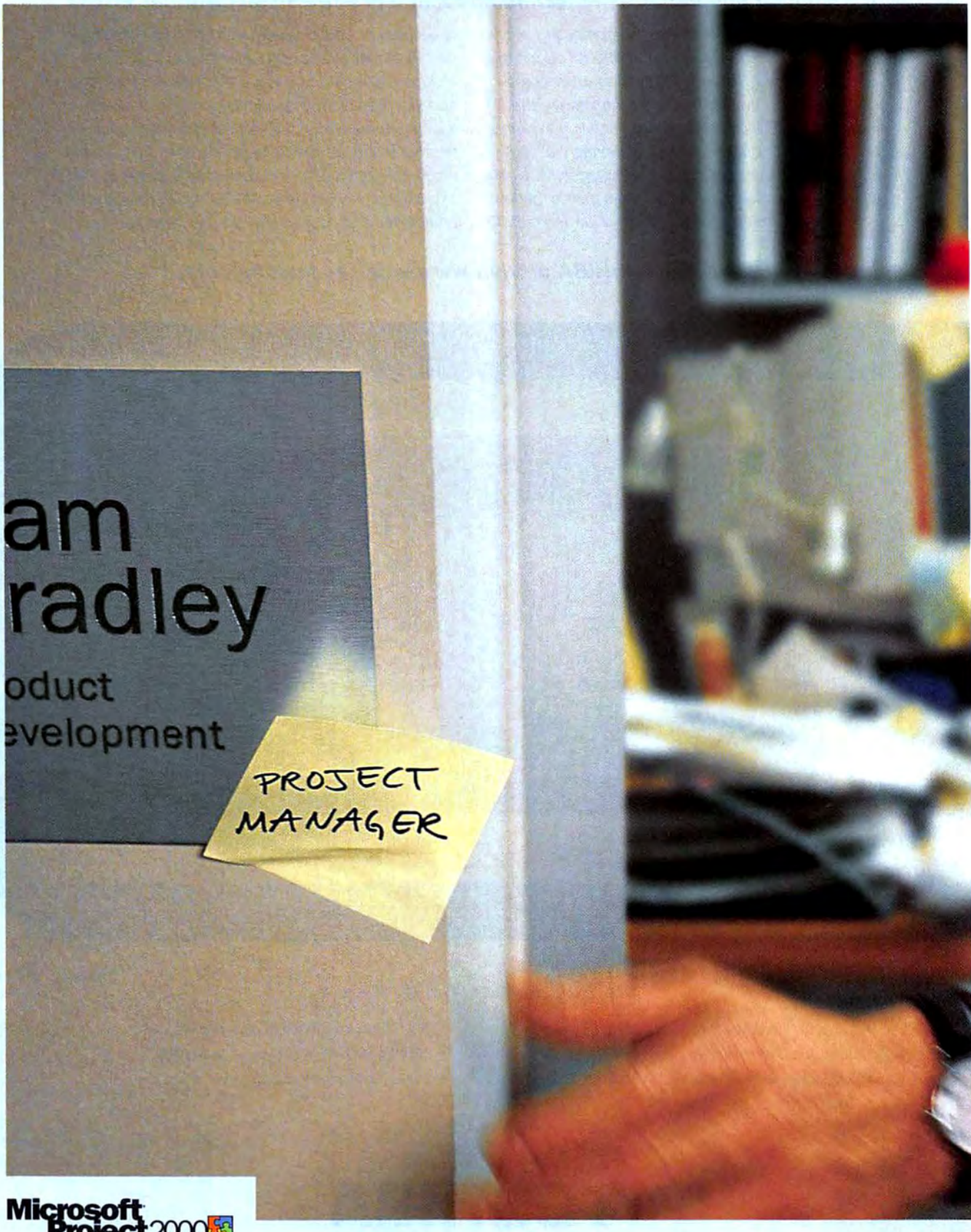

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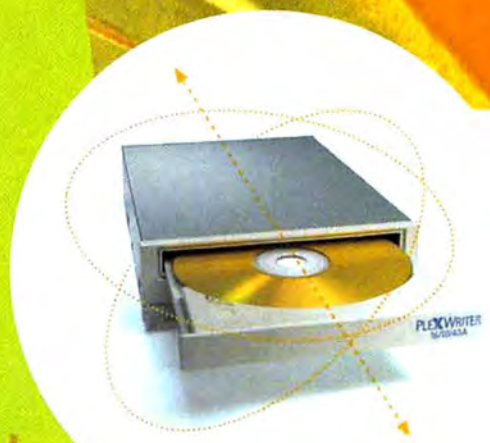

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YOUR TAKE ON: Netscape 6, Windows Me woes • Chat rooms • PDA pros, cons

PC TROUBLESHOOTING GUIDE: KUDOS AND A CAUTION

JUST WANTED TO TELL you the April issue of *PC World* was, to me, the best in a long time in the information it provides for the everyday home desktop user—especially your cover story, the "Ultimate PC Troubleshooting Guide."

Thanks again, and I hope to see more issues like this one.

Patsy Massey, via the Internet

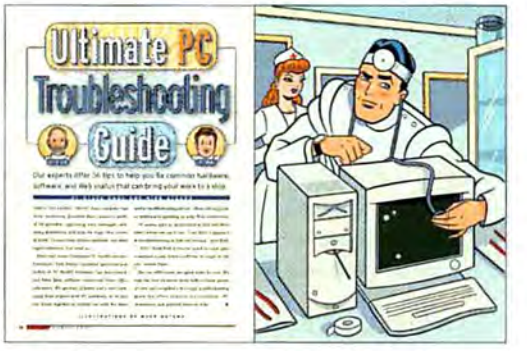
THE APRIL ISSUE was excellent, especially the troubleshooting guide. It hit the nail on the head on three major nagging glitches I'd been having with my computer and more than made up the cost of subscribing to *PC World*.

Vic Mukai, Alexandria, Virginia

I LEARNED A LOT FROM your troubleshooting guide, but the photo above the "Tools of the Trade" list (page 81) shows a cup of coffee right next to the tools and parts. Although it's not listed as a necessary item, I would agree that a mug of java might well be needed to prepare users for some computer repair projects.

I discovered the hard way, though, that it's a bad idea to have any liquids near the work area. If you think you have troubles now, wait until you saturate a circuit card or even worse, a motherboard with your spilled beverage. You'll need more than a cup of strong coffee to get through that situation!

Bob Engelbardt, Kailua, Hawaii



MORE ON FLAT-PANEL DISPLAYS

THE ARTICLE ON flat-panel displays in the March issue was very interesting ["Big & Flat," *Top of the News*]. But one up-and-coming technology that it did not mention is TDEL (thick dielectric electroluminescent display). I've heard that TDEL displays will be substantially cheaper and easier to make than LCDs, resulting in more affordable flat-panel devices.

Mike Clarke, Kitchener, Ontario

ANOTHER CHAT ROOM

I WAS SURPRISED that Harry McCracken's article on Webcam chat rooms [*Web Savvy*, April] did not mention IVisit (www.ivisit.com). IVisit is a stable beta site with a strong following, and it's a good choice for people looking to connect to friends, families, and business acquaintances around the globe. Although the audio quality is sometimes quirky, the software is free, easy to install, and user friendly.

Eric Burkam, Hong Kong

FIXING NETSCAPE 6...

THANKS TO Stuart Johnston and his April *Bugs and Fixes* item on Netscape 6 glitches. I recently experienced some of these troubles with the browser myself (hangs, freezes, errors, and so on), but I thought it was just my PC acting up.

Johnston left out one way to solve the issues that plague Netscape 6—switch to Microsoft's Internet Explorer. After years of avoiding the Dark Side, as Scott Spanbauer calls it in *Internet Tips*, I finally felt myself being irresistibly forced to try IE.

Let the force be with you.

Thomas Paull, via the Internet

...AND FIXING WINDOWS ME

SO JAMES SUMMERLIN thinks you've been too hard on Windows Millennium Edition [*Letters*, April]?

Well, it took me two weeks, but I solved every single problem with Windows Me. I got all my programs (such as Norton Firewall and QuickBooks Pro) to run, I managed to get all my local and remote networking connections to work, and ▶

HOT BUTTON

PDA Appraisal Stirs Users' Passions

YOUR CONCLUSION that in almost every category, Pocket PCs are superior to Palm-based handhelds is astounding ["Palm vs. Pocket PC," April]. As a user of Handspring's Visors, including a Visor Prism, I believe that your writer showed little knowledge of the current Palm operating system or of the capabilities possessed by the Visor and its Springboard expansion slot. With its applications and with various available hardware add-ons, my Prism handily replaces my laptop when I'm traveling.

I use Windows and other Microsoft products on my desktop PCs, but when a software conflict between an application and Windows recently destroyed my file system, it was my Visor, seamlessly linked daily to Outlook, that saved my critical contact and calendar information. Pocket PC and the shrunken-down version of Windows? Not likely.

Ron Goins, Tulsa, Oklahoma

I LOVE BEING a subscriber to your magazine. I haven't seen so much cheerleading for iffy technologies since NASA and the Mars landing.

My Palm IIIe works just great as long as I remember not to place it in the cradle—which should really be called the casket because every time my Palm does go in there, it dies. Well, that's not really true. It just won't sync!

It used to. Everything was fine. Then the process became balkier and balkier. Now syncing successfully is about as likely as...well...finding a space vehicle on Mars. I bought a USB "sync" kit. It sank. I've called Palm so much, I know many of their tech support people by first name.

My conclusion after all these headaches? Too many times, technology makes promises it simply cannot keep.

Cal Hunter, Red Bluff, California

ILLUSTRATION: MARK MATCHO

I also stopped getting blue screens with a locked-up computer.

The solution was simple. I reformatted my hard disk, threw Windows Me on the floor, bought a legal copy of Windows 98, and installed it. Everything has worked fine ever since!

Drew Berding, Scottsdale, Arizona

Editor's note: See May's *Bugs and Fixes* column (www.pcworld.com/may2001/bugs) for advice on how to deal with various commonly encountered Windows Me problems.

A LIFELINE FOR OLD PCs

NOT EVERYONE is interested in really fast computers or the most up-to-date technology—or at least they are not willing to give up their older systems. For such people, the Internet is like life support. For instance, Texas Instruments has not made a 99/4A PC in years. Yet it is kept alive on the Internet via Web sites like www.99er.net and online discussion groups. I'll bet many other sites support older, no-longer-produced computers. If it weren't for the Internet, many users of these systems would probably have given up on their machines.

Tom Mullins, via the Internet

CORRECTIONS AND CLARIFICATIONS

MAY'S *Top of the News* story on Windows XP ("Great XPectations," page 52) should have said that the OS requires at least a PII-233 CPU; a PII-300 is recommended.

A tip on moving drivers from one PC to another in May's *Answer Line* should have said to right-click your *My Computer* folder.

Gainward's CardExpert GeForce2 MX, which is listed on several recent *Top 10 Graphics Boards* charts, lacks DVI-out.

May's "Fortress PC" should have said Trend Micro bundles its PC-cillin antivirus software with the ZoneAlarm Pro firewall.

In May's *Upgrade Guide*, the URL for Labtec should have been www.labtec.com.

In April's "Ultimate PC Troubleshooting Guide," the Windows Me directions for changing modem settings ("Don't Get Dumped," page 80) should be: Select *Start•Settings•Control Panel* and open *Modems*. Ensure your modem is highlighted and click *Properties*. Click the *Connection* tab, then the *Port Settings* button. Select the next-lower setting in the Receive Buffer and the Transmit Buffer drop-down lists.

April's "Power Browsing" should have said Windows Media Player 7 supports various file formats but not QuickTime's .mov.

Contrary to a statement in April's *Top 10 Digital Cameras*, the Kodak DC4800 does not include serial-port output.

PC World regrets the errors.

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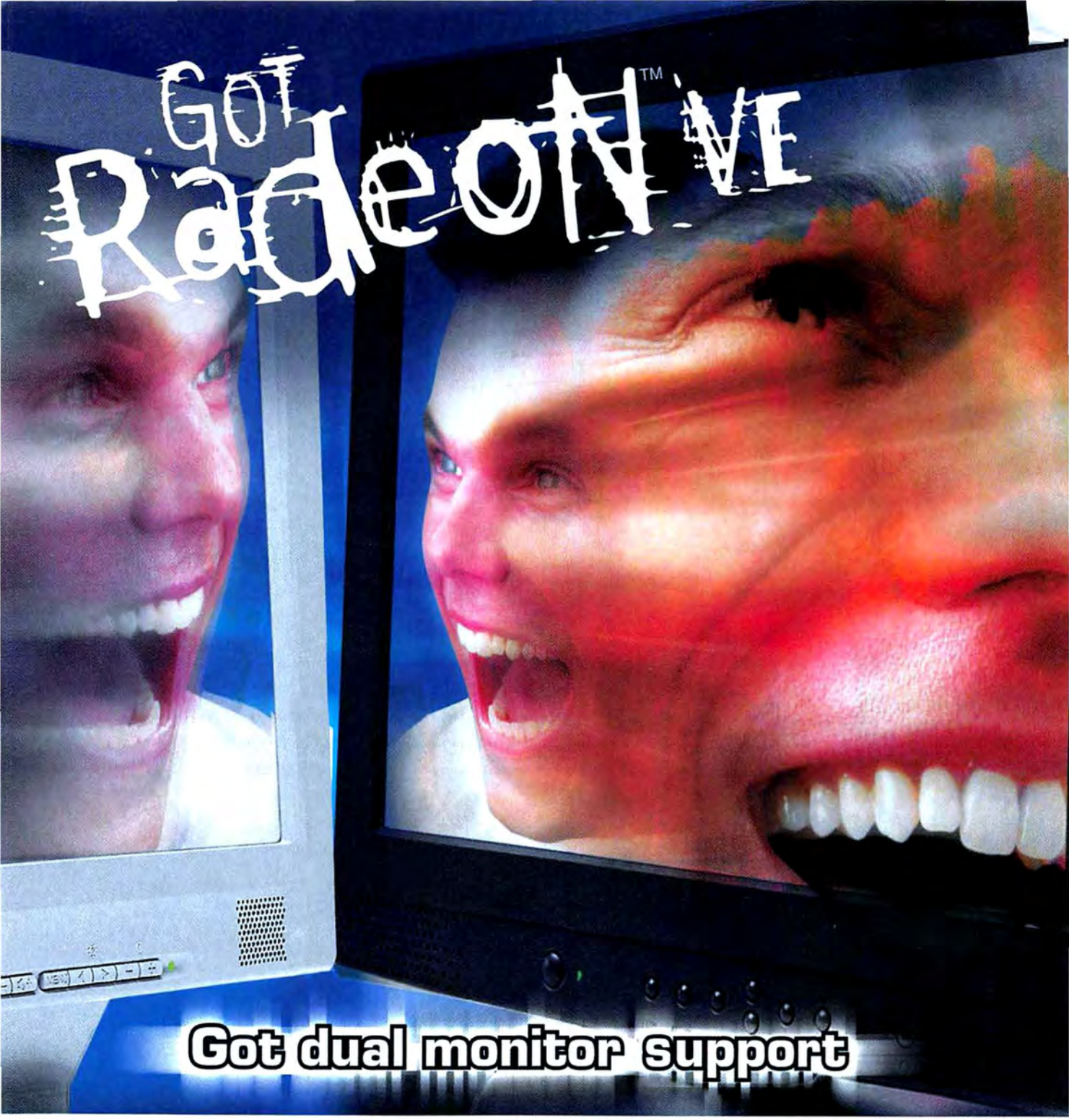

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The Taxman Is Coming to the Net

Thought you could dodge sales taxes by making your purchases on the Web? Think again.

ILLUSTRATION: MARK STEELE

THINK BACK TO YOUR LAST online purchase. Did you pay sales tax? Maybe, maybe not. It depends on whether you bought from a Web site whose parent company is located in the state where you live. It also matters what you bought—some states tax food but not software; others tax software but not clothing. And it may also depend on when you made the purchase, since states' sales tax rates and laws change frequently. Finally, it depends on whether your online merchant bothers to charge its customers sales tax.

Has all this got you confused? You're not alone.

The picture may soon get clearer, but not in a way most Web consumers will like. State and federal officials are working together to make sales taxes on the Net easier for companies to apply and far more common. Some supporters of these changes expect you to be routinely paying sales tax on Web purchases soon—perhaps as early as next year.

Wait a minute, you may be saying, isn't the Internet supposed to be a tax-free zone? Not quite. The Internet Tax Freedom Act of 1998 (which expires in October but will almost certainly be extended for at least a few more years) does ban new taxes on Internet access, discriminatory taxes on Internet transactions that two or more states could tax, and taxes for items purchased online that would not be taxed if purchased offline. But it doesn't outright ban sales taxes on products bought online.

Right now, online retailers typically follow the same sales tax rules as mail-order catalog companies. They're required to charge you sales tax only if they have a retail store, office, or warehouse in your state. If you live in Maine, for example, and order a pair of snowshoes from llbean.com, you'll find a 5 percent state sales tax tacked on to your credit card bill. If you order the same snowshoes from your condo in Maui, you'll dodge the Maine sales tax.

Of course, like most things tax-related, there's more to it than that. Even if you order from an out-of-state Web site, in most states you're still responsible for paying a *use* tax—a sort of self-imposed sales tax. But if—like most Americans—you somehow overlooked paying your use tax this year, you probably needn't worry about government officials knocking on your door. It's extraordinarily difficult to keep track of use taxes, and most states don't bother trying (only a few, including Michigan and North Carolina, provide a line on their state tax return form for reporting use tax).

The bottom line is that consumers can make the majority of their online purchases without paying a cent in sales or use taxes.

UNFAIR ADVANTAGE?

UNDERSTANDABLY, traditional retailers have cried foul: Why should e-merchants enjoy the advantage of offering customers a 5 to 8 percent price break? "It's incredibly unfair," says David Didriksen, who owns a successful bookstore and café in Acton, Massachusetts. "Why ▶

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should Internet companies get a free ride? We pay a lot of taxes [as business owners], and it's not right to require some businesses to pay and not others. It puts us at a competitive disadvantage, since our customers end up paying more."

Civic leaders have joined in the chorus, claiming that municipal services suffer from sales tax revenues lost to the Web. According to Forrester Research, states stand to lose as much as $14 billion in sales and use tax revenue in 2003 due to online purchases that are made tax-free.

Does that mean you should blame the dot coms when the potholes in the roadway aren't filled? Probably not. Less than 1 percent of total retail sales in the United States took place on the Internet in 2000.

Meanwhile, Internet entrepreneurs argue that they're the ones who need protection, not the brick-and-mortar stores. The young Internet economy needs to gain a foothold unfettered by tax burdens, they say. And the plunge in dot-com stock prices—which is still ongoing at this writing—lends weight to that argument. Suddenly, your neighborhood bookstore may be on more solid financial ground than once-mighty Amazon.com.

Tony Hsieh, co-CEO of San Francisco–based online shoe store Zappos.com, says having to unravel the red tape of states' tax laws will hinder the development of dot coms.

"I don't think [sales taxes] will affect our customer base as long as they're uniformly applied," he says. But Hsieh can see the potential for the tax to slow the pace of innovation if companies have to spend time figuring out tax laws. "Better to work on improving products and services," he contends.

> 'It's incredibly unfair. Why should Internet companies get a free ride? It puts us at a competitive disadvantage.'
>
> *–David Didriksen, bookstore owner*

Such arguments, however, seem unlikely to sway lawmakers. Broader application of sales taxes to Internet purchases is almost a certainty. In February, Representative Chris Cox (R-California) and Senator Ron Wyden (D-Oregon) introduced a bill that would extend the Internet Tax Freedom Act while broadening states' ability to enact their own online sales tax laws covering all Internet transactions. Perhaps most important, the proposed law attempts to simplify and streamline states' existing sales and use tax systems. Essentially, the bill offers a deal to the states—Congress will make it easier for them ▶

ON YOUR SIDE

I ORDERED a new system from Dell in January. A week later, I called to follow up on the status of my order and discovered that it hadn't even been processed. A helpful salesperson did sort out my request and offered free shipping to compensate for the oversight. A month passed with no sign of my computer. What's more, Dell kept slipping its promised delivery dates. On March 1, I received a digital camera that was part of my purchase but still no PC. I'm sure Dell was aware of delivery issues when I placed the order. And giving me bad news a little at a time is not an acceptable practice for a reputable company such as Dell.

Danny Morrison
Huntington, West Virginia

***On Your Side* responds:** I've received several complaints about Dell's service—including order delays and inadequate technical support—in the past few months. So I contacted the company. According to Dell spokesperson Bryant Hilton, a wireless networking card was unavailable for several weeks, causing the delay in shipping Morrison's system. Two months after Morrison ordered a PC, Dell finally shipped him one—with a slightly faster processor and graphics card as amends.

—Grace Aquino

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to tax online purchases if the states make their sales tax rules more uniform.

Enter the Streamlined Sales Tax Project, a group established in March 2000 by officials from dozens of states who want to radically simplify sales and use taxes. Proposed legislation developed by the SSTP has already been introduced in several states, and Wyoming recently became the first state to enact a law based on SSTP recommendations. Among the organization's proposals are uniform definitions of what items should be taxed and a single way to calculate tax rates for items that are shipped to other states.

CONSUMER REACTION

IN SHORT, you may want to rev up your favorite shopping bot now because the days of tax-free Internet purchases are numbered. How will online consumers react to what amounts to an across-the-board increase in prices? Opinions vary widely. A Forrester Research study indicates that many consumers are more concerned about shipping charges than about paying sales tax for Internet purchases.

Add taxes to shipping costs, though, and some consumers may decide to bypass their browser and head to the mall instead. "Part of the reason I shop online is to sidestep sales tax," says Doug Ashford, a systems specialist at a Boston financial services company. "But shipping charges often offset the advantage of not having to pay sales tax. That, combined with waiting for the item to arrive—and occasionally the hassle of having to return an item—tips the scales more toward a traditional retailer."

It makes sense. I plan to send Mysimon out on a few more excursions before the sale ends, too—especially for pricier stuff like PCs, software, and household appliances. But when I want a good cup of coffee and advice from someone who understands my six-year-old's addiction to Magic Tree House books, I'll gladly troop to the local bookstore and pay the extra 5 percent for the personal attention.

Anne Kandra is a contributing editor and Grace Aquino an associate editor for PC World. ■

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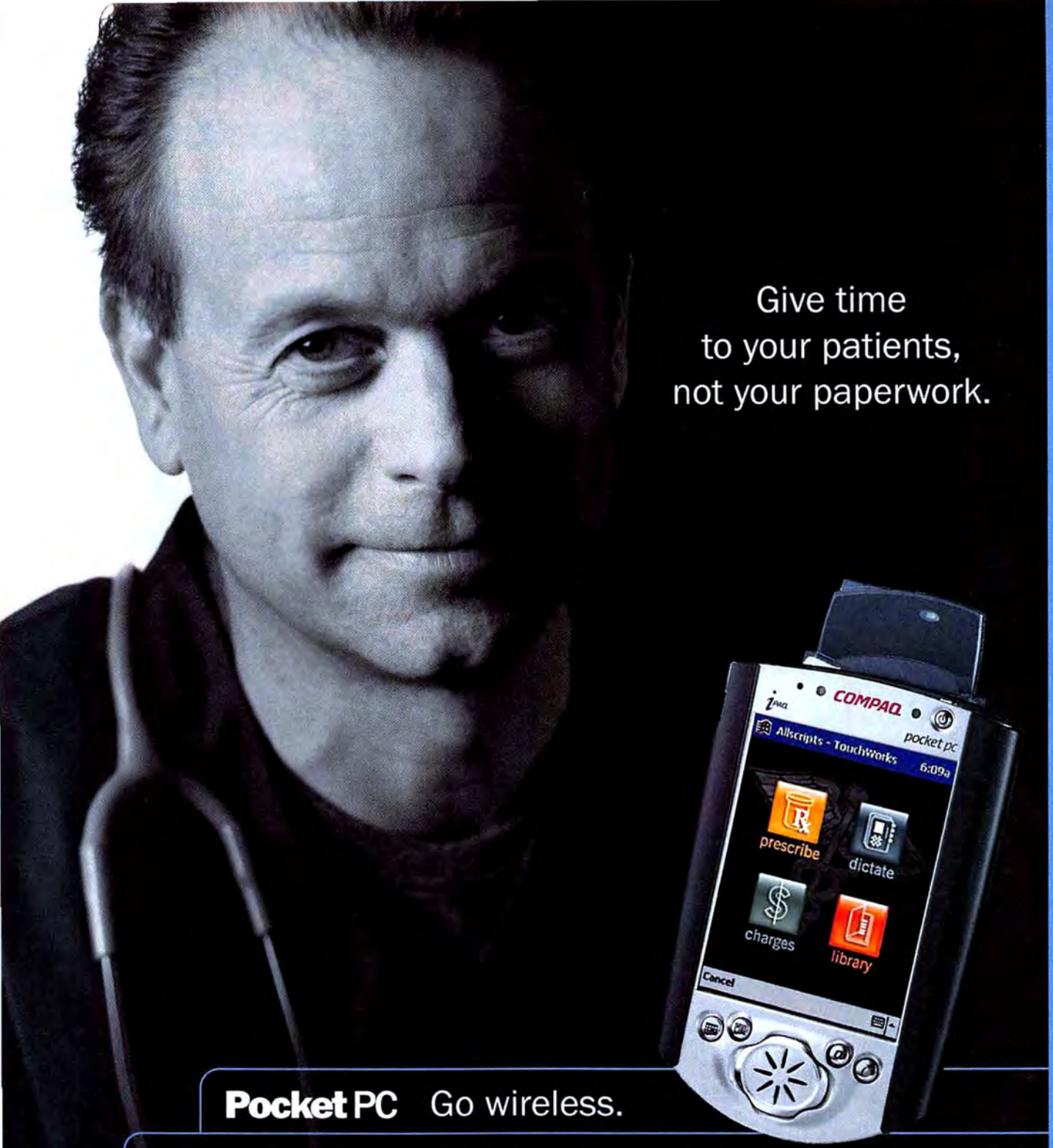

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Free Stuff: An Endangered Species?

WARNING: If your favorite free Web service sends you an e-mail that declares itself "Important," open it pronto—and brace yourself for grim news. If my in-box is any indication, "Important" is becoming a cold, hard euphemism for *Sorry, pal, the free ride is over.*

In just the last month or so, Driveway notified me (and 8 million other users) that it was discontinuing its online storage service. UReach.com told me it was taking away my all-in-one messaging service—unless I started paying at least $5 a month. And Searchbutton, which hosted the search engine for my personal Web site, instituted a $500 annual fee for the service it had been giving away.

There's no denying the facts: Lots of companies that thought they could make a business out of free services can't. Either they start charging, or they disappear.

But I'm not bitter. I'm still a dedicated consumer of Net services—just a more cautious one. Want to follow my strategy for surviving the ongoing shakeout? Keep these tips in mind.

Don't get too comfortable: Think like a nomad, not like a homesteader, and you'll be ready to evacuate a service without undue hassle. For instance, don't stow the only copies of your essential files at a free storage site—local backups are a must. And while Web-based fax numbers are handy, printing up a lifetime supply of business cards with such a number would be a mistake. Chances are the service will expire long before you will.

Research your options: If a service folds or introduces a stiff fee, fear not. For the time being, at least, there's probably a free or low-cost alternative out there. For instance, when Searchbutton raised its annual fee from $0 to $500, I didn't flinch—mostly because I knew that Atomz (www.atomz.com) offered a similar indexing service that remains free.

Even if your favorite free service seems to be in robust health, keep tabs on its competitors. There may be a site dedicated to tracking them, such as All the Free Space (www.all-the-free-space.com), which provides a remarkably thorough list of storage sites like the late Driveway. Similarly, Freedomlist (www.freedomlist.com) covers free ISPs. (No-charge ISPs are a vanishing breed, so Freedomlist now tracks cheap providers, too.)

Consider a big name: I offer this advice reluctantly, since so many inventive services have come from no-name start-ups. But if you're a cautious consumer, you might want to stick with well-established providers. Microsoft's Hotmail, for instance, will likely prosper long after Free-Mail-by-Sid.com withers away.

That's why I opted for Yahoo's Briefcase when the end of Driveway's service put me in the market for a new free storage provider. Briefcase isn't the most feature-rich contender, but it does the job. And if anyone can ride out the Web's tough times, it's Yahoo—or so I hope.

Get ready for a fee-based future: Okay, so banner ads will probably continue to pay the way for some Internet goodies, including basic stuff like search engines and driving directions. Still, it can't hurt to start pondering just how much you'd be willing to fork over for the services you really value. Would you pay $2 a month for an online calendar? Are digital greeting cards worth as much as their paper predecessors? What if listening to baseball games via Web radio cost $10 a year? (Actually, it does: The major leagues halted free Webcasts, beginning this season.)

Think about how we pay for TV—you get over-the-air channels free, spend a few bucks for basic cable, and shell out $10 a month extra for HBO solely to get *The Sopranos*. It seems to work for everyone involved. And sooner rather than later, it could be the way of the Web.

Contact PC World *Executive Editor Harry McCracken at websavvy@pcworld.com.* ■

GIMME FIVE

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3. The New Yorker: Home of the Cartoon Channel, a desktop window with a new cartoon every 30 seconds. www.newyorker.com

4. Doonesbury.com: Thirty years' worth of Garry Trudeau's strips make this site a satirical history of our life and times.

5. Big Panda Comics: Indexes 1000-plus mostly online-only strips, including many duds and some gems. www.bigpanda.net

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Power Your PC—No Matter What

THERE'S A NEW SIGN at the California border: "Warning: Area subject to earthquakes, riots, salad bars, floods, mud slides, and rolling power blackouts." At least there's finally a disaster I'm prepared for: My PC is protected from nearly every type of power problem, and it didn't cost me an arm and a leg—just a digit or two.

Of course, you don't have to live in California to be worried about keeping the power flowing to your PC. Power glitches can happen anytime, anywhere, and they're more common than you may think. Only about 20 percent of power surges come from lightning or power-company problems. Most surges are caused by copiers, printers, air conditioners, and other office machines (and household appliances).

Okay, how's your protection? A show of hands: Who's using a surge suppressor to plug several devices into a single wall outlet? (If you're using a simple power strip, you have my permission to lie about it.) You may feel protected, but if the suppressor cost you less than $20, it probably won't shield you from power glitches.

SACRIFICE A UPS, SAVE A PC

BEFORE YOU KVETCH about the cost, remember Bass's power-protection rule: It's better—and cheaper—to let your UPS or surge suppressor commit suicide than to watch your PC sizzle into oblivion.

So for your shopping pleasure, here are some specs: If your suppressor has a response time of 5 nanoseconds or more (this rating should be posted on the box or at the vendor's Web site), it's too leisurely to be effective. Replace it with one that responds in no more than 1 nanosecond (a billionth of a second, which is about the time it takes my editor to call when I'm late with a column). Next, the amount of electricity that gets through during a surge (the suppressor's "let through" factor) should be 330 volts or less. Look for a rating of at least 300 joules (higher numbers are better). And don't scrimp—these are the minimum specs to look for.

It's better—and cheaper—to let your **UPS or surge suppressor** commit suicide than to watch your PC **sizzle into oblivion.**

The suppressor I use with my peripherals, APC's Network SurgeArrest Net8, has eight outlets, three of which are for big AC adapters. It sells for about $45 street.

Surge suppressors are your first line of defense, but they protect you only from power surges (hence the name), not from drops in power. To guard against power sags, you need an uninterruptible power supply. A UPS protects you from surges and—with its built-in battery—from dips in power. Depending on the UPS and your equipment, the battery may run your PC for as much as 20 minutes, which is plenty of time for a graceful shutdown.

To save space in my tiny home office, I opted for APC's small Back-UPS CS500 (about $129 street). It's roughly the size of a clock radio, and it ran my test PC (a Pentium-based system with a 15-inch monitor, a hard drive, a DSL modem, and a CD-ROM) for about 16 minutes.

Here are a few power-protection tips:

Keep it fresh. Metal-oxide varistors (MOVs)—the suppressor's components that save your PC's bacon—wear out. Replace the suppressor every few years.

It's not a generator. Looking for a good way to damage your UPS? Use it to do something it wasn't made for, such as running a printer, vacuum cleaner, or other power-cycling appliance. (Don't ask. Just trust me on this, okay?)

Every wire counts. Protect everything that connects to the PC, including phone lines, DSL and cable modems, and network wiring. Most surge suppressors and UPSs protect at least one phone or network line (RJ11 or RJ45). If yours doesn't, grab an extra phone-line protector.

Blackout? Start unplugging. Even if you have UPS or surge protection, when a blackout occurs, unplug all your critical components and appliances—PC, monitor, refrigerator, home electronics. When the power comes back on, your equipment won't be harmed. Leave one lamp plugged in and turned on so you'll know when the power returns.

Dedicate your power. I reduced my surge risk further by spending $100 for an electrician to install a dedicated power line in my home office, isolating my PC from other appliances in my home.

Gotta go. I just heard that a tsunami is about to give Malibu a wash and rinse, so I'd better get my lamp turned on.

Network SurgeArrest Net8, Back-UPS CS500

SurgeArrest $45 street, Back-UPS $129 street, APC, 800/800-4272, www.apc.com

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Contributing Editor Steve Bass runs the Pasadena IBM Users Group. Sign up for his Home Office *online newsletter at www.pcworld.com/bass_letter. He can be reached at steve_bass@pcworld.com.* ■

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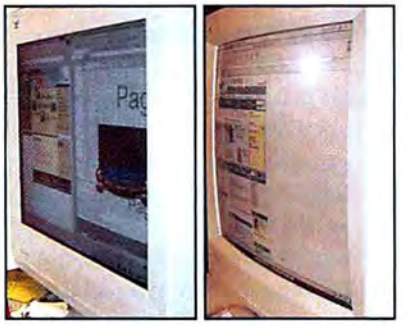

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PF790	19" (18.0")	.25mm-.27mm	1600 x 1200
G90f	19" (18.0")	.21mm	1600 x 1200
PF775	17" (16.0")	.25mm	1600 x 1200
G75f	17" (16.0")	.25mm	1600 x 1200
G73f	17" (16.0")	.21mm	1600 x 1200
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Digital certificate problem ◆ **Outlook security alert** ◆ Compaq IPaq modem trauma

Can You Really Trust That Download?

MICROSOFT RECENTLY announced that someone tricked VeriSign, the company that issues digital certificates, into granting two certificates to a person claiming to be a Microsoft employee. That's a bit like allowing someone to steal a police officer's badge—it puts the thief in a position of trust that he or she can abuse.

When you download a program off the Web, its digital certificate guarantees that it comes from the company it says it comes from. Using the stolen certificates, though, a cracker could send you a Trojan horse, a virus, or another nasty piece of code that presents itself as an officially approved Microsoft program.

Microsoft has released a security update to address the problem. You can find a link to the 128KB fix (along with a FAQ section discussing the security breach and related issues) at www.microsoft.com/technet/security/bulletin/MS01-017.asp.

For Norton AntiVirus users, Symantec says that any virus definitions dated March 23, 2001, or later will detect the two stolen certificates. Similarly, McAfee users are protected with virus definition files dated March 24, 2001, or later.

HOLE IN OUTLOOK, OUTLOOK EXPRESS

OUTLOOK 98, OUTLOOK 2000, and Outlook Express 5.*x* have a security hole in their VCard capabilities. A VCard stores your business card information in an electronic format. In addition, it permits you to send your contact information to other users as an attachment that they can load into their Outlook and Outlook Express contacts databases—no typing required.

Though it's handy, the VCard technology has a bug that enables a malicious hacker to create a VCard that could crash the user's e-mail program or, worst case, let the attacker take over the user's computer. In this last instance, the bad guy could do anything the user had privileges to do, including reformat the hard drive.

The specific element responsible for this flaw ships as part of Outlook Express and is shared by Outlook. Since IE installs Outlook Express by default, identifying the correct patch for your PC depends on the version of IE you use, not on the version of Outlook you have, according to Microsoft. (To find out which version of IE runs on your system, from within IE select *Help•About Internet Explorer.*) The attack takes advantage of a buffer overflow error to flood the program with data. Envision a stoppered sink with the water left on. By sending the VCard feature too much info, the hacker can overwhelm Outlook or Outlook Express.

The patch turns off the flow by truncating the length of the character stream that the rigged VCard is trying to pour into the program. For details on how to select the proper patch for your computer, visit www.microsoft.com/technet/security/bulletin/MS01-012.asp. To get the patch itself, hop to www.microsoft.com/windows/ie/download/critical/q283908/default.asp.

You'll find files from this article at www.pcworld.com/downloads. Stuart J. Johnston is a contributing editor for PC World. ■

ICON: JEFFREY PELO

Keep Folders Safe From Prying Eyes

WINDOWS MILLENNIUM EDITION enables you to compress directory folders and protect them with passwords. However, Microsoft recently reported that those passwords are actually written in plain text to a file on your computer. Anyone with physical access to your PC who wanted to poke through your most confidential files—and who knew where to look—would be able to access those passwords. This vulnerability does not affect any other password-protected areas (like Windows log-on). Versions of Windows 98 and 98 Second Edition with the Plus 98 add-on are also vulnerable.

Microsoft fixes the problem by preventing future passwords from being stored on the system. Two patches are available—one for Windows 98, and the other for Windows Me. Find instructions at www.microsoft.com/technet/security/bulletin/MS01-019.asp.

IN BRIEF

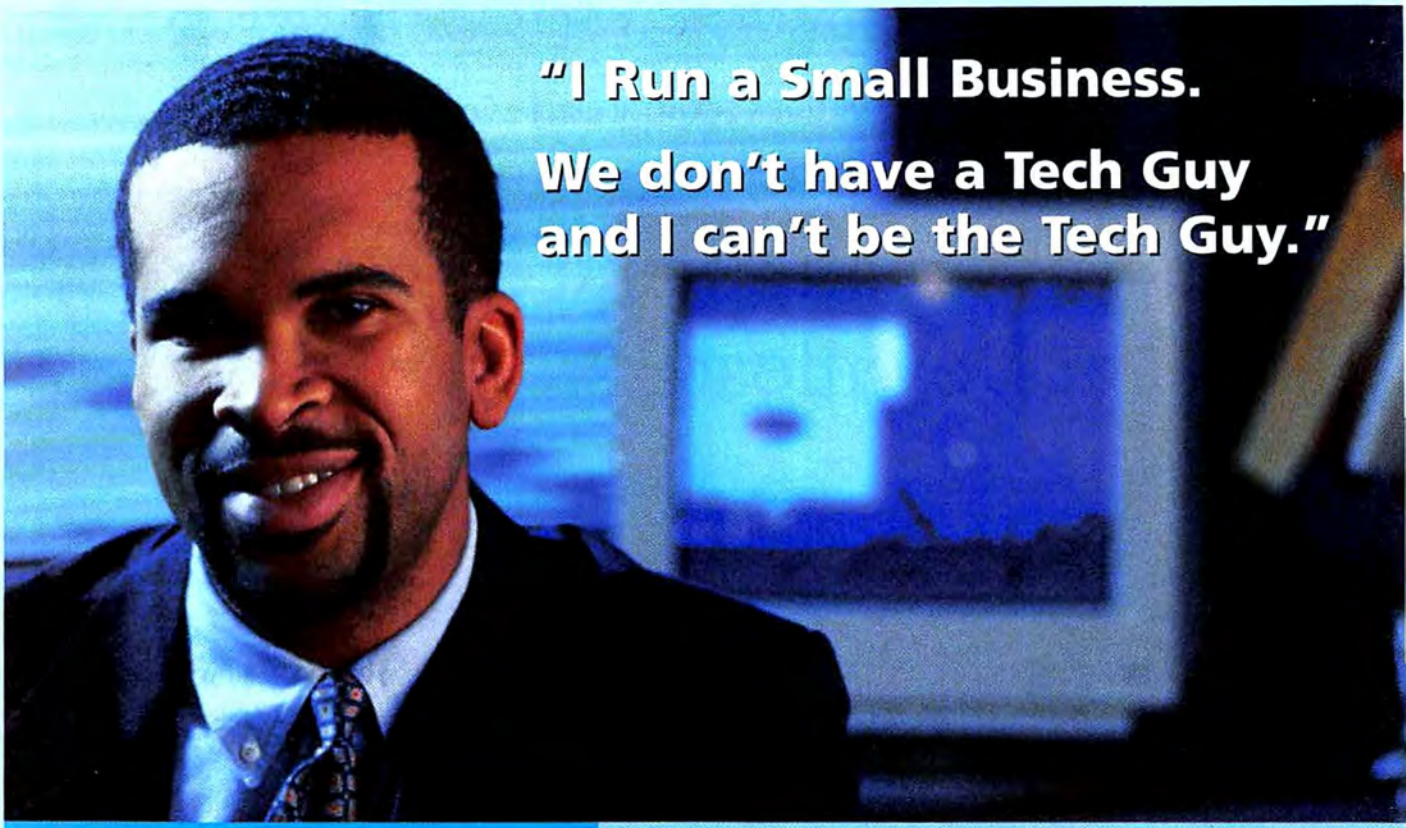
IPaq Flash Crash

FEELING DISCONNECTED from your IPaq? You're not alone. Many owners of Compaq IPaq H3600-series Pocket PCs have been complaining for months that their handheld devices do not recognize some CompactFlash 56-kbps modem cards, including cards from New Media Tech and Kingston. Compaq recently released a software patch for the glitch. The patch also fixes abnormal behavior of the IPaq's e-book reader. For example, the reader's page-scroll feature wasn't functioning properly.

Find the patch and the necessary installation instructions at www.compaq.com/support/files/handhelds/us/download/9586.html. The 1MB patch is identified as version 1.00A or later. At press time, Compaq said it was working on a ROM upgrade that will include this particular patch.

BUGGED?

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



Systemax Customer Support is so good, it's like having your own Tech Guy in the office with you.

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And to help keep your business running all the time, Systemax Venture PCs run on Windows® 2000 Professional. With Windows® 2000, downtime and reboots are virtually a thing of the past. NSTL test results show that Windows® 2000 Professional is 13 times more reliable than Windows® 98*. Systemax recommends Windows® 2000 Professional for business.

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*NSTL, February 2000. For full report and test results see: www.nstl.com/html/windows_2000_reliability.html

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1.4GHz
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- 40GB Ultra ATA 7200 RPM Hard Drive
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- 17" (.25dp) 16" viewable Montior
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- SoundBlaster PCI
- Cyber Acoustics CA-15 Speakers
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- Microsoft® Office XP Small Business[2]
- 7-Bay Mid-Tower Case

$1999 #980159 Lease $67.37/Mo.

Venture U15

- **Intel® Pentium® 4 Processor 1.5GHz**
- 128MB RDRAM
- 30GB Ultra ATA 7200 RPM Hard Drive
- TNT2 M64 4x AGP Card (32MB) Graphics
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- 12x8x32 CD-R/RW[1]
- Intel® 10/100 Ethernet
- Microsoft® Windows® 2000 Professional
- Microsoft® Office XP Small Business[2]
- 7-Bay Mid-Tower Case

$1599 #980158 Lease $53.89/Mo.

Venture U14

- **Intel® Pentium® 4 Processor 1.4 GHz**
- 128MB MB RDRAM
- 20GB Ultra ATA 5400 RPM Hard Drive
- nVidia Vanta 16MB Graphics
- 52x Max CD-ROM[1]
- Intel® 10/100 Ethernet
- Microsoft® Windows® Millennium
- 7-Bay Mid-Tower Case

$999 #980156 Lease $33.67/Mo.

Venture T10

- **Intel® Pentium® III Processor 1 GHz**
- 128MB 133MHz SDRAM
- 30GB Ultra ATA 7200 RPM Hard Drive
- Intel 3D Direct AGP Integrated Graphics
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- 12x8x32 CD-R/RW[1]
- PCI Wavetable Integrated
- Cyber Acoustics CA-15 Speakers
- Intel® EtherExpress 10/100 PCI
- Microsoft® Windows® 2000 Professional
- Microsoft® Office XP Small Business[2]
- 7-Bay Mid-Tower Case

$1279 #980155 Lease $43.10/Mo.

Venture T9

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- 52x Max CD-ROM[1]
- PCI Waveable Integrated Sound
- Intel® 10/100 Ethernet
- Microsoft® Windows® Millennium
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- Intel® 10/100 Ethernet
- Microsoft® Windows® Millennium
- 7-Bay Mid-Tower Case

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Systemax® Venture PCs come with a 3.5" Floppy Drive, a 104-Windows Keyboard, a Microsoft Intellimouse, 1 Year Extendible Limited Warranty, 24/7 Tech Support and 1 Year On-Site Service.* [1]CD-ROM speeds are variable. Maximum speed shown. [2]Microsoft Office XP Small Business includes Microsoft Word, Excel, Outlook, Publisher, and Small Business Tools.

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Broadband Users Still Sing the Blues

High-speed access to the Internet was supposed to be everywhere by now. But **financial** and **technical problems** dog the industry.

◆ **By Tom Spring**

FOR LESLIE and Bruce Forrest, broadband Internet access promised relief from painfully slow modem speeds. So when Verizon Communications began a DSL marketing blitz in the Forrests' Washington, D.C., neighborhood, signing up for it was a no-brainer. "We really wanted this," Bruce says.

But what was supposed to be broadband heaven turned into a protracted nightmare for the couple, both of whom are attorneys. After laying down $1200 for a new PC that met Verizon's minimum system requirements for DSL, and enduring weeks of post-installation troubleshooting, the Forrests learned that their efforts had been in vain.

A Verizon technician, Leslie Forrest says, told her that they lived too far from the phone company's central office to receive the service.

Irate, the Forrests contacted a lawyer, who in turn filed one of a growing number of class-action lawsuits against Verizon by disgruntled DSL customers who contend that the provider has fallen far short of its advertised promises.

The Forrests aren't the only disillusioned broadband consumers, and Verizon certainly isn't the only broadband company with angry customers.

Installation hassles and long waits for service are a common complaint. Several small and medium-size providers have gone out of business, leaving their customers in the lurch. Surviving high-speed providers are starting to raise prices, and millions of people like the Forrests still can't obtain DSL or cable service at all.

Over a year ago, when *PC World* documented a litany of woes plaguing high-speed Internet customers (see "Broadband Blues," February 2000; www.pcworld.com/news/feb2000/broadband), vendors promised improvements. So what gives? Wasn't DSL supposed to be as easy to get by now as ordinary telephone service? Shouldn't the dial-up option be dead, or at least dying?

FINANCIAL MELTDOWNS

THERE IS NO doubt about the demand for high-speed Internet access. In the past year alone, the number of households with a broadband connection almost doubled, to 6 million, according to the research group Cahners In-Stat. But it's equally clear that the industry is suffering severe technical and financial problems that should concern anyone who is considering or already has broadband service. (For the few precautions available, see "Beating the Broadband Blues," page 44.)

For existing customers, the most alarming trend may be the wave of bankruptcies hitting small and medium-size DSL providers. The most publicized of these was NorthPoint Communications. In March, NorthPoint's network vendors began shutting down services that NorthPoint had bought from them, leaving roughly 100,000 DSL customers without service. NorthPoint had been operating under Chapter 11 bankruptcy protection since

January, following a failed attempt to merge with Verizon.

More than a dozen other DSL providers have filed for bankruptcy, too, including Zyan and Flashcom. Seattle-based Bazillion shut down in mid-January, stranding customers like Greg Van Belle. When Van Belle checked his e-mail in January, he found a message explaining that market conditions had forced the provider out of business.

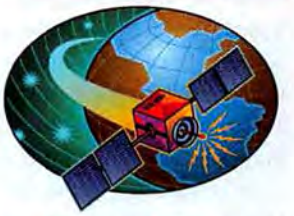
"Four days later, the red light went out on my DSL modem, and service just stopped," Belle says. He went without DSL for three months until EarthLink stepped in, picking up Bazillion's customers.

Industry observers say that DSL providers are hurting due to a combination of factors, including dried-up venture funding and cutthroat competition from telephone companies that forced them to price service lower than expected. "A lot of DSL providers ran out of cash before they could start making money," says Adam Needles, director of DVG Research, a Boston information technology research firm.

THE BIG GET BIGGER—AND PRICIER

MEANWHILE, the surviving broadband ISPs are getting bigger—and raising prices. In a closely watched move, SBC ended a yearlong promotion and in late February raised its monthly price from $40 to $50. EarthLink soon followed suit, also ending a $40 promotion for new subscribers and raising its fees by $10 per month. Consumers can expect more of the same as the field of competitive DSL and cable providers narrows, says David Butler of Consumers Union.

For prospective DSL customers, technical issues compound service problems. Copper phone lines must be upgraded and tweaked to carry a DSL signal, which has made service slow to ▶



Product Pipeline

➤ **Test-Drive Office XP:** For $10, you can try out Office XP for 30 days. Microsoft's latest office suite, slated for release on May 31, includes Smart Tags, Task Panes, collaboration tools, and recovery aids. It also features a new activation wizard that limits installations, so don't expect to share it. Office XP will be offered in both Standard ($479, upgrade $239) and Professional ($579, upgrade $329) versions. Download it from www.microsoft.com/office/trial/default.htm.

➤ **Flat Panels Get Affordable:** If you yearn to have an LCD monitor on your desktop, take note: Dell, Samsung, and ViewSonic have broken the $500 price barrier with 15-inch LCDs. Available for $499 are the Dell 1503FP (with purchase of an OptiPlex or Precision workstation), Samsung's SyncMaster 570vTFT, and ViewSonic's VE150 ViewPanel.

➤ **A Hard Drive's Worth of Music:** I/OMagic's new Neo Jukebox 2200 is a high-capacity MP3 player that doubles as an external drive. This 20GB music player holds up to 600 CDs and can serve as a hard drive when it's connected via USB to a PC. The $449 Neo Jukebox comes with MusicMatch software and has a rechargeable battery for portable playback.

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

ILLUSTRATION: RICHARD DOWNS; ICONS: JEFFREY PELO

arrive in some neighborhoods. Further, the cabling between the customer and the telephone company's central switching office must be no longer than 3 miles for the service to work. So if the DSL provider miscalculates, it may promise service that it physically can't deliver.

And one in four DSL connections ordered never get installed as a result of order-processing and network problems, according to a report issued last fall by DVG Research. Even when you qualify to receive service, the average time between ordering DSL and getting the service up and running is approximately four to six weeks, compared to just five days for cable.

In March, SBC said installing DSL service took only two weeks; Verizon claims to take about three. Despite such assertions of relative improvement, half a dozen class-action lawsuits alleging poor DSL service have been filed against these two telecommunications giants and their subsidiaries.

NO HIGH-SPEED JOY: Attorneys Leslie and Bruce Forrest initiated a class-action suit against Verizon after a fruitless quest for service.

CABLE GAINS—BUT IT'S NO PANACEA

OVERALL, cable companies appear to be doing a better job of installation and service. That may be partly because cable technology is simpler, and because its coaxial cables are more robust than most phone lines and therefore are better suited for carrying large amounts of data, including video. One *Consumer Reports* study found that 73 percent of cable consumers had no problem with installation, compared with just 46 percent of DSL customers.

Cable isn't perfect, however: Sluggish networks and service issues persist. Plenty of cable Internet providers have earned low marks at sites like DSLReports.com, which acts as a sounding board and a consumer advocacy forum for broadband customers.

"Most of the cable complaints are not about installations," says Justin Breech, founder of DSLReports.com. "They're about speed and lack of customer service when there is a problem."

Cable performance often dips during peak use hours, and it can gradually diminish over time as more customers join the same network within a particular neighborhood.

IS THE WORST OVER?

ASKED TO comment on this daunting array of problems, providers once again promise to improve service and performance. SBC has added hundreds of DSL technicians and is spending $6 billion to eliminate distance and equipment issues. "The worst is behind us," says Kevin Belgrade, a spokesperson for SBC.

Verizon admits it has experienced problems, but it considers lawsuits such as the Forrests' groundless and is fighting them in court, spokesperson Larry Plumb says.

The bottom line for consumers? Keep expectations low. The rollout of services will continue to be gradual. Cable has an edge in reliability, but DSL will increasingly become more widely available.

To get an idea of what to expect, check out DSLReports.com. If you're lucky, your high-speed service will arrive and work without a hitch. But if you do get the broadband blues, you'll at least be familiar with the tune.

Beating the Broadband Blues

1 Do research: When considering an ISP, find out as much as you can about its financial stability, service quality, and installation record. DSLReports.com is a good place to start.

2 Buy from the big boys: The higher up your ISP is on the DSL food chain, the less likely it is to go out of business.

3 Investigate alternatives: Two-way satellite services from Hughes Networks and StarBand and fixed wireless service from providers such as Sprint and WorldCom offer high-speed access via line-of-sight transmissions. Interference from foliage and bad weather is an issue.

4 Install your own service: Verizon, Covad, SBC, and others offer do-it-yourself DSL installation kits that eliminate the wait for a technician. You can save up to $100—but the phone company must still activate your line for DSL service, which can take weeks.

5 Keep your analog modem: Check with your provider to see if it offers dial-up service as a backup for times when broadband service is down—or when you're traveling. EarthLink's high-speed customers can use 6500 numbers for dial-up.

6 Get a printed contract: Online versions can change. Check your actual bandwidth at sites like MSN Computing Central (www.computingcentral.com) and Cable-Modem.net (www.cable-modem.net) to see if it meets your ISP's guaranteed minimum. Business users especially should check the fine print. For example, some ISPs limit the size of e-mail attachments.

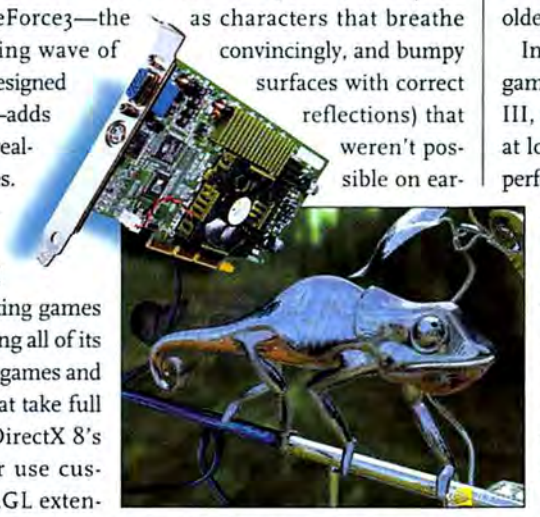
7 Keep good written records: Notes with specific dates and times of service interruptions and calls to technical support will come in handy if you ever ask for a refund.

PHOTOGRAPH: MARK GODFREY

Best 3D Graphics Yet: NVidia's GeForce3 Card Delivers

FIRST LOOK

NVIDIA'S HOT new GeForce3 graphics chip marches in the vanguard of a revolution in PC 3D. Based on our tests and on demos, the GeForce3—the first of a coming wave of chips that are designed for DirectX 8—adds a new level of realism to 3D games. You can purchase the card now, and it will work with existing games—but unleashing all of its power requires games and applications that take full advantage of DirectX 8's capabilities or use customized OpenGL extensions. Most such games won't be available for a few months (out now is a special edition of Interplay's Giants), and with GeForce3 prices hovering around $400, most mainstream users will probably stay away.



NVIDIA'S NEW GeForce3 card allows more realistic effects, such as detailed skin tones.

PHOTOGRAPH: KEVIN CANDLAND

The GeForce3 pioneers a set of features (dubbed the NfiniteFX engine) that pulls more of 3D's complex calculations onto the graphics chip and away from your CPU. Two such features—vertex shaders and pixel shaders—let game developers program much more realistic and customized special effects (such as characters that breathe convincingly, and bumpy surfaces with correct reflections) that weren't possible on earlier graphics cards. NVidia's Lightspeed Memory Architecture speeds 3D rendering, and its High-Resolution Anti-Aliasing smooths the jagged edges often found in PC 3D.

The chip boasts 57 million transistors—more than either the Pentium 4 or the Athlon. Our reference board carried 64MB of DDR SDRAM running at an effective 460 MHz. This power shows in games like AquaNox AquaMark that partially exploit DirectX 8, but the chip has far less impact on older 3D games and apps.

In tests involving current 3D games such as MDK2, Quake III, and Unreal Tournament at low resolutions, GeForce3 performance was good but unimpressive, lagging a bit behind that of a GeForce2 Ultra–based card. When we cranked the resolution up to 1024 by 768 at 32-bit color, however, the GeForce3 pulled nearly even. At 1600 by 1200 and 32-bit color in Quake III and MDK2, the GeForce3 hit about 74 and 82 fps, respectively—a snappy 20 fps better than the older Ultra in both cases.

Results were even more dramatic with AquaNox AquaMark. Here, the GeForce3's frame rates almost doubled the Ultra's. At 1024 by 768 in 32-bit color, the chip cranked out 27 fps to the Ultra's 14. This pattern remained constant at other resolutions, too.

Developers and gaming fans will enjoy the power of the GeForce3 now. Other PC users may want to wait for NVidia's next chip, widely expected to arrive in the fall. By that time, DirectX 8 games should be available, and the new chip (as well as DirectX 8–enabled chips from NVidia's competitors) should combine to make the GeForce3 more affordable.

—*Eric Dahl* ▶

Tidbytes

➤ **Micron Dumps PCs:** Micron Electronics has decided to sell its PC business, MicronPC, to an unnamed private company. The transaction is expected to be finalized this summer. Despite the sale, along with layoffs of several hundred employees, MicronPC is still selling systems and providing service to current owners of Micron PCs. Whether the name MicronPC will survive remains uncertain.

➤ **U.S. Government Fights Spam:** If Uncle Sam has his way, lousy spammers could face big fines. Two proposed federal bills—the C.A.N. (Controlling the Assault of Non-solicited Pornography and Marketing) Spam Act of 2000 and the Unsolicited Commercial Electronic Mail Act of 2001—would set national standards for mass-distributed, unsolicited e-mail, requiring return addresses and opt-out policies.

3D GRAPHICS BOARD PERFORMANCE TEST REPORT

NVidia's GeForce3 Scores With DirectX 8 Games and at Higher Resolutions

GRAPHICS BOARD	AquaNox AquaMark [1]		Unreal Tournament		Quake III		MDK2	
	1024 by 768 (frames per second)	1600 by 1200 (frames per second)	1024 by 768 (frames per second)	1600 by 1200 (frames per second)	1024 by 768 (frames per second)	1600 by 1200 (frames per second)	1024 by 768 (frames per second)	1600 by 1200 (frames per second)
NVidia GeForce3 reference board	27.2	17.7	63	57.1	95.1	74.4	110.2	81.9
Hercules 3D Prophet II Ultra with GeForce2 Ultra chip set	14	10.9	69.3	62.4	93.3	54.9	111.1	59.8

TEST PC WORLD CENTER **HOW WE TEST** Our performance tests measure the frame rate of the following games: GT Interactive's Unreal Tournament, Id Software's Quake III Arena, Interplay's MDK2 Demo, and Massive Development's AquaNox AquaMark. The test system was a Dell PC with a PIII-933 CPU, 128MB of PC133 SDRAM, Windows Me, and DirectX 8. We use drivers supplied by the vendor. All tests were performed at 32-bit color. For all scores, higher is better. All rights reserved. [1] Takes advantage of DirectX 8. Numbers highlighted in red represent best test scores.

Intel Ramps Up P4 to 1.7 GHz—Is It Finally Worth the Price?

INTEL's latest Pentium 4 chip runs at 1.7 GHz—a 200-MHz bump from last year's first P4s. Even so, our tests find the chip still locked in a tight battle with AMD's premier CPU, the 1.33-GHz Athlon.

The P4 beats the Athlon in a few test areas, notably video encoding. But on most counts the slower (in MHz) Athlon wins out, proving again that speed isn't everything. Moreover, top-line P4 systems continue to remain more expensive than comparable Athlon and PIII PCs.

We looked at two shipping 1.7-GHz P4 systems: HP's Vectra VL800MT, a corporate PC with 256MB of RDRAM and Windows 2000; and Gateway's gamer-friendly Performance 1700, with 128MB of RDRAM and Windows Me.

THE GATEWAY PERFORMANCE 1700 and the Hewlett-Packard Vectra VL800MT.

Gateway's Performance 1700 PC squeaked past comparable Athlon PCs with a PC WorldBench 2000 score of 170. That's four points better than an HP Pavilion 7875 with a 1.3-GHz Athlon and 128MB of DDR memory (for more on the Pavilion 7875, see *Top 15 Home PCs*, page 170), and two points above the average of five 1.2-GHz Athlon PCs—an imperceptible difference on most applications. However, the Performance 1700's score beats the average of four 1.5-GHz P4 PCs by 8 percent, a boost you're likely to notice.

On two music-encoding tests, the Athlon-based HP 7875 and the P4-based Gateway performed evenly. As in previous testing, the Athlon PC excelled at the floating-point-intensive AutoCAD ▶

1.7-GHz PENTIUM 4 CPU TEST REPORT

P4 Speeds Up, but Athlon Leads in Business Apps

	SYSTEM	CPU	PC WorldBench 2000	AutoCAD	MusicMatch	Windows Media Encoder audio file	Windows Media Encoder video file
Windows Me 128MB of RAM	Gateway Performance 1700	P4-1700	170	536	64	67	42
	HP Pavilion 7875	Athlon-1300	166	472	62	70	69
	Average of four desktops	P4-1500	158	n/a	n/a	n/a	n/a
	Average of five desktops	Athlon-1200	168	n/a	n/a	n/a	n/a
Windows 2000 256MB of RAM	HP Vectra VL800MT	P4-1700	209	514	63	56	45
	Micro Express MicroFlex 1333A	Athlon-1333	231	423	61	57	62
	Average of two desktops	P4-1500	205	n/a	n/a	n/a	n/a
	Average of three desktops	Athlon-1200	220	n/a	n/a	n/a	n/a
	n/a=not available			In seconds			

TEST PC WORLD CENTER **HOW WE TEST** All systems are tested with PC WorldBench 2000, PC World's application-based benchmark. In the AutoCAD 2000 test, we time Autodesk Group International's AUGI Gauge benchmark, which runs computer-aided drafting tasks. In the MusicMatch encoding test, we time the conversion of a raw 14.3MB .wav file to .mp3 format, using MusicMatch Jukebox. Using Windows Media Encoder, we time the conversion of an 8.9MB .mp3 audio file to .wma format; in a separate test, we time the conversion of an 11.2MB .avi video file to .wmv format. A higher PC WorldBench score is better; in all other cases, lower is better. All rights reserved. Numbers highlighted in red represent best test scores.

IN BRIEF

Far Out

➤ **The Coming of 3D TV:** Remember those campy 3D movies of the 1950s? Well, 3D may not be hitting theaters again soon, but new display technologies from Dynamic Digital Depth could have you watching TV, playing arcade games, and surfing the Web—all in 3D. DDD's 3DTV and 3D flat panel displays, developed with 4D-Vision, offer 3D viewing without the need for those corny glasses. While you won't see the 3D TVs in stores anytime soon, DDD plans to install a commercial display in a Maryland mall this May. And if you're willing to wear 3D glasses, DDD's free OpticBoom Plug-in turns QuickTime movies into 3D.

➤ **Blackberry at High Speed:** Research in Motion is working to offer wireless broadband on future Blackberry handhelds. Lucent Technologies will provide the so-called third-generation wireless network for the devices. Expected in two to five years, 3G networks promise to deliver broadband data speeds to wireless devices. RIM also plans to bundle GoAmerica's Go.Web 6.0 wireless Web access service in Blackberry devices.

➤ **Keeping Track of Loved Ones:** Next time the twins disappear at the mall, you'll know exactly how to track them down—if you've signed up with a new wireless location service. Called the Wherify Personal Location System, the service uses a wristwatch-size device that combines LSI Logic's wireless CDMA technology, which allows communication via a national network, and a GPS receiver. Starting this summer, subscribers will be able to use the Web or a phone to quickly locate lost children or other at-risk loved ones who are equipped with the device.

PHOTOGRAPH: KEVIN CANDLAND

IBM ThinkPad A21e

Desktop alternative

Mobile Intel Celeron™ processor 650MHz[2]
12.1" SVGA TFT display
64MB SDRAM • 20GB[3] upgradable HDD
Ultrabay 2000 24X-10X[4] CD-ROM
Mini PCI 56K[5] V90 modem
4MB ATI Rage Mobility M graphics
Microsoft® Windows® 98 Second Edition
Lotus® SmartSuite® Millennium Edition[6]
ThinkPad Button
5.5 lbs.[7] travel weight
Part #265521U

$1,499[8]

SuccessLease™ for Small Business $53/MO.[9], 36 MOS.

IBM ThinkPad T22

Performance and portability

Mobile Pentium III processor 900MHz featuring Intel SpeedStep™ technology
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test, while the P4 system outperformed in video encoding. Both ran Windows Me.

On Windows 2000 systems, the relative performance was much the same, except on PC WorldBench 2000. Here, a 1.33-GHz Athlon-based Micro Express PC with 256MB of DDR memory earned a 231, while the HP Vectra came in at 209—a noticeable difference of over 10 percent (for more on the MicroFlex 1333A, see *New Products*, page 66).

COMPONENT PIECES

HP MAINTAINS the business focus of its Vectra line, bundling its TopTools desktop management program with the unit. The Vectra we tested came with a crisp 18-inch LCD. Though lovely, it adds $2349 to an already-steep $3999 for the PC alone (a 19-inch monitor costs $449). You also get a 12X DVD-ROM drive, NVidia GeForce2 GTS graphics with 32MB of SGRAM, a 40GB hard disk, and a 10/100 ethernet card.

Gateway's gaming system skips the management features, but offers better components and sells for far less: $2699 with a 19-inch monitor. You get NVidia GeForce2 Ultra graphics with 64MB of DDR SDRAM, a 75GB hard disk, a 12X DVD-ROM drive, a 12X/8X/32X CD-RW drive, a 56-kbps modem, a 10/100 ethernet card, and speakers.

Either P4-based system will cost more than most comparable Athlon-based PCs. For example, the MicroFlex 1333A includes a 15-inch LCD and sells for $1799; the Pavilion 7875 sells for $1898 with a 17-inch monitor.

Bottom line: If you do a lot of video editing or encoding, consider a P4 system. For other tasks, steer toward a PC with an Athlon or a PIII.

—Anush Yegyazarian

Gateway Performance 1700
Street price: $2699; 800/846-2000; www.gateway.com

HP Vectra VL800MT
List price: $6348; 800/752-0900; www.hp.com/desktops

You Can Take It With You: Modular PCs

SHUFFLING files among home, work, and notebook PCs is a hassle, and the files you need always seem to be on the *other* system. But what if you could take the brains of your PC with you, like a paperback?

That's what the Acqis Interputer system promises. Newcomer Acqis shoehorns the essentials—CPU, memory, graphics, hard drive, and LAN—into a 1-pound module slightly larger than a VHS tape. Move the module from one docking station—a desktop, a notebook, or even a PDA—to another and you've transplanted your whole computer. Now just don't lose it—or drop it.

ACQIS'S modular Interputer adds portability to your desktop PC.

Our tests of the preproduction Interputer system confirmed its potential. High-end and home users may not see the appeal, but corporations that require salespeople to have both a desktop and notebook—or want to let employees work from home—may find the system both cost-effective and easy to implement. Similarly, small-business users who occasionally need a notebook may also find this option more attractive than two separate systems. Analysts say that modular computing may be the next big thing, and major vendors are reportedly preparing modular systems for launch next year.

The first Interputer modules should be shipping as you read this. The $875 removable IMod C20 holds an Intel Celeron-600 CPU, 128MB of SDRAM, a 10GB hard drive, 4MB of graphics memory, and Windows Me. It mates with the $429 IDock DS1 docking module, which typically has one open 3.5-inch bay, a keyboard, a mouse, speakers, standard ports, and a CD-RW drive. ▶

Acqis Interputer
Street price: IMod C20 $875, IDock DS1 $429; 650/938-8198; www.acqis.com

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PHOTOGRAPH: KEVIN CANDLAND

IBM NetVista A20

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[1]MHz/GHz only measures microprocessor internal clock speed; many factors affect application performance. [2]System includes chipset that uses some main memory for the video subsystem. The amount used will vary depending on video mode and may be as much as 8MB. Thus, accessible system memory is less than the amount stated. [3]GB equals one billion bytes when referring to storage capacity; accessible capacity may be less. [4]CD-RW, DVD-ROM and CD-ROM drives list a variable read rate. CD-RW write and re-write speeds vary and list only the maximum possible. Actual CD-RW, DVD-ROM and CD-ROM speeds will vary and are often less than the maximum possible. The read and write results of the CD-RW drive depend on the quality and characteristics of the CD-R and CD-RW media used. Poor results may be obtained with some media suppliers. [5]Some software may differ from its retail version (if available), and may not include user manuals or all program functionality. For non-IBM software, applicable third-party licenses may apply. Warranty, service and support for non-IBM products, if any, are provided by third parties, not IBM. IBM makes no representations or warranties regarding non-IBM products. [6]Pricing shown is price available from IBM directly; reseller prices may vary. IBM price does not include tax or shipping and is subject to change without notice. [7]SuccessLease is offered by third-party providers of business financing approved by IBM Global Financing. SuccessLease terms and conditions provided by the third party. Featured monthly lease payments include prespecified purchase option at end of lease, to qualified business customers only, installing in the US. Documentation fee and first month's payment due at lease signing; taxes are additional. Offer may be withdrawn or changed without notice. Options cannot be leased separately. [9]The ThinkPad Carrying Case is manufactured, distributed and sold by Port/Targus and the UPS System is manufactured, distributed and sold by Tripp Lite. IBM, the IBM logo and IBM trade dress are owned by International Business Machines Corporation and are used under license from IBM. IBM does not manufacture these products and provides no warranty or support for these products. Please contact the respective manufacturers for all questions/comments and service or support related to these products. [8]Designed to be capable of receiving at up to 56Kbps with compatible phone line and server equipment, and transmitting at up to 31.2Kbps. Public networks currently limit maximum download speeds to about 53Kbps. Actual speeds depend on many factors and are often less than the maximum possible. [10]Includes battery. Weight may vary due to vendor components, manufacturing process and options. IBM reserves the right to alter product offerings and specifications at any time, without notice. SuccessLease and all IBM product names are registered trademarks or trademarks of International Business Machines Corporation. Lotus and SmartSuite are registered trademarks of Lotus Development Corporation, an IBM company. Intel and the Intel Inside logo are registered trademarks and Celeron is a trademark of Intel Corporation. Microsoft and Windows are registered trademarks of Microsoft Corporation. Other company, product and service names may be trademarks or service marks of others. ©2001 IBM Corp. All rights reserved.

Acqis plans to unveil smaller, $249 IDocks in June, and should release a $900, 3.5-pound notebook station by year's end. In late 2002, Acqis hopes to launch a battery-equipped, PDA-like IMod.

IT WORKS

WE TESTED A preproduction IMod with a Celeron-500 and two IDock DS1 stations. They worked. We switched the IMod back and forth between docks and booted successfully every time. We occasionally had trouble extricating the module from an IDock due to a jury-rigged release latch; Acqis assured us it will fix this in the shipping version.

The IMod earned a PC WorldBench 2000 score of 101—not stellar, but in line with others in its CPU class.

This Interputer can't compete with the overall value of today's average desktops, however. For the same price, you can get faster PCs with cases that let you easily upgrade individual components. Savings do tip back to the Interputer if you need a second station for the same user or to upgrade multiple parts; faster IMods are on the way, too.

Security is another potential drawback: It's pretty easy to swipe such a compact PC. At launch, Acqis won't offer a ready security system for the Interputer. Companies can, however, install software identification keys to prevent an IMod from working except in specified stations.

PC IN YOUR POCKET

ACQIS'S modules aren't for everyone, especially with current limitations. But once notebook modules arrive, some businesses may find this a cost-effective answer.

—Tom Mainelli

Handspring Takes On Palm With Slim, Expandable Visor Edge

FIRST LOOK

WITH ITS built-in slot for Game Boy cartridge–size add-ons, Handspring's Visor has won a growing following among fans of the Palm operating system who want a more expandable personal digital assistant. But the Springboard add-ons require a wide slot—precluding a skinny Visor that could compete head-on with the popular Palm V. The new Visor Edge tries to solve Handspring's size-versus-expansion conundrum with a compromise: It's about as light, thin, and sleek as a Palm V, and you can still add Springboard modules—but you must first remove a flip-up cover and slide on an included Springboard slot. Doing so restores the Visor Edge to standard Visor bulk, and makes for an extra piece of hardware to fiddle with whenever you want to use a module to add content or hardware such as modems, GPS receivers, phones, cameras, or MP3 players.

Weighing under 5 ounces, the Visor Edge comes in matte metallic shades of silver, blue, and red. With its form-fitting lid, the device resembles a cigarette case from the 1940s. Its monochrome display appears sharper than previous Visors' screens, and it offers better black-on-gray contrast. The device runs on an update to Handspring's Palm OS variant, version 3.5H. A handy fast-lookup feature allows one-handed address book searches (you use the application buttons to key in letters).

THE SLICK, THIN Visor Edge bulks up when you add Springboard modules.

Though flimsy-feeling, the slide-on Springboard connector did work perfectly in my tests: The device recognized a backup module and a Tiger Woods golf game instantly.

The $399 Visor Edge features a 33-MHz Motorola VZ processor, 8MB of RAM, and a rechargeable lithium ion battery that Handspring says will last about two weeks. A new plastic power button on the lower right corner can be set to blink for a silent alarm. An attractive metal stylus/pen tool sits on the outside of the unit, but is tricky to remove. The HotSync/recharging cradle is smaller than previous cradles but does not fit other Visors. And when you flip open the lid it hangs down awkwardly, rather than rotating completely to lie flat against the back.

Though the Visor Edge does give Handspring fans a skinny option, it makes sacrifices that many users may not find worthwhile. It will face stiff competition from Palm's equally thin monochrome m500 ($399) and color m505 ($449), which can accept wafer-thin MultiMedia Cards and Secure Digital expansion modules without requiring an additional adapter. The first SD modules won't be ready until late this year, however, and Visor Edge users can start plugging in several dozen existing Springboard modules right away.

Still, if you want a PDA that's thin and expandable—and you can wait a bit for the expansion options—Palm's m500 series offers greater long-term promise, with smaller (and possibly cheaper) add-ons that won't increase the size of the device.

—Cameron Crouch ▶

PHOTOGRAPHS: KEVIN CANDLAND

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Majestic: You Don't Just Play This Game, You Live It

FIRST LOOK

FORGET *Survivor* and *The Sopranos*. Why just sit and watch a TV show when you can really live one? That's the pitch for Electronic Arts' groundbreaking PC-based adventure game, Majestic.

Due to launch by early summer, Majestic makes you the star of an online-only conspiracy thriller that unfolds around you—and not just while you're at the PC. When it's not putting videos or scanned copies of realistic-looking newspaper articles on your hard drive, the game will call you on your phone, send you faxes and e-mails, or chat with you via AOL Instant Messenger (using remarkably convincing artificial intelligence to interpret your comments and generate responses). Preview and sign-up info is available at www.majestic.ea.com.

Majestic is designed to be played in small chunks of time, instead of in hours spent at your PC. It's up to you to advance the experience by solving puzzles using clues planted in all these media to find places (like Web sites) or do things (like chat with a character) that, in turn, trigger other events and advance the game. Players must use the dmoz.org open-source search system, as it is integrated into the game's home page.

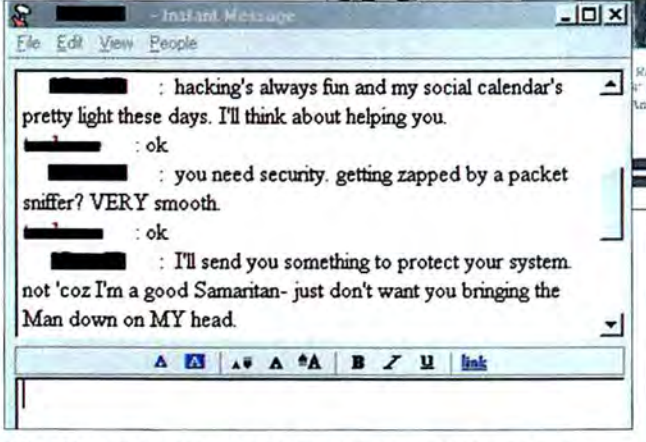
However, Majestic doesn't have to dominate you. When you sign up, you can set parameters for when you may be contacted. If you don't, the game is likely to call you in the middle of the night.

Majestic is not for kids. The game's rating is M (for mature)—and those players who give their age as under 18 when registering will be rejected. Nor is Majestic free after the pilot: You must subscribe to the EA Platinum Service at $10 a month. To play, you download a small application and specify how and when you'd like to be contacted. After that, you wait to hear from the game, which unfolds in episodes much like a TV series. The pilot plays out over four to five days; then, new episodes launch over each of the next eight months. You don't have to play every day, but if you were to, each episode would play out over roughly 15 days and require about 15 to 20 minutes of your time.

Majestic represents a new twist on the multiplayer online game craze that has prompted tens of thousands of players to pay about $10 a month to log on to Sony's EverQuest role-playing game. Neil Young, vice president and executive in charge of production at EA, hopes Majestic will be to the Internet what Orson Welles's *War of the Worlds* broadcast was to radio in its day—a convincing fantasy that exploited its medium (or multimedia, in this case) to the fullest. "In some ways," Young says, "it's a reinvention of the category of the adventure game."

—*Yardena Arar*

THE GAME FAXES YOU cryptic material, such as this page below, that holds clues to help you solve its conspiracy-thriller puzzles.



YOU SET THE PARAMETERS for when clues, like those in this realistic instant message, arrive. Otherwise, they could come any time.

A PLAYER MAY ALSO decipher clues sent in streaming video clips such as this one featuring an "overheard" Web-cam conversation.

IBM

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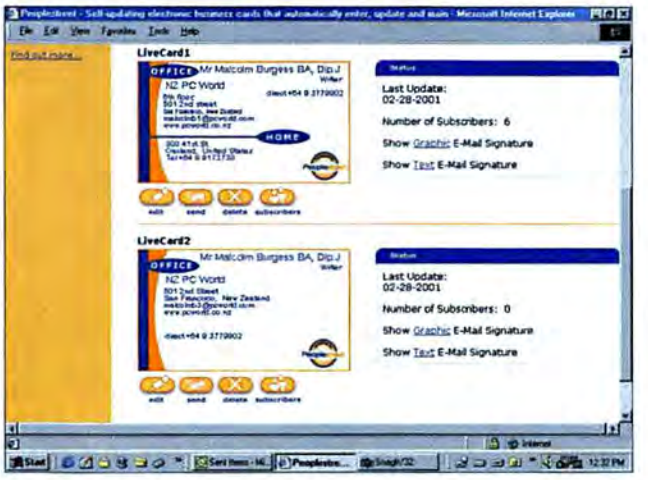
[1]MHz/GHz only measures microprocessor internal clock speed; many factors affect application performance. [2]GB equals one billion bytes when referring to storage capacity; accessible capacity may be less. [3]CD-RW, DVD-ROM and CD-ROM drives list a variable read rate. CD-RW write and re-write speeds vary and list only the maximum possible. Actual CD-RW, DVD-ROM and CD-ROM speeds will vary and are often less than the maximum possible. The read and write results of the CD-RW drive depend on the quality and characteristics of the CD-R and CD-RW media used. Poor results may be obtained with some media suppliers. [4]Some software may differ from its retail version (if available), and may not include user manuals or all program functionality. For non-IBM software, applicable third-party licenses may apply. Warranty, service and support for non-IBM products, if any, are provided by third parties, not IBM. IBM makes no representations or warranties regarding non-IBM products. [5]Pricing shown is price available from IBM directly; reseller prices may vary. IBM price does not include tax or shipping and is subject to change without notice. [6]SuccessLease is offered by third-party providers of business financing approved by IBM Global Financing. SuccessLease terms and conditions provided by the third party. Featured monthly lease payments include prespecified purchase option at end of lease, to qualified business customers only, installing in the US. Documentation fee and first month's payment due at lease signing; taxes are additional. Offer may be withdrawn or changed without notice. Options cannot be leased separately from system unit. IBM reserves the right to alter product offerings and specifications at any time, without notice. IBM cannot be responsible for photographic or typographic errors. SuccessLease and all IBM product names are registered trademarks or trademarks of International Business Machines Corporation. Intel, the Intel Inside logo and Pentium are registered trademarks of Intel Corporation. Microsoft and Windows are registered trademarks of Microsoft Corporation. Other company, product and service names may be trademarks or service marks of others. ©2001 IBM Corp. All rights reserved.

Your Contacts Are Forever: Self-Updating Address Book



AND IT WORKS WITH QuickBooks: A form to capture sales leads.

FIRST LOOK

A FAT ADDRESS book is a business person's best friend—as long as the information inside is current. But keeping track of hard-won contacts can be a nightmare. Help may be at hand, however. Several new Web-based services promise to keep your contacts current, no matter where you—or your contacts—stray.

We tried out three services: ActiveNames, Scout, and Peoplestreet. Each uses a small, downloadable applet; pricing and options vary. In our tests, all three worked fairly well. But they share one big problem: Your contacts must subscribe to your service before it becomes truly useful.

E-MAIL ONLY

THE ACTIVENAMES service (www.activenames.com) alerts you when you send e-mail to an outdated address and notifies your contacts when they send e-mail to your old address. It protects your privacy by letting you decide whether to automatically pass on your new address to all contacts, or to go through your address book and decide which contacts should get the update. The 150KB download works with most major e-mail clients, including AOL, Microsoft Outlook (97, 98, 2000, and Express), Eudora, Netscape, NeoPlanet, Pegasus Mail, and all the major Web-based mail services. It's free for individuals; a more robust version for businesses charges $1 for every contact update the service supplies.

While ActiveNames updates e-mail addresses only, Scout (www.ants.com) updates all of a contact's information. The Scout plug-in we tested (version 1.04) is compatible only with Outlook 98 and 2000, but users who prefer other contact managers can still use the service's Web-based database. For example, if you enter your new address on the Web site, an "auto-change-of-address" feature alerts registered colleagues. If you do have the Outlook plug-in, you need only type in the e-mail addresses of new contacts, and Scout will check to see if they are registered; if so, Scout will complete the Outlook contact entry form with information from the server.

Users invite contacts who haven't registered to do so. If they accept, Scout keeps their information current by updating the address book on a regular schedule. Scout records any changes it makes, along with the time and date, in the notes field of Outlook 98's or 2000's contact window. However, the publisher, Ants.com, says the application may not integrate fully with other address book plug-ins, and that users who also run Microsoft Small Business Manager have run into problems. And Scout's uninstall feature isn't as thorough as it could be, sometimes leaving behind a blank tab in Outlook where the Scout button had been, the company says.

> All three services share **one big problem:** Your contacts must **subscribe to your service** before it becomes truly useful.

Scout is a freebie for now, but eventually users will have to either pay a one-time charge of $30 or agree to receive targeted marketing e-mail. An enterprise version set for release this summer will charge organizations based on the number of updates it makes. Support for Lotus Notes 5, Outlook Express, and the Palm OS is due by midyear.

Peoplestreet (www.peoplestreet.com) is a Web-based contact manager that updates information through the exchange of LiveCards—electronic business cards you create online. When a registered user sends a LiveCard to someone who is not registered, Peoplestreet invites that person to sign up and download Peoplestreet's software in order to collect the LiveCard, which will automatically update the contact's entry in Outlook 2000. Members can receive e-mail reports showing who has their LiveCard and what details have been updated. You can create an unlimited number of LiveCards and specify a list of subscribers for each—handy if you don't want to give your personal info to your business contacts, for example.

Support for Lotus Notes 5 and Outlook 98 is planned for this summer. The service is free for individuals; Peoplestreet charges for updating corporate directories.

PDA VERSIONS COMING

THE NEXT generation of this kind of software will work with mobile phones or PDAs. But for now, if you're concerned only with staying current in the e-mail world, ActiveNames is a fairly hassle-free way of doing so. Scout and Peoplestreet handle all contact info, which is more useful for professionals. If you can get your contacts to play along—that's a mighty big if—these services could prove helpful in keeping your address book current.

—Malcolm Burgess ■

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The essentials of imaging

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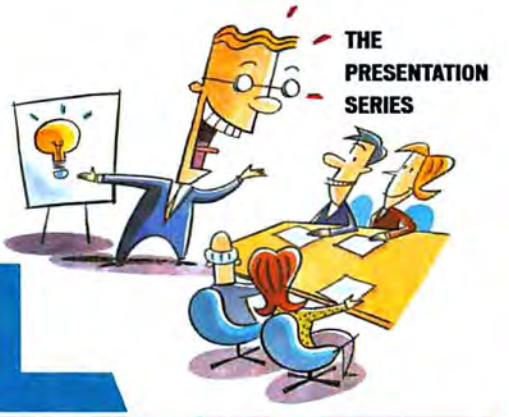

THE PRESENTATION SERIES

SHINING IN THE SPOTLIGHT

Staying COOL When The HEAT Is On

From anecdotes to technology, advice for keeping your presentations both lively and informative

The human brain is an amazing thing. It starts working long before birth, and continues working right until the time you get up in front of an audience to deliver a presentation. At least that is the way it can seem.

The truth is, even the most poised and confident-looking presenters suffer moments of anxiety prior to and during presentations. The good news is that the one-two combination of sound advice from the experts, teamed with products from a hot generation of presentation technology, can help you shine in the spotlight, no matter how high the heat.

All too often, people assume that great presenters are born with the knack for delivering a smooth presentation and for being comfortable in front of an audience. In reality, there is very little that is natural or in-born about such presentation skills. Rather, effective presenters work hard to remove as much of the guesswork and as many of the surprises as possible from their presentations, while also preparing to deal with the inevitable glitches. And so can you.

Video taping can help cure a raft of presentation maladies, many of which are totally unconscious—until you see them for yourself. Habits that will become immediately apparent on tape include drumming fingers on the lectern; touching one's hair, clothing or jewelry excessively and unnecessarily; and punctuating sentences with miscellaneous "ahs," "uhms" and throat clearing—all signs of nervousness. Remember: focus on the message, not on the audience. Turn to page 5 to read more tips for delivering applause-worthy presentations from one of the country's foremost presentation consultants.

Of course, it is easier to focus on your message when you

continued on page 7 › › › › ›

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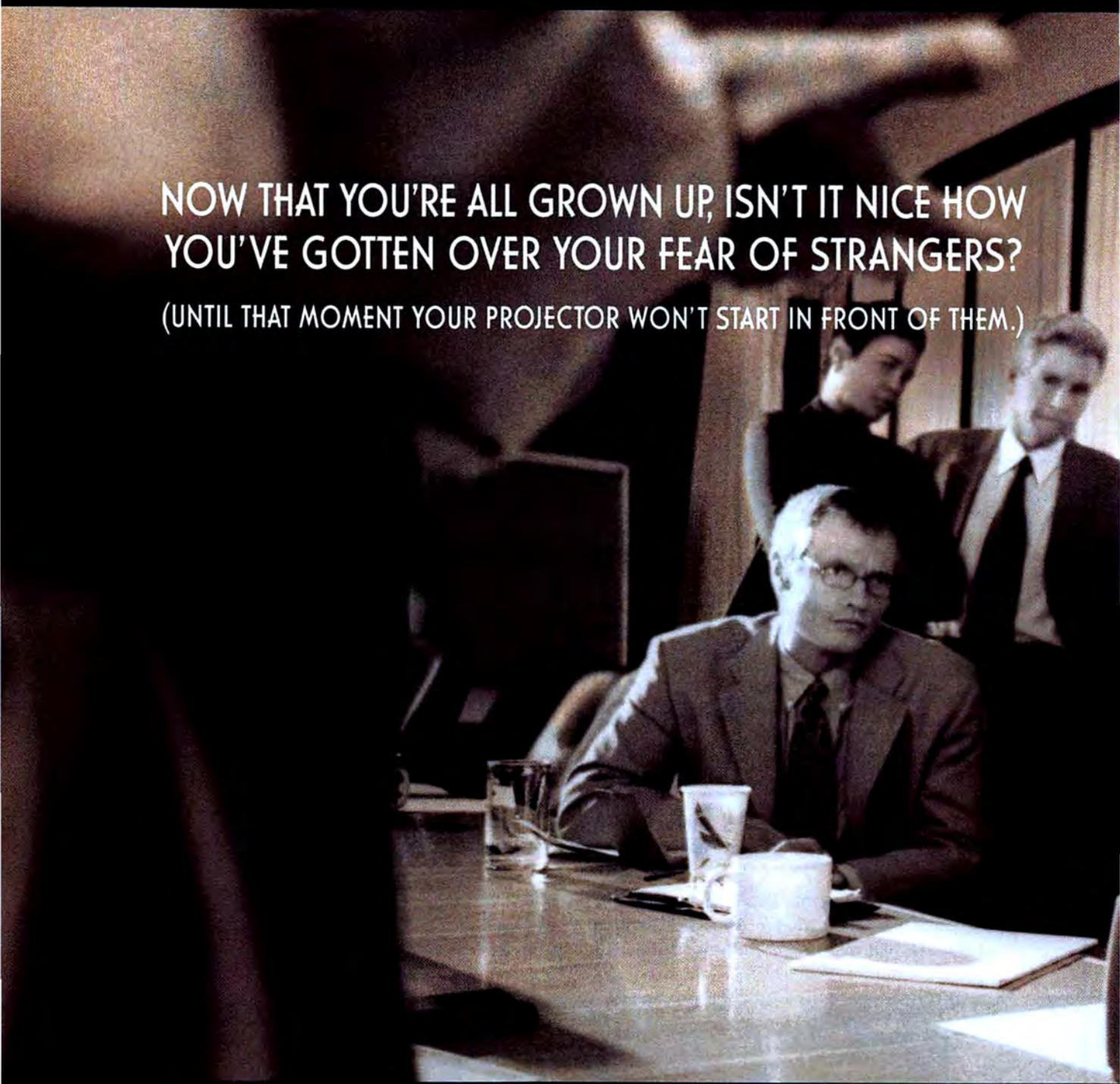

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THE PRESENTATION SERIES

Well Spoken: Q&A with Lenny Laskowski

Don't touch that glass of ice water before starting your presentation! Reach for a glass of warm water spiked with lemon, which opens rather than constricts the vocal chords. This is the kind of practical advice dispensed by Lenny Laskowski (www.LJLSeminars.com), one of the country's foremost experts in delivering effective presentations. His latest book, *Ten Days To More Confident Public Speaking*, is due out this summer from Warner Books.

Q What's the good and bad of presentation technology?

A The technology itself is great. Prices for very good projectors have come way down and the software to create on-screen presentations is not hard to use. Just remember that what you do on the screen should not be the focus of your presentation, but an important aid to it. The technology doesn't automatically make you a better presenter. Used properly, it can help to create an outstanding presentation.

Q What are some good ways to leverage this technology?

A First and foremost, know how to use it. The software today makes it simple to add in all sorts of multimedia effects. But it's easy to overdo them, to the point where it becomes annoying and distracting when every new slide is accompanied by sound effects. Take time to learn how to use the equipment to do important things like making the screen go blank on purpose so the focus can be 100 percent on the speaker. Make sure you know how to go back quickly and find a particular slide if the audience wants a review, so you can do it just as easily as a person using overheads can put up a used transparency. It's really easy, but you have to know how. And make sure that you are as much in control of the technology as possible so that you don't have to rely on anyone else but yourself if something goes down.

Q How can you prepare for the inevitable glitches?

A First, get the most reliable equipment you can buy. Think in practical terms, too. So have a spare bulb in case the one in your projector burns out. Hotels know how to rent equipment, not how to fix it. Always carry a back-up disk with your presentation. This is common sense but you'd be surprised how often these important things are ignored.

Q How about some tips for the presentation itself?

A Don't read from the slides. It's annoying—the audience knows how to read. I tell people not to have more than six lines of text on any one slide, and no more than six words per line. You must learn to speak extemporaneously, which of course means knowing the subject well. I'm not a big fan of joke telling. I encourage speakers to integrate personal stories and anecdotes into their presentations, but to make sure they relate to the subject!

Q What if you hit that awful moment of total anxiety meltdown?

A Take a breath, a deep one. Then focus hard on the first sentence or two that you wanted to say in your presentation. Usually once you get going, you'll be fine. What happens in anxiety attacks in presenters is that they focus too much on the audience and not on the message.

Q Is there any one thing that is most important to making a good presentation?

A You must rehearse, multiple times. Do it alone or in front of others, but you must rehearse. That will help you to relax with the material, and to recover in the event of nervousness or some sort of technical problem. A survey I took revealed that 47 percent of presenters are extremely uncomfortable about presenting in front of others. Take lots of time to rehearse, and you'll be pleasantly surprised with the result.

A wow B

Most ultraportable projectors go from point A to point B. Only Mitsubishi's X80 with ColorView™ takes you there with flying colors.

Make the most dynamic presentation of your life with Mitsubishi's X80 XGA LCD ColorView projector. The Mitsubishi X80 is the first ultraportable with super-high 1500 ANSI lumens designed to impress you and your audience. With Mitsubishi's patented and award-winning ColorView Natural Color Matrix color reproduction technology, the X80 is able to offer the sRGB color display mode, a breakthrough in achieving the objective of precise color reproduction. This is an exclusive feature only Mitsubishi's X80 can offer. Combine this with razor-sharp image clarity and you'll have your audience demanding an encore. Along with the X80, Mitsubishi now offers a complete line of ultraportable Colorview projectors. Four great choices, one great design. The only way to truly appreciate the dazzling performance of Mitsubishi's ultraportable ColorView projectors is to see one in operation. To arrange for a demo, or for more information on how Mitsubishi can get your message across with flying colors, visit Mitsubishi's web site at **www.mitsubishi-presentations.com** or call toll-free **888-880-6351**. In Canada, call **905-475-7728**.

X80 + ColorView NATURAL COLOR MATRIX™ = sRGB

Model	Brightness	Resolution	ColorView™
X80	*1500 ANSI*	*XGA Native*	*Yes with sRGB*
X70	1100 ANSI	XGA Native	Yes
S50	1000 ANSI	SVGA Native	Yes
SA51	1000 ANSI	SVGA Native	Yes

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"Confidence. Before an audience can judge information quality, they judge the speaker's self-confidence. A hesitant style or an unwillingness to make judgments comes off as uncertainty, and that undermines credibility."

-Tom Nolle
President of CIMI Corp.

Lightware's Traveler projector, connected to Handspring's Visor PDA. The Presenter-to-Go Springboard expansion pack from MARGI can create presentation materials from any printable program.

‹ ‹ ‹ ‹ ‹ continued from page 1

are confident that your presentation equipment is going to work just the way you want it to. For years, executives doing presentations have longed for an LCD projector that displays the same high-quality color that they see on their office CRT monitors. Thanks to Mitsubishi Presentation Products (www.mitsubishi-presentations.com), professionals can have CRT-color quality in an ultraportable XGA LCD projector.

The first to offer sRGB Color Mode, Mitsubishi's X80 projector displays color images that mirror the same natural color tones of images displayed on a CRT or other sRGB-compliant device. Developed by an international standards group, sRGB technology determines tone, saturation and brightness of images. For users, sRGB technology means that all imaging equipment, including projectors and monitors, have the same, ultra-high quality color reproduction.

For many presentation applications in medicine, education or graphic arts, where subtle color discrepancies can cause problems, the X80 is an ideal projector. The X80 also features an eye-popping 1500 lumens that can deliver very high quality images in both video and computer slide presentations.

Sales and other traveling professionals are forever on the hunt for presentation technology that is an appropriate match for their own polished skills. That technology has to be highly portable, easy to set up and use, and it must deliver razor-sharp image quality. They'll get all this and more with the Epson PowerLite 50c (www.projectors.epson.com/ads).

With brilliant images provided by its powerful 1000 lumens, the 50c features digital keystone correction that adjusts the angle, ratio and shape of projected images without sacrificing quality, making it an ideal projector for just about any environment. When you want to run a video presentation, the 50c's digital comb filter offers exceptional video clarity, reduced noise and improved overall contrast.

The 50c's advantages also include a presenter-friendly remote control with right-left mouse emulation, a pointer, and three special effects. The USB mouse has hot-swap capability for changes on the fly without interruption. And Epson's warranty is fully international, offered in some 45 countries.

With more and more mobile professionals e-mailing with various handheld devices, lugging a PC around just to drive presentations can be annoying. For this and other reasons, mobile professionals whose livelihood depends upon delivering world-class presentations welcomed the announcement of an innovative presentation solution from Beaverton, Ore.-based Lightware (www.lightware.com). Working with MARGI Systems of Fremont, Calif., Lightware has married its ultra-portable projectors to Handspring PDAs to eliminate the need for a laptop when making bright and clear presentations. This new combination gives users a complete presentation package weighing less than six pounds.

The solution connects Lightware's Traveler and Scout multimedia projectors to Handspring's Visor PDA using the Presenter-to-Go Springboard expansion pack from MARGI. Presenter-to-Go incorporates desktop software to create presentation materials from any printable program such as Microsoft PowerPoint or HTML Web pages. Before leaving the office, presenters use a simple link-up between their PC and the Visor PDA to store their presentation materials. Once on the road, presenters then connect the PDA to any one of Lightware's ultraportable projectors. Included software for the PDA allows presenters to rearrange slides on the go, just as they would on a laptop. The new package gives mobile executives the benefit of the utmost in traveling light without sacrificing presentation quality.

The Epson PowerLite 50c offers exceptional video clarity, reduced noise and improved overall contrast.

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MIRROR, MIRROR

There are two items at the top of the projector wish list for traveling professionals who spend a lot of time delivering presentations. They want a projector whose image quality is as close to real life as possible, and they want a super-lightweight machine that travels and stores easily. Often, these projector features are at odds with each other. That is, you can have the image quality, but only at the expense of weight and size.

Today, thanks to an innovative and highly advanced technology from Texas Instruments, mobile professionals can have it all. Using TI's Digital Light Processing (DLP) technology, the biggest names in projector products can offer super-compact, lightweight projectors that deliver startling clarity, thanks to DLP's unique characteristics.

In Europe, which has traditionally been a market for projectors of the highest brightness and resolution, projectors featuring DLP technology will increase their share of the market by 75 percent by the end of this year, according to Decision Tree Consulting. And at the Consumer Electronics Show in Las Vegas earlier this year, DLP-based hardware from several vendors took top show honors for Best In Show in their classes.

The heart and soul of TI's DLP technology is an optical semiconductor chip called the Digital Micromirror Device.

The LP130 ultra-compact projector from InFocus is a full 40 percent smaller than the formerly biggest-selling microportable projector.

TI's Digital Micromirror Device has an amazing array of up to 1.3 million hinged, microscopic mirrors.

Only the size of a half of a business card, the chip has an amazing array of up to 1.3 million hinged, microscopic mirrors. Each of the mirrors works as an optical switch to create the highest possible resolution and rich color images. How good is the color? DLP projectors sporting a three-chip set offer image quality that rivals large-screen movie projectors.

One sterling example of DLP technology in action is the InFocus LP130 ultra-compact projector (www.infocus.com), which is a full 40 percent smaller than the formerly biggest-selling microportable projector. Yet the LP130 delivers 1100 lumens of brightness, true multimedia functionality, and XGA resolution. The DLP "brain" gives the LP130 projector uncompromised color clarity. The LP130 also features integrated video and digital connectivity.

The first thing users notice about the LP130 is its size. It is smaller than a notebook computer and weighs a mere three pounds. Built for the mobile professional, the LP130 sports a tough, magnesium case and a standard notebook PC-style power cable, as well as 2000-hour lamp life. Multimedia functions include multiple source options as well as a zoom lens and digital keystone correction.

Packing super-crisp brightness in its compact, modular design, the Proxima UltraLight X350 whispers in nearly silent operation while providing the world-class presentation quality of DLP technology. The X350 offers 1100 lumens of brightness, making it suitable for almost any environment, while Proxima's Smart Electronics gives users auto source selection, auto image optimization, auto room light sensing, and thermal adaptive cooling. Projector Manager software allows source-switching as well as power and screen saver management. The X350's modular design also supports a host of future upgrades.

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Digital Light Processing™ technology by Texas Instruments delivers unsurpassed color, sharp contrast and the brightest images, even in ambient light. This revolutionary technology is at the heart of the world's lightest projectors that now weigh under three pounds. Enabling you to make a brilliant presentation in places you never dreamed possible. Whether it's microportable or large-screen projectors, high-definition home entertainment or digital cinema, DLP™ technology delivers the best and the brightest projected images. So demand visual excellence. To get more information about DLP™ processors, visit our Web site or call 1-888-DLP-BY-TI.

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NEW PRODUCTS

More PC Power to the People: AMD's New 1.33-GHz Processor

DESKTOPS

JUST CAN'T GET enough PC power? AMD's latest 1.33-GHz Athlon processor stands ready to answer your call. We tested three of the first systems equipped with this speedy new chip: Polywell's impressively decked-out but costly **Poly 880-K7**, the bargain-priced **MicroFlex 1333A** from Micro Express, and Tangent Computer's preproduction **Valera**. All were terrific performers, and the MicroFlex topped the list of all the Windows 2000 systems we've tested to date.

The $1799 MicroFlex shipping unit earned a score of 231 on our PC WorldBench 2000 tests, nearly 13 percent better than the average of two comparable systems we've tested based on Intel's 1.5-GHz Pentium 4—a difference you'd notice while using standard business applications. The MicroFlex was about 5 percent faster than the average of three 1.2-GHz Athlon systems, a less detectable increase. The $2095 Tangent and the $2888 Polywell weren't far behind the Micro Express, garnering PC WorldBench 2000 scores of 225 and 224, respectively.

All three 1.33-GHz systems run Windows 2000 and have robust features sets, including 256MB of 266-MHz DDR SDRAM, 10/100 ethernet, a 56-kbps modem, a fast NVidia GeForce2 Ultra–based graphics card with 64MB of RAM, a Digital Video Interface (DVI) port for digital LCD monitors, and a DVD-ROM drive (12X for the Tangent and the Micro Express, 16X for the Polywell).

Micro Express sweetens an already good deal by adding a basic 15-inch Bell Office NWB156A LCD monitor and an 8X/4X/32X CD-RW drive to its configuration. The system also has a 40GB hard drive and integrated sound. Unfortunately, when set at a refresh rate other than 70 Hz, the LCD had areas of blurred text and graphics as well as noticeable flicker—you may be better off choosing a 17-inch CRT and saving $300. I also saw a bit of pixelation during DVD playback. The tower case of the MicroFlex 1333A has a neat interior and offers sufficient room for expansion.

Tangent's Valera comes with a 45GB IBM hard drive, integrated audio, a good pair of Altec Lansing ACS 45.2 speakers with subwoofer, and a clear 19-inch Optiquest Z90 monitor, but no CD-RW drive. DVD playback was good. The Tangent's tower case sets aside adequate room for future additions, but a support bar that runs along the expansion cards and helps to keep them in place complicates upgrades.

TOWERS OF POWER: 1.33-GHz-based PCs from Tangent, Micro Express, and Polywell.

PHOTOGRAPH: MARC SIMON

Polywell rounds out its high-end multimedia package with a top-notch, six-piece Creative Labs Cambridge SoundWorks 5.1 Dolby speaker package, a SoundBlaster Live Platinum card, a 16X/10X/40X CD-RW drive, Lotus SmartSuite, and a 19-inch ViewSonic GS790 monitor with a crisp picture. DVD playback was very good. The Polywell we tested carried a pair of 30GB IBM disks in a RAID 0 configuration. This lowest-level RAID setting does speed up throughput—but if you lose one drive, you lose your data. On the other hand, RAID also lets you configure your system so that one drive mirrors the other, generating a redundant copy. Of course, you may prefer to take advantage of the full 60GB of space available to you on two separate hard drives. This shipping unit's tower case provides plenty of expansion room and clear access to all components.

Priced to satisfy a range of pocketbooks, any of these three systems will give power users the performance they crave; which price you pay depends on which additional features you desire.

—Anush Yegyazarian

MicroFlex 1333A

PRO: Top performer at a good price.
CON: Subpar LCD monitor.
VALUE: High-end performance that doesn't break the bank.
Street price: $1799
Micro Express
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www.microexpress.net

Poly 880-K7

PRO: CD-RW and DVD-ROM drives, top-notch sound, RAID card.
CON: Pricey.
VALUE: Strong components yield a high-end multimedia system.
Street price: $2888
Polywell
800/999-1278
www.polywell.com

Valera

PRO: Strong performance, adequate expansion room.
CON: No CD-RW drive, some interior components a bit awkward to reach.
VALUE: This is a decent system at a reasonable price.
Street price: $2095
Tangent Computer
800/342-9388
www.tangent.com

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68 SiPix Pocket Printer A6; Sonicblue RioVolt CD/MP3 player
70 La-Z-Boy Explorer e-cliner; portable rechargers for PDAs
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Hewlett-Packard's Budget Pocket PC

P D A

HEWLETT-PACKARD'S **Jornada 525** is a Pocket PC for people with skinny pockets—and wallets. At $359, it (along with its near-identical sibling, the Jornada 520) is one of the least-expensive color Pocket PCs available—a good $90 cheaper than the Jornada 548, and $140 less than Compaq's popular IPaq Pocket PC.

Even so, the Jornada 525 has many attractive Pocket PC selling points: a svelte, 8-ounce design; a high-resolution (240 by 320) color screen; and stripped-down versions of such Microsoft Office applications as Outlook, Word, and Excel. But as you might suspect, HP did cut some corners to get the price down so low.

Most glaringly, there's no built-in stylus holder on the PDA itself; the 520 series offers only a little pocket in the fabric lining of the included leather case. HP also economized on the color screen, which uses a 256-color passive-matrix LCD technology. The display looks bright enough, and it has settings that you can adjust for indoor and outdoor lighting. The colors aren't as saturated or rich as those found on the 4000- or 65,000-color active-matrix screens of more-expensive competitors, however. I also noticed some ghost images on the display of my shipping model. Finally, you must sync via a poky serial cable—the Jornada 525 doesn't support a faster USB hookup, and a cradle costs extra.

HP'S JORNADA 525: Fewer options, but still a good value.

On the plus side, you can boost the Jornada 525's 16MB memory via a CompactFlash slot. And the software bundle includes a useful note-taking and organizing application, several audio players, and a couple of fun games.

Overall, the Jornada 525 offers good value for its price (the Jornada 520 bundles the same device with software that's slightly more corporate). Cost-conscious Pocket PC fans should consider checking out one of these models.

—Yardena Arar ▶

Jornada 525

PRO: One of the most affordable color Pocket PCs available.
CON: Serial hookup means slow syncing; no built-in stylus holder; passive-matrix display.
VALUE: Reasonable sacrifices for cost-conscious Pocket PC fans.
Street price: $359
Hewlett-Packard
800/752-0900
www.hp.com

PHOTOGRAPH: MARC SIMON

SiPix Brings Tiny Portable Printing to PDAs

PORTABLE PRINTER

IF YOU'RE ON the go and short of space, you can print documents from a Palm OS handheld or a notebook with SiPix's **Pocket Printer A6**. Because the A6 uses thermal technology that prints by heating coated paper, this $149 printer doesn't need ink cartridges or ribbons. Weighing less than a pound with its four AA batteries installed, the unit is only 5.85-by-4.25-by-0.99 inches, so it fits in your pocket in its included velvety pouch. The A6 comes with an average-size, lightweight AC adapter.

THE A6 is about as big as a paperback book.

PDAs using any Palm OS version from 3.0 to 3.5 can talk to the printer via an infrared port; notebooks can use that or the serial port (a cable is included). I easily loaded the driver for my shipping unit to a PC (you need a Pentium processor or higher, and a CD-ROM drive) and hotsynced to my handheld. After that, my PDA could print a memo, a to-do list, e-mail, or an entry from a datebook or an address book—but nothing else. However, notebooks running Windows 98, 98 SE, Millennium Edition, or 2000 can print from any application.

The A6 spits out a 4.125-by-5.75-inch page of text fairly quickly; blown up to nearly 200 percent on a copier, the dimensions fit well on letter-size paper. But print quality is poor, with smudged text that loses its definition when enlarged. The included roll of coated paper is flimsy and curls up—like thermal fax paper—so it's easier to use sheet paper that you manually feed into the printer ($10 fetches 100 sheets or six rolls of coated paper). Documents of multiple pages print out as a single long sheet on the over-8-foot-long roll of paper, with places to cut marked.

Mobile professionals such as attorneys and contractors may find the A6 useful. But in view of the teensy documents a PDA can hold, most people won't find printing them out all that useful. If I really need a hard copy of a memo or a to-do list, I'll grab a pen.

—Lisa Cekan

Pocket Printer A6

PRO: Small, quick, lightweight.
CON: Flimsy paper.
VALUE: Size and ease of use might make it worthwhile for mobile professionals who print a lot on the go.
Street price: $149
SiPix
408/719-8888
www.sipix.com

RioVolt Hits the High Notes

MUSIC PLAYER

WHEREAS A conventional audio CD holds up to 80 minutes of music, you can store 20 hours' worth of MP3 files on one recordable CD. The new **RioVolt** portable player, from Sonicblue's Rio division, works with both conventional audio CDs and recordable CDs with MP3—and it also can handle Windows Media Audio (WMA) files.

An additional benefit: It is currently the only player that lets you upgrade (via CD-ROM) to add new user features as they arrive.

The RioVolt uses effective built-in 120-second shock protection to buffer audio tracks, eliminating skipping and increasing the batteries' life. In the shipping unit I tested, the buffering was noticeable—particularly on the MP3 tracks. The disc stops spinning after about 10 seconds, and it starts up again about 2 minutes later. The song title, track number, artist name, and overall playing time appear in the device's two-line backlit LCD panel. Rio says two AA batteries will last for 15 hours playing WMA files; I got a little over 12 hours while listening more to regular CDs than to discs encoded with MP3s.

SONICBLUE'S RioVolt dual-purpose CD player.

I slapped the player around a bit while a CD was playing, and it didn't skip a beat. You can switch the 120-second shock protection span to 10 or 40 seconds for standard CDs to prolong battery life.

Unlike flash-memory MP3 players, this music player does require you to carry around discs to play. The flip side? With discs at hand, you don't have to hook up the unit to your computer when you want to change the music.

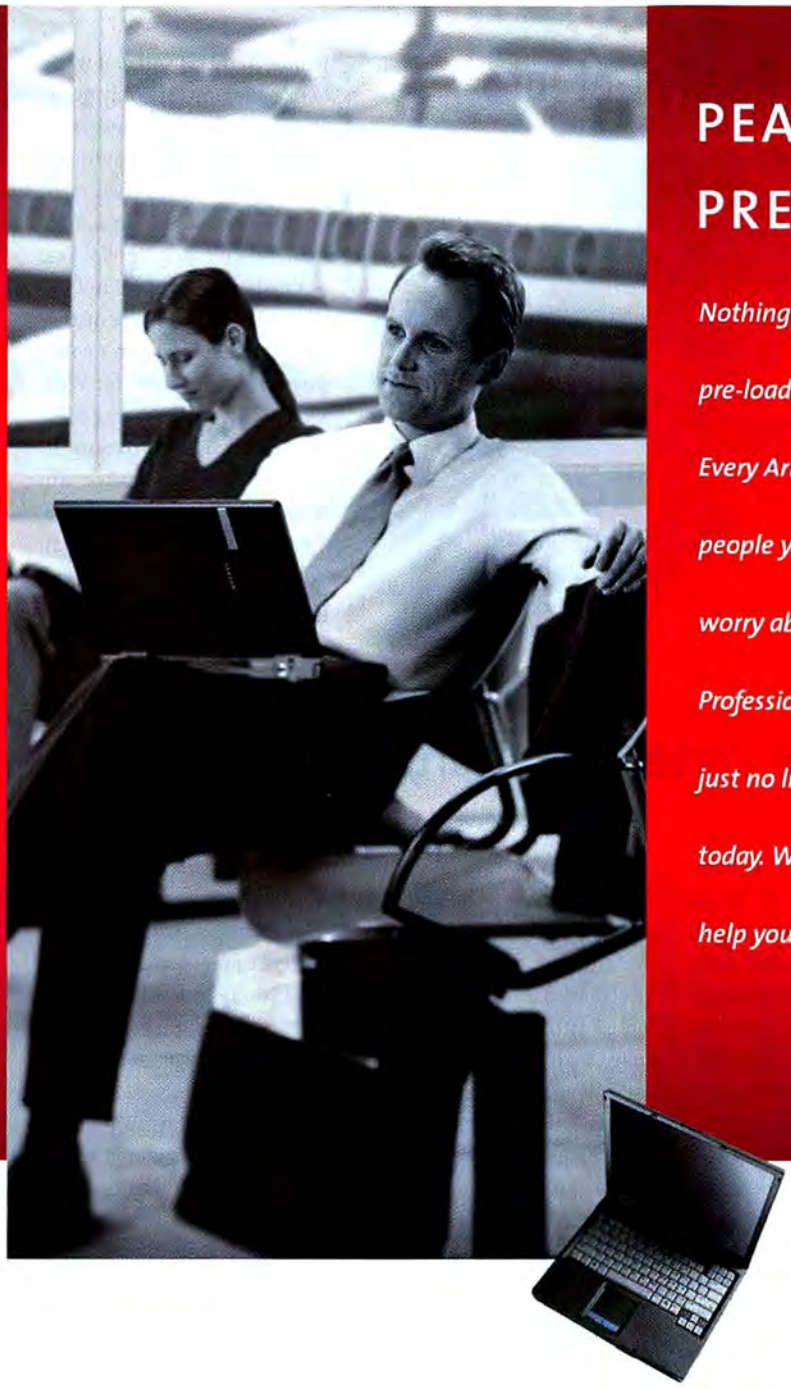
Priced at $170, the RioVolt won't give you sticker shock. It ships with earphones, an eight-function remote control, an AC adapter, Easy CD Creator 4 software, Real Jukebox software, and a carrying case.

—Michael S. Lasky ▶

RioVolt

PRO: Dual-purpose CD player handles MP3-encoded discs for up to 20 hours of music; good battery life.
CON: You'll need a CD burner to listen to MP3s or upgrade firmware.
VALUE: Competitively priced with high-end portable MP3/CD players; its ability to play WMA files is a plus.
List price: $170
Sonicblue
800/468-5846
www.sonicblue.com

COMPAQ | BUSINESS



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Technology You Can Really Get Into

INTERNET ACCESS

ERGONOMICALLY correct office chairs be damned. If you want true comfort while cruising the Web, the new **La-Z-Boy Explorer** lounger is the way to go. This cushy recliner comes equipped for Microsoft WebTV Plus service, giving you Internet access and interactive TV while you vegetate. All you provide is the TV, the phone line, and electricity.

Roomy enough for even the stoutest couch potato or Yahoo yam, this "e-cliner," as La-Z-Boy dubs it, is the first Web-enabled easy chair. When my $1299 black leather shipping unit arrived, I sat down, lolled back, and promptly zoned out for 20 minutes. Once back to reality, I had no trouble connecting the hardware for WebTV to my television, and I was quickly logged on for viewing and limited surfing.

Both armrests on the Explorer flip open. The right one houses a drink holder and remote; the left contains a tray table bearing the wireless keyboard you use to communicate with the Sony INT-W250 Internet terminal perched atop your television. If you were a whiz at Rubik's Cube, you'll easily maneuver the keyboard tray in and out of the arm (I resorted to the manual). Once it's out, the tray easily swings out of your way, but it can't move back and forth or tilt. The keyboard detaches, however, so I just set it in my lap. Beer bellies should also work nicely.

LA-Z-BOY'S Internet-ready recliner.

Inside the tray table arm, the Explorer has outlets for power, phone, and DSL—if you want to use a laptop. My only gripe about the chair: its overly soft arms. If you lean heavily on them while heaving yourself up, they give a lot; the infirm may end up crying, "Help! I've e-clined and I can't get up!"

The WebTV aspect of the La-Z-Boy Explorer can't compare with using a PC for Web access, but in most respects, the chair itself is a dream. If you're trying to entice an older, comfort-loving relative onto the Web (or are just plain lazy yourself), the Explorer could be the answer.

—Lou Bergeron

La-Z-Boy Explorer

PRO: The most comfortable Web surfing you'll ever enjoy.

CON: You eventually have to get out of the chair; there's no fridge.

VALUE: Good for novice Web users, TV fiends, and comfort cravers.

List price: $1299

La-Z-Boy

800/625-3246

www.lazboy.com

A Light, Portable Recharger for Your PDA

RECHARGERS

MOBILE DEVICES are supposed to make life on the go easier, and for the most part they do. But no matter how small or lightweight your notebook, PDA, or cell phone is, you're still saddled with bulky AC adapter bricks to power and recharge them.

Wouldn't it be great if you had a single slim, lightweight power adapter that worked with all your portable devices? Try the 7.5-ounce **Universal AC Adapter** from Targus—a 0.5-inch-thick panel with built-in surge protection that automatically senses the power needs of any device you attach to it. Included in the $120 package is a supply of eight removable power tips that plug into the adapter ports of most major makes and models of notebook PCs. You can buy additional tips for other electronic devices at about $20 per set.

The shipping unit I tried worked flawlessly on Dell and Fujitsu notebooks and two Nokia phones. Though it's pricey, the Targus Universal AC Adapter could become a necessary luxury. Downsides? Those little tips look easy to lose, and you can recharge only one device at a time.

Jetta Tech's ultralight **USB PDA Charger** cables take a different approach to recharging PDAs. No additional power supply or installation software is required: Just plug the $25 cable right into a notebook or desktop USB port, attach the other end to the PDA, and it charges as if it were plugged in to its original (and heavier) power supply—especially useful if you're trapped in a hotel room with insufficient electrical outlets. To preserve your notebook's battery, remember to do the recharging when your notebook is plugged in.

The shipping PDA Charger cables I tested easily charged a Compaq IPaq Pocket PC and a Palm V without a hitch.

—Michael S. Lasky ▶

Universal AC Adapter

PRO: Thin and lightweight power adapter works with multiple devices.

CON: Power tips easy to misplace.

VALUE: Worth it if you have three or more devices and don't want to carry bulky adapters for each.

List price: $120, additional tips about $20 per set

Targus

877/819-8572

www.targus.com

USB PDA Charger

PRO: Uses power from a USB-equipped PC to recharge devices.

CON: A separate cable is required for each device.

VALUE: Great for recharging PDAs if your hotel doesn't have enough wall outlets.

List price: PDA cable $25

Jetta Tech

949/465-9988

www.jetta-tech.com

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24-port 10/100BASE-TX managed stackable switch

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$959.59 CDW 245297

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$1149.00 CDW 271012

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$979.51 CDW 175216

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$879.81 CDW 263039

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$51.73 CDW 197422

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hp invent

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866MHz Intel® Pentium® III processor

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$1288.14 CDW 268632

Simple Technology 128MB memory module

For hp vectra vl400

Give your business the boost it needs to stay ahead of the competition with a 128MB **Simple Technology memory module**.

$257.37 CDW 227066

ViewSonic LCD VG181

18.1" active-matrix LCD

With digital DVI-V and analog inputs, as well as a contrast ratio of 300:1, **ViewSonic VG181** offers clearer, crisper and more vibrant images.

$1799.99 CDW 240563

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19 ppm network-ready

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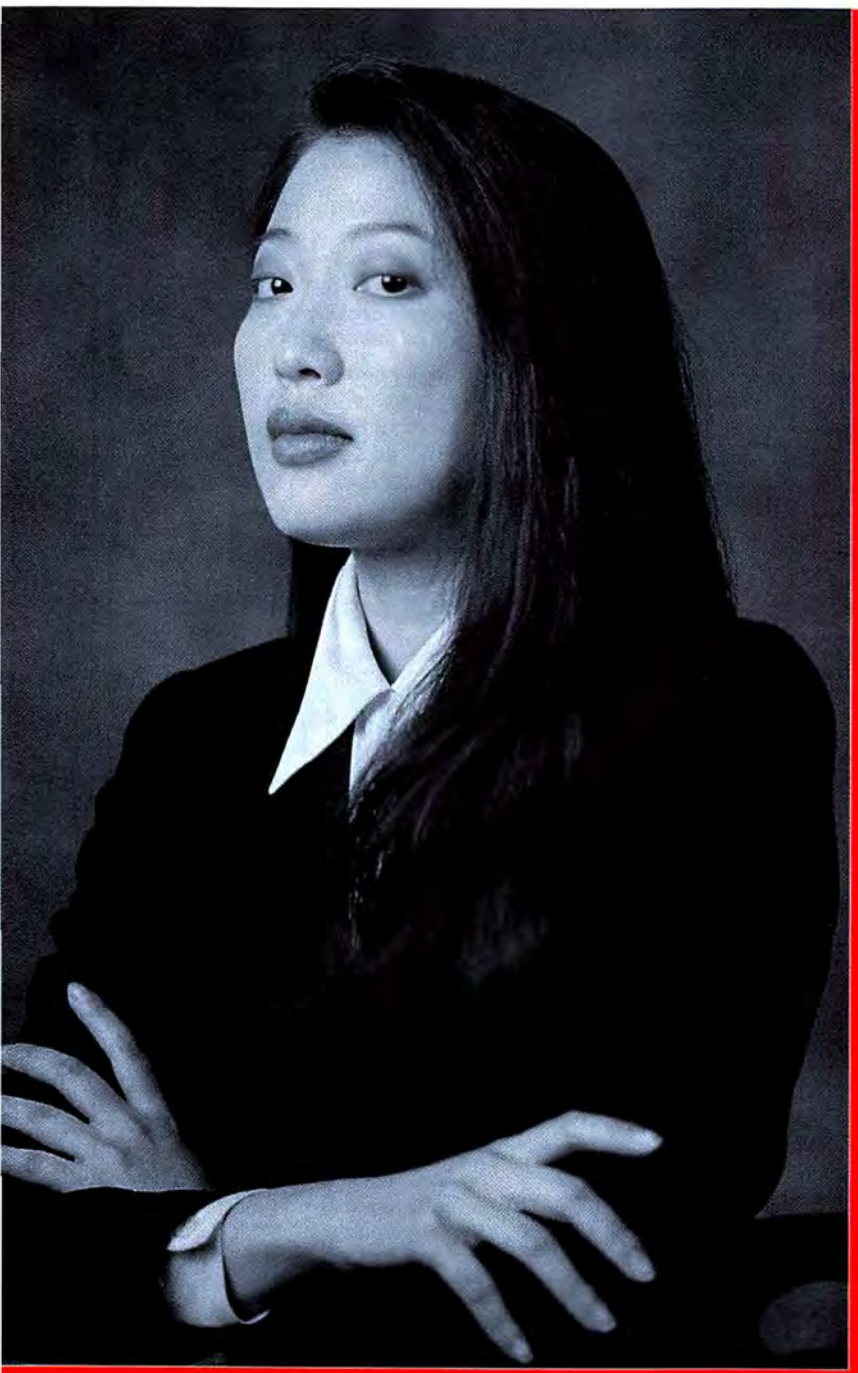

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Toshiba Magnia SG10: A Little Server That Can

APPLIANCE SERVER

IN A SMALL, gray box no larger than a thick laptop, Toshiba has created an appliance server for users needing a network they can handle themselves.

The **Magnia SG10**, easy to install and maintain, is perfect for a small business, a school, or a high-tech home that needs to transfer files across platforms or to share a printer or an Internet connection.

The unit boasts a 350-MHz AMD K6 processor and 64MB of RAM. My $1499 shipping model contained two 10GB hard drives; a single-drive version costs $1289. The versatile SG10 also has an ethernet connection for high-speed Net access, a local network hub with seven ports, a 56-kbps modem, and a printer port.

TOSHIBA'S MAGNIA SG10 is easy to use.

The software is based on Red Hat's version of the Linux operating system, but it also supports Windows NT and 95 or later, and Mac OS 9 or later. Users handle setup and administration via a JavaScript-capable Web browser such as recent versions of Internet Explorer or Netscape. The server supports all common network services, including e-mail, FTP, intranet Web serving, print spooling, firewall filtering, and Web caching.

I had no trouble setting up the SG10 and using the included CD-ROM to configure computers on the network. Setup also creates shortcuts to administration Web pages where you can view reports; change settings; schedule backups; control the basic, easy-to-use firewall; and more. Some of the administration pages seemed slow, and I encountered occasional JavaScript errors in the browser.

The built-in intranet portal is basic but adequate. Wizards help you build a home page, a news page, event listings, a file directory, and a links database. Advanced users can add to or replace predefined Web documents. You can switch easily from DSL to dial-up, all without reentering your information—handy during ISP outages.

Overall, the Magnia SG10 is a solid server for people who need a small, easily managed network. Cobalt's competing Qube 3 offers slightly more expandability, but the SG10's compact size and built-in 10/100-mbps hub are appealing in this growing field.

—Jamie Fenton

Magnia SG10

PRO: Small; feature-packed; easy to use; built-in 10/100-mbps hub.

CON: Minor flaws in the administration interface.

VALUE: A useful, inexpensive server you can manage yourself.

List price: $1799 with 40GB of hard-drive space, $1499 with 20GB, $1289 with 10GB

Toshiba

800/316-0920

www.shoptoshiba.com

Swap Instant Messages Outside Your Service

MESSAGING SOFTWARE

INSTANT messaging is great when everyone you need to reach uses the same system, but it can become a Tower of Babel nightmare when they don't. With the free **Jabber Instant Messenger**, you're able to chat with ICQ, MSN Messenger, and Yahoo Messenger users, as well as with other JIM subscribers.

Jabber.com isn't the first company to try to link with other services, but most of those services (especially AOL Instant Messenger) have been quick to block any kind of interoperability. During my informal testing, I was able to get Jabber.com's new version 1.6.0.3 to communicate successfully with the other services, albeit not with complete reliability. JIM even worked fairly successfully with AIM, but AOL subsequently began to block JIM's access to AIM's servers.

GATEWAYS let JIM users chat with other services.

Since Jabber is open-source, several clients are available, but JIM appears to be the most stable. Its interface is very AIM-like, with a simple contacts list that can be organized into folders, plus toolbar buttons to handle basic functions. JIM allows you to chat one-on-one with another user or simultaneously with multiple users from other services.

To use JIM to chat with non–Jabber IM users, you must first set up a gateway with each service. This entails creating an account for the outside service and then entering the account name and password into JIM's gateway settings. It took me several tries to set up MSN Messenger and ICQ gateways.

JIM has fewer advanced features than ICQ or AIM, but it has advantages for users with contacts across the IM universe. I'll definitely keep it installed on my system.

—Joel Strauch ▶

Jabber Instant Messenger 1.6.0.3

PRO: Interoperable with multiple messenger services; clean interface.

CON: Won't work with AIM.

VALUE: Well-designed chat client that bridges (some) digital gaps.

Free

Jabber.com

303/308-3231

www.jabber.com

USB Simplifies Desktop Wireless Networking

WIRELESS NETWORKS

IF YOU'RE considering setting up a home or small-business wireless network using the popular 802.11b standard (also known as Wi-Fi), your task has just gotten easier. The first 802.11b USB adapters, from Agere Systems' (formerly Lucent's) Orinoco family of adapters and from D-Link, make adding desktop PCs to your network as simple as adding a notebook.

Because they take PC Card adapters, notebooks have been a snap to configure: Install a driver, slide in the card, and you're ready. But desktop PCs are trickier. Until now, users have generally had to open the PC and install a PCI or ISA add-in card—a hassle most people would just as soon avoid. Either of these new USB adapters makes the drill simple again: Install the drivers, connect the cable, and you're in business.

In most of my tests with a shipping version of the utilitarian-looking **D-Link DWL-120** and a preproduction model of the futuristic **Silver Orinoco USB Client**, setup was just that easy. USB's 12-mbps maximum bandwidth also proved a good match for 802.11b's 11-mbps maximum. But I did run into problems when I tried to install the adapters on a Windows Millennium Edition desktop on which I'd previously used Orinoco's PC Card adapter in a PCI card reader. Technicians from both companies said such USB installations on a PC with a previously installed 802.11b adapter are prone to Me Registry issues—even if you uninstall the old adapter and its drivers.

USB WIRELESS adapters from D-Link (left) and Agere Systems.

The Silver Orinoco USB Client costs $180 (a $200 Gold model comes with high encryption support). Buying either one is only slightly less expensive than shelling out $65 for the Orinoco PC Card Reader and another $130 or $148 for the Silver or Gold Orinoco PC Card. However, the $130 D-Link DWL-120—$5 cheaper than D-Link's PCI card adapter—stands out as the best value.

—Yardena Arar

PHOTOGRAPH: MARC SIMON

D-Link DWL-120

PRO: Easy-to-install USB adapter for 802.11b wireless networks.

CON: Installation hassles are possible for those who upgrade.

VALUE: Good for painless addition of a desktop to a wireless network.

Street price: $130

D-Link

949/790-5290

www.dlink.com

Silver Orinoco USB Client

PRO: Easy-install USB adapter for 802.11b wireless network.

CON: Pricey; installation hassles possible for upgraders.

VALUE: Sharp-looking device, but not as good a deal as D-Link's.

Street price: Silver $180, Gold (with high encryption support) $200

Agere Systems

866/674-6626

www.orinocowireless.com

Do You, PC, Take This Mac?

INTEROPERABILITY

MACS AND PCS, working together in harmony under the same roof. Some view this as an unholy union. For those who don't, new software from Miramar Systems lets computers from both platforms share disks, files, and printers over a network.

PC MacLAN 7.2.1 has versions that run on either Windows 95/98/Me or on NT/2000 systems. Either allows a PC to see Macs on a LAN or WAN, and enables your Macs to see the PC. Microsoft's and Apple's respective server software applications support connectivity by both platforms, but PC MacLAN provides peer-to-peer networking for small offices that don't use a server. My $199 shipping copy of version 7.2.1 adds the ability to connect over Internet Protocol (rather than just over the slower AppleTalk), as well as support for printing to non-PostScript printers.

After a simple installation routine on your PC, the software is mostly transparent. You can access Macs via Network Neighborhood, just as if they were Windows-based PCs; Macs can access the PC via their Chooser. The software comes preconfigured to ensure that files created on a Mac open with the proper application on a PC (Macs don't require file-name extensions—they hide the information within the file). I encountered no problems sharing platform-agnostic files, such as HTML pages, images, and Microsoft Office documents.

Printing to PostScript printers, which use a cross-platform language of their own, should pose no difficulty, but Macs must use the generic LaserWriter PostScript driver to print to non-PostScript printers, so you can't get printer-specific functions such as the superhigh resolutions some ink jets now offer.

Still, PC MacLAN is great to have in integrated offices. Share it with a Mac you love.

—Alan Stafford ▶

PC MacLAN 7.2.1

PRO: Transparent networking using both Macs and PCs.

CON: Some Mac printing limitations.

VALUE: A very useful program for cross-platform offices.

Street price: $199

Miramar Systems

800/862-2526

www.miramar.com

FRONT LINES OF DEFENSE

When it comes to computer security, it pays to be prepared for the worst

A year ago February, the world awoke to find that the biggest e-businesses in the world had fallen victim to a series of hacker attacks, leaving their sophisticated networks inaccessible to customers. Even the FBI's site was hacked. Meanwhile, a computer bug affectionately called the I Love You virus sent untold thousands of PC users scrambling to find an antidote when they unwittingly launched the virus into their own systems. Variants of I Love You are still popping up, mutating, and defying conventional antivirus protection just like real viruses.

If these highly publicized attacks and pranks demonstrated anything, it is that no system is 100% safe from hackers and viruses. They have very real costs for businesses in terms of downtime, the expense of getting the system back on track, and customer goodwill. Then there's the matter of recovering corrupted data, if it can be recovered at all. You can't avoid hackers and viruses entirely, yet you must protect against their consequences. But how?

THE OUTSOURCING SOLUTION

It is not surprising that a growing number of businesses are turning to desktop outsourcing solutions, such as that provided by Fremont, CA-based Everdream Corp. (http://www.everdream.com). Indeed, three quarters of businesses surveyed by technology research firm International Data Corp. outsourced some or all of their security functions in 2000. And small firms are more likely to outsource their firewall management and vulnerability assessment than midsize and large companies.

These outsourced solutions not only provide the most current anti-virus defenses, but also regular remote backup of vital company data. With some 50,000 PC viruses in existence, and more coming all the time, there is no substitute for regular backup, a cornerstone of the Everdream PC solution.

But small firms may be falling victim to a false sense of security. A fifth of small business owners believe that increased Internet use will have no impact on their security operations. "It is likely that the shock of ever-growing Internet use has worn off," the IDC report's authors write, but that doesn't mean security issues should no longer be cause for concern.

"You have no idea how common these attacks are until you start looking for them," says Bob Christoph, principal of TypoFinders.com, a San Francisco, Calif.-based proofreading service. Christoph often works from home, on a notebook PC connected

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Bright Smiles, Safe Data

State-of-the-art dentistry has come a long way from paper appointment books, plaster casts, and film processing chemicals. Keeping up with the industry today requires electronic record-keeping and billing, intra-oral cameras, and digital sensors that shoot X-rays instantly to computer screens.

To keep its San Jose-based practice competitive and operating efficiently, Bragg & Hamilton Family Dental Practice Associates uses an assortment of high-tech tools as well as technology partners like networking firm BridgeNet Information Systems, Inc. (www.bnis.com) and outsourcing provider Everdream Corp. (www.everdream.com), both based in nearby Fremont, Calif.

Bragg & Hamilton has come a long way in the last several years toward its goal of a paperless office. "Five years ago we had paper appointment books, most of the billing was done by hand, and we used snail mail," says Dr. Suzanne Hamilton, who in 1998 merged her practice of two years with Dr. Harley Bragg's practice of more than 30 years. Now that the practice serves more than 2,000 patients in San Jose and Saratoga, "we do all scheduling and a large part of documentation on computers," says Dr. Hamilton, "and a lot of billing through electronic claims."

Eleven other employees round out the staff, she says, "and none of us are terribly computer-savvy. That was one of the huge selling points of Everdream," which was recommended a year ago by their networking provider BridgeNet. "We wanted our administrative staff to have 24x7 access to Everdream." The outsourcer has helped walk them through tricky tasks such as personalizing patients' statements via their Microsoft Office mail merge program. "We didn't know how to use the information on our Excel program 'statement notes' and run it through the mail merge so it would fit on stickers in the order we wanted, to be placed on patient statements," she says. "So we'd call Everdream and they'd tell us what to do."

Perhaps the most important task the outsourcer provides, though, is daily backup for Bragg & Hamilton. "This is critical for

Continued from page 1

to the Net via a DSL service. He installed Internet firewall software on his PC after reading a cautionary magazine article about the risks associated with lax home office security. "Since I had a static [Net] connection, I knew that it was especially important to take steps to guard my business' resources."

Christoph's clients entrust him with unpublished novels, legal briefs, and pre-launch Web sites. "And since I'm the one editing the document," he says, "I'm often the only one with an up-to-date copy." His firewall detects hostile and suspicious activity and deflects hacker attacks, while permitting legitimate traffic to reach his PC.

An independent group called the Partnership for Critical Infrastructure Security has issued a series of guidelines and suggestions for preventing hacker and virus attacks. They include steps such as staying informed about the Internet's most-often-exploited vulnerabilities, using "system-hardening" tools, and verifying that all recommended security patches have been installed on Internet-accessible devices. These are excellent measures, but the fact is that many businesses can hardly afford the cost of hiring and training their own Net security specialists. "That would be out of the question," TypoFinders' Christoph says. "I have to count on other, outside people for their technical expertise." Even those who can afford such security protection would rather focus their efforts on their core businesses, not on IT security.

SECURITY BLANKET

In turning to Everdream Corp., businesses of varied sizes nationwide seek to guard their data against denial-of-service attacks as well as viral threats and other catastrophic events. Everdream's customers pay flat monthly fees to use top-of-the-line Hewlett-Packard hardware, custom software configurations, automated software maintenance, and daily remote data backups over

us, because we do so many transactions a day," she says. "All our finances, billing, insurance, and appointments are on our computers."

Office manager Barbara Goldbaum knows the value of the backup service provided by Everdream. A few years ago when the office was handling its own backup using a tape system, a hard disk crashed and two weeks worth of postings—all transactions and charges, as well as recall appointments—were lost. "We had to go back in and enter them. It was a major catastrophe," says Goldbaum. At the time, their backup system allowed a partial or complete backup, but because the full backup took so long (about three hours), it didn't happen regularly. "So the information we were able to put back into the computer was incomplete," she says.

And, of course, restoring data—even incomplete data—cost the company time and money. After all, for any business, time spent on data recovery is time not spent taking care of customers and clients.

Today, though—thanks to Everdream—if a hard disk crashed, the most Bragg & Hamilton would lose would be a day's data. "They will load our backed-up information at their site into a new system and deliver it to us ASAP, that day, so we are not 'down' for our patients," says Dr. Hamilton.

Using a turnkey provider like Everdream lets Bragg & Hamilton keep current with the industry without losing its investment. "The needs of our computer systems are changing so fast," says Dr. Hamilton. "We don't want to be outdated in three years and have to buy new equipment."

CHUCK NACKE / MERCURY PICTURES

Dr. Suzanne Hamilton of Bragg & Hamilton Family Dental Practice Associates in San Jose, California.

secure connections. What they gain, most of all, is some peace of mind.

The automated backup has saved time, money, and aggravation for some Everdream customers. When a destructive virus sneaked through the front-line antivirus protection at one customer site, a pair of hard disks loaded with vital customer information and records were corrupted beyond repair. When Everdream phone support couldn't rectify the situation, Everdream shipped the user a pair of new drives, fully loaded with all the backed-up data. Using simple phone instructions, the user installed the drives on his own and was up and running smoothly in a matter of a few hours.

Everdream's state-of-the-art Solutions Center provides high-level, 24x7 personal technical support to all sizes of businesses. Center staff are trained to access, diagnose, and fix problems on their clients' PCs via secure, high-speed Internet connections. Everdream's customers, for their part, save money and increase their productivity by reducing downtime and limiting "house calls" from technical support specialists.

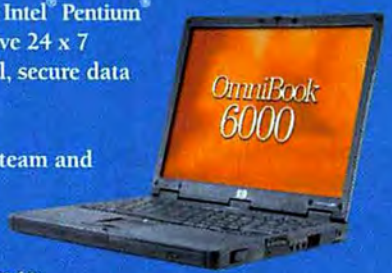
Everdream partners with leading security providers such as McAfee, a division of Network Associates Inc., and Symantec (Norton). These global leaders in Internet security solutions and services allow Everdream to provide customers with continuous, up-to-date protection against viruses and the malicious code behind denial-of-service attacks. And, like an invisible IT department, Everdream girds its customers' security systems by automatically installing up-to-the-minute data on new and mutated viruses.

Small-business owners like Bob Christoph value the security functions now offered by Everdream. "There are some good tools out there that small businesses can use to tighten their security," he says. "Not to take advantage of them would be very irresponsible."

Everdream™ stands behind my small business with computing expertise and technology.

Imagine what you and your business could do with the support of a strong IT department that takes care of your computing needs: Your computers could always be up and running, your data could be secured against loss and destructive viruses. You would always know who to call if you had a problem. You could attract and service customers on the web and take advantage of the latest productivity-enhancing tools.

Everdream provides you with the highest level of IT services available: Powerful Intel® Pentium® computers, Dreamware™ self-healing technology, the latest business software, live 24 x 7 support, virtual desk side assistance, unlimited Internet access, training, email, secure data back-up, virus protection... and more.



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Franklin's EBookMan Scores an F

PDA

FIRST AN APOLOGY: In last December's *PC World*, I recommended Franklin Electronic Publishers' $229 **EBookMan EMB-911**, based on a viewing of a preproduction version. With its ambitious array of features (MP3 player, e-book reader, audio-book player, and PDA), it looked like an absolute winner. Now that I have tested a much-delayed shipping unit, however, I've found it to be an absolute loser.

EBookMan EMB-911

PRO: Having music player, PIM functions, and an e-book reader in one device is a great idea.

CON: To work, it has to be easy to use, and it isn't easy to use.

VALUE: The EBookMan is not worth it in its current iteration.

List price: $229

Franklin Electronic Publishers
800/266-5626
www.franklin.com/ebookman

For starters, installation is a nightmare. Unlike Palms and Pocket PCs, the EBookMan does not come with its proprietary operating system installed. You have to load a 1.6MB desktop application from a CD-ROM that, once installed, downloads and installs the device's OS—a 15-minute process if all goes well.

The interface of both the desktop software and the device, although spartan, is not intuitive. And currently, the EBookMan will sync only with Microsoft Outlook using a stripped-down version of Puma's IntelliSync that you can download with the desktop application. If you use any other PIM, you're out of luck.

AMBITIOUS: The EBookMan PDA/e-book reader/MP3 player.

Other flaws: The device's processor operates at glacial speed. For example, loading an MP3 file and then converting it to the EBookMan's audio format took 7 minutes—for a 3.5-minute song. Try to load an e-book and while you wait, you might be able to finish its paper counterpart. And battery life was short. Between long synchronization and download times, MP3 listening, and e-book reading, the two AA batteries that power the device were drained after only a couple hours of use.

Although the touch screen measures a generous 3 by 3.25 inches, it's difficult to read in many ambient light conditions, and its backlighting is so dim that you have to be in a completely darkened room to make any use of it.

Franklin has the right idea about packing robust functionality into a tiny, low-priced machine. Now the company just has to do it right.

—Michael S. Lasky

PDA Directions a Snap(-on) With a GPS Module

GPS MODULE

SEEKING THE nearest Krispy Kreme doughnut shop for your early morning sugar fix? Just attach GeoDiscovery's new **Geode GPS Module** to your Handspring Visor, and it can tell you where to find that bit of ambrosia, and the directions to get there.

My shipping version of the Geode was a tad bulky and relatively pricey at $289 (Nexian's Handy GPS is $150). However, GeoDiscovery provides much more than just the usual Palm OS–based maps and global positioning system locator that other mapping companies give you. Geode users can share the interesting locations they mark on their maps by uploading them to a section of the company's Web site called GeoExchange for others to download. Unusual features also include a built-in digital compass and two MultiMediaCard slots for storing map data or any other Handspring files. (A 64MB MultiMediaCard costs about $100.)

SWAP location data, using a Geode GPS Module.

GeoDiscovery's mapping software, GeoView Mobile, is included on a CD—it's also available as a free download—and requires Palm OS 3.1 or higher. I found it fairly easy to use, and once I learned the tricks, I had good control over how much map data my little PDA screen displayed.

GeoDiscovery has a fun, if limited, collection of free maps and offers more-extensive city and national park guides at $5 each. But the most interesting map information may be from the other GeoExchange users.

Viewing maps on a PDA's tiny screen can be frustrating, and GPS coverage is sometimes spotty, but if you want a GPS on your PDA, GeoDiscovery is worth considering.

—Tracey Capen ▶

Geode GPS Module

PRO: GPS with built-in digital compass; data sharing with other users.

CON: Pricey; controlling data display is tricky at first.

VALUE: Uncommon features for a GPS add-on make this a good candidate to add to your Handspring module collection.

List price: $289

GeoDiscovery
888/206-6444
www.geodiscovery.com

A Simple Web-Enabled Phone

CELL PHONE

SOMETIMES, simpler is better. That's true for the $199 **Audiovox CDM-135XL**, a sleek, stylish Web-enabled wireless phone that's a snap to master.

This Audiovox, with its 4.9-by-1.8-by-0.7-inch single-piece design, weighs in at about 4 ounces. The shipping unit I tested offered a crisp, backlit, five-line display, and the big, centrally mounted navigation button let me sail through the menus and options.

I used the integrated, one-touch Web browser to send and receive e-mail using my Hotmail account. Hitting the dedicated 'Web' key let me quickly access the Phone.com browser and navigate to MSN's WAP-enabled site, which provided access to Hotmail. I needed to enter my username and password only once—and the phone then stored the data.

In my tests, the CDM-135XL earpiece transmitted a bit more sibilance than other phones I've used. I was able to squeeze in 150 minutes of digital talk per charge of the standard lithium battery—slightly shorter than Audiovox's claim of 180 minutes. A tabletop recharger is included, as are such features as dual-mode operation (800-MHz CDMA and analog), a ten-number call history, caller ID logs, and a 100-name phone book that allows you to enter phone and e-mail contact information under one heading.

THE CDM-135XL cell phone from Audiovox.

Entering data is easy with Tegic's T9 predictive text-input system, which accesses a built-in vocabulary list to guess the word that you're spelling—a handy feature that speeds up the entry of e-mail text and calendar schedules.

The Audiovox CDM-135XL's elegant design makes accessing the Web by cell phone easier than ever.

—Keith Kirkpatrick ▶

Audiovox CDM-135XL

PRO: Stylish design, easy to use, simple feature navigation.
CON: Occasional sound distortion.
VALUE: A simple, good-looking wireless phone with Web access.
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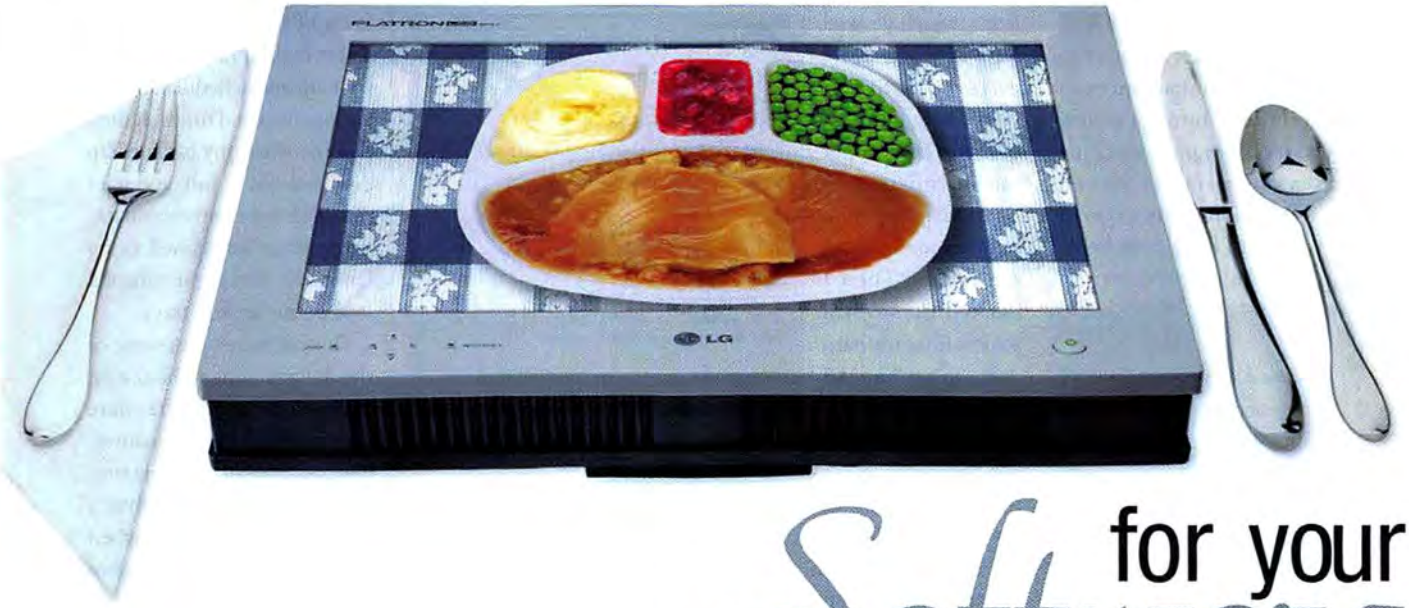

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Iomega QuikSync 3 Backup: Set It, Forget It

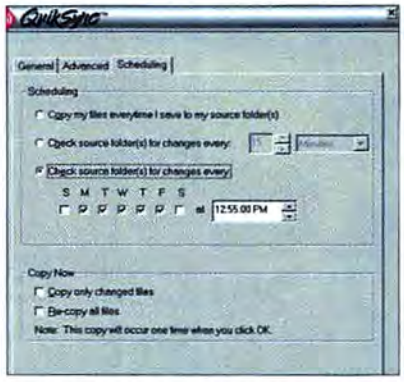
BACKUP SOFTWARE

JUST TOO DARNED busy to back up those important computer files? Iomega's new **QuikSync 3** program instantly saves your data to a second drive, so you're always covered if your hard drive goes belly-up. And unlike previous versions, which worked only with Iomega's drives, QuikSync 3 works with all types of drives from other manufacturers.

QuikSync 3

PRO: Simple, effective, fast backups.
CON: Freeware can do the basics.
VALUE: Worth the money for its power and simplicity.
List price: $20
Iomega
888/446-6342
www.iomega.com

I installed my shipping version in about 5 minutes. Then I backed up several folders from my hard drive to my 100MB Zip drive. After that, each time I saved a file to one of those hard-drive folders, QuikSync 3 saved the file to my Zip, too.



IOMEGA's QUIKSYNC 3 software easily lets you schedule regular data backups.

The software's clean, simple control panel offers backup amenities aplenty. When you change a file, you can either overwrite the old file on the backup drive or create a new one—useful for tracking revisions of a document. You can specify the number of revisions to retain—if any—before the oldest is deleted in favor of the newest. You can select certain file types *not* to back up and schedule specific backup days and times. It notified me when my backup Zip disk was nearly full, and it let me disable the intrusive backup progress bar, as well as the QuikSync icon (lightening the load on my system tray).

This software takes some of the hassle out of backups. While you can find freeware utilities with similar features, few could possibly be this simple to use. At $20, QuikSync 3 is a bargain—especially when compared to the high price of losing precious data.

—*Tom Mainelli* ■

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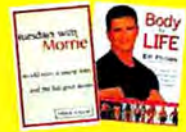

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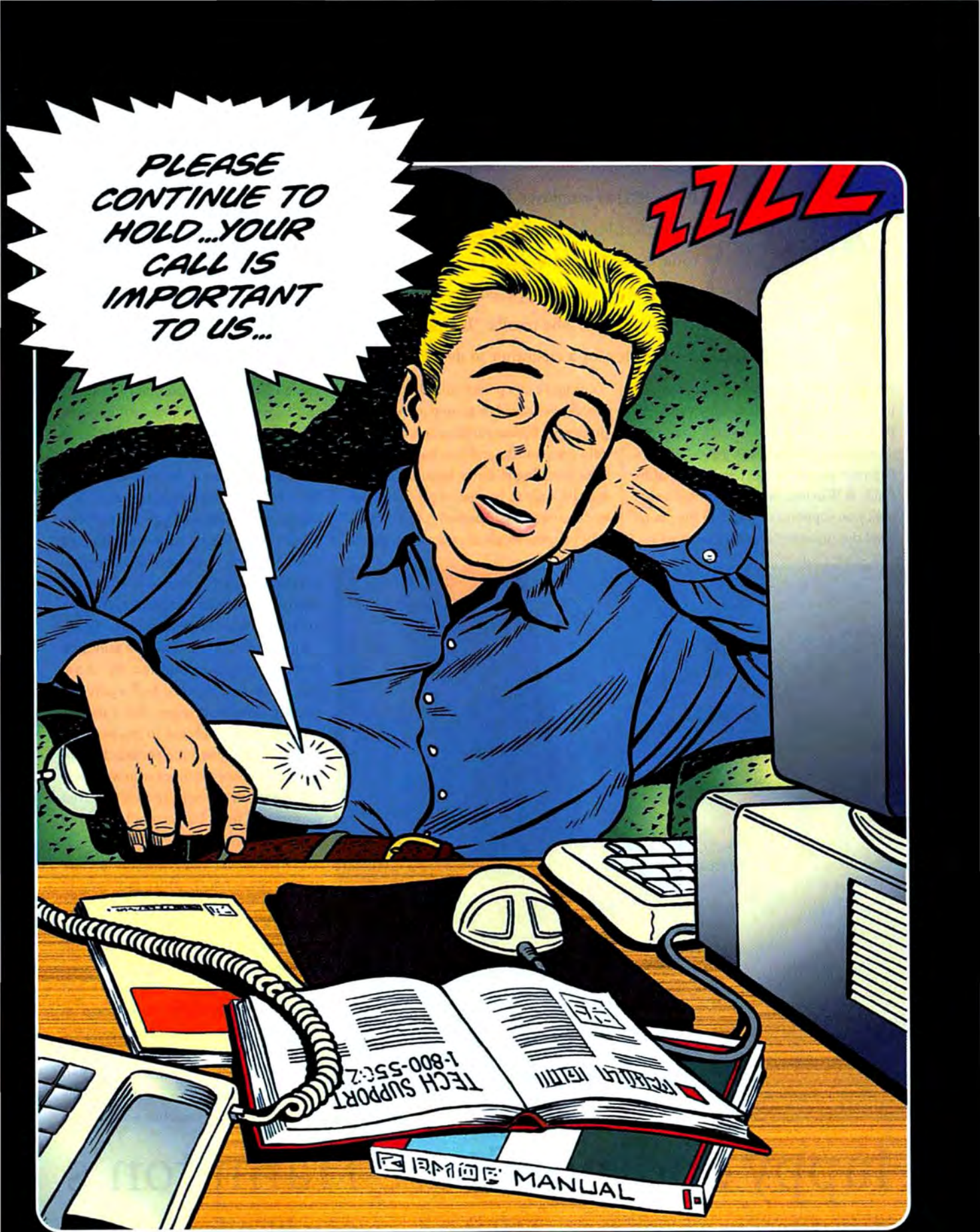
ARRIVE SAFELY

Get the HELP you need

Tired of bad tech support? Here's how to get better service, even if your vendor fails you.

BY JEFF BERTOLUCCI



ILLUSTRATIONS BY MARK ZINGARELLI

AS TECHNICAL SUPPORT representative for an Internet service provider, Virginia Gudgel of Sacramento, California, easily handled countless phone calls with cool, professional composure.

But when her employer, MCI Internet, laid out stringent rules for handling customer support calls, even the unflappable Gudgel was taken aback. "We were supposed to get calls done in 5 minutes," she recalls. "It already takes 2 minutes for a customer to describe what's wrong. If technicians are trying to get a person off the phone so they can keep their call volume down, well, that's not doing the customer any good." (MCI's Internet business was later acquired by Cable & Wireless, which instituted a new policy on support calls: Stay on the phone until the customer's issue is resolved.)

Gudgel's story may sound familiar if you've ever called tech support. Your PC, printer, or Internet connection unexpectedly goes south, and you waste half an hour listening to Barry Manilow's greatest hits, only to be rushed off the phone by a tech who hasn't solved your problem.

In extreme cases, it may take hours to reach a living, breathing customer support rep. Laurie Gibb, an information technology manager from Virginia, waited on hold repeatedly, sometimes for as long as 2 hours, trying to get Dell's tech support reps to troubleshoot her PC's hard drive. She phoned Dell ten times—and spoke with a different person during each call—before her issue was resolved. Dell spokesperson Anne Miano says, "two-hour waits usually don't happen; [the average hold time is] much shorter."

Service nightmares like Gibb's make it seem as if technical support is getting worse. That's not quite the case, according to historical data from our Reliability and Service surveys, based on periodic polls of approximately 10,000 *PC World* readers over several years. Our readers' responses to many of the questions about their tech support experiences didn't change much between 1998 and last year.

Still, PC vendors' support teams are clearly slipping in some areas. The most significant is in the number of customers who never obtained a satisfactory solution to their computer problems. In 1998, 6.6 percent of home PC users said their problem was never resolved. By 2000, that figure had climbed to 8.3 percent. Among notebook users, the number jumped from 5 percent to 7.9 percent. And over the same time period, the proportion of home PC users who were very satisfied with the service they received plummeted from 62 percent in 1998 to just 49 percent in 2000.

What about the support offered by other technology vendors? Since our surveys cover only PC companies, we placed three calls each to two ISPs, two printer manufacturers, and two software vendors to evaluate their services. Our best experiences were with printer makers HP and Lexmark, whose techs generally picked up the phone within 5 minutes and provided accurate answers to our questions. Our calls to ISPs EarthLink and Pacific Bell weren't as pleasing. Our shortest wait for an EarthLink representative was 12 min-

Steve Hampton, freelance desktop publisher

Happy ending: Steve Hampton's computer came back from HP fixed—and with a faster CPU.

PHOTOGRAPH: GARY CAMPBELL/LIAISON AGENCY

utes, and the longest dragged on for more than a half-hour. Pacific Bell's techs picked up sooner but weren't very helpful.

When it comes to software support, you'd better have your wallet handy. Both Microsoft and Symantec, maker of the popular Norton AntiVirus program, often charge for support. For Windows and Office, for example, Microsoft allows users two free calls or e-mail inquiries (or one of each) to tech support. After that, one query costs a stiff $35. Norton AntiVirus users can choose to pay either $30 per consultation or $3 per minute. If you correspond via e-mail, there's no charge. (Symantec promises to respond by the next business day.)

One of the best ways to avoid the high cost of fee-based technical support—or the long waits and occasional aggravation of free support—is to solve the problem yourself. We've assembled 50 tips, techniques, and resources that may provide solutions faster and easier than your vendor's support staff can (see "The Tech Support Survival Guide," starting below).

THE MONEY PIT

OF COURSE, many tech support tales have a happy ending. Last summer, Steve Hampton of Calgary, Alberta, returned his 667-MHz Celeron PC to HP for repair of a faulty hard drive. When his system was returned, he discovered a different CPU—a 750-MHz Pentium III. "I offered to pay the difference," he says, "but HP said 'No, it was our mistake, just keep it.'"

Spectacular service remains the exception, not the rule. The biggest reason: Quality service comes at a high price. It takes money—a lot of money—to staff call centers. A vendor spends anywhere from $10 to $15 to handle a typical tech support call, according to Giga Information Group customer relationship management analyst Erin Kinikin. So from a vendor's perspective, phone support is a money pit. "It [can cost] millions of dollars to build a call center, and companies have to find people to answer the phones," says International Data Corporation software support and services analyst Ana Volpi. ▶

50 Problem-Solving Tips

The Tech Support Survival Guide

OKAY, SO GREAT TECH SUPPORT isn't as common as pigeons in Manhattan. Maybe it's even an endangered species. What can you do about it? Plenty. Read on to learn our strategies for getting answers from technology vendors—and for doing your own support, including simple fixes for common computer glitches and reliable sources of top-notch troubleshooting advice.

10 Things to Do Before, During, and After a Tech Support Call

[1] Double-check the obvious stuff: The computer is plugged in, right? And all its cables are firmly connected? (Don't laugh. Many technical support calls result from problems as elementary as these.)

[2] Flip open the product manual: Then search the company's Web site for troubleshooting tips. If you find what you need, it could save you 30 minutes' tenancy in On-Hold Hell.

[3] Ask a newsgroup: Lots of savvy, helpful users frequent Usenet's discussion groups on PC hardware and other topics. You can post questions with a newsgroup reader (one's built into Outlook Express) or through a Web-based service such as Newsranger.com.

[4] Dig out the reference numbers: Before you call technical support, find and record the product's model number and serial number. A support technician will probably ask you for this information.

[5] Write down every error message: Did the message mention kpmon32.dll or kpsys32.dll? The technician needs that exact information. Keep a pen and some paper beside your PC, so when error messages pop up, you'll be ready to jot them down.

[6] Have the misbehaving product handy: Call tech support from the vicinity of the problem equipment. You can describe the difficulty most clearly that way.

[7] Stay cool and collected: Yes, your PC (or printer or PDA) is broken. Yes, you hate life. But don't take it out on humble technicians. Be polite, and you'll get better assistance.

[8] Keep a log: Write down essential information about your contacts with tech support and customer service—when you called, whom you spoke with, and what happened. You'll need these details if you have to escalate a complaint or take it to a third party such as the Better Business Bureau.

[9] Don't hesitate to escalate when necessary: If the support rep can't fix what's wrong, ask to speak to a manager. And don't stop trying—the chances are somebody can help.

[10] Don't give up: If you're still dissatisfied after repeated phone and e-mail contacts, you may need to write a letter to the company. Or consider registering a complaint with a third-party organization (for details, see "When You Just Can't Take It Anymore," page 95).

Self-Help for Desktops and Notebooks

5 QUICK FIXES

[1] Baffling hardware problems may indicate a virus infection. If you aren't running a virus scanner, head to Trend Micro's HouseCall (housecall.antivirus.com), a free Web-based service that detects and removes viruses.

[2] You installed new hardware, and suddenly a component stopped working. Check if cables inside your PC are plugged in and cards are firmly seated.

[3] Your PC crashed, so you pressed the power button. Nothing happened. Press it again, keeping it depressed for at least 20 seconds. Some PCs have software-driven power buttons that may fail if Windows crashes.

[4] If your laptop screen ▶

These days, few PC makers have money to spare. Last year, the average price for a system in the United States was $909, just over half the $1728 average in 1996, according to market research firm PC Data. Fewer consumers are buying, even at those prices. Naturally, vendors are scrambling to cut costs, including laying off their workforce, to stay competitive. "If you're not making much on the machine, every service call takes away from the profit margin," says Giga Information Group hardware analyst Rob Enderle.

Customer support is tricky to manage, too, says Giga analyst Kinikin. Staff turnover is high, and telecommunications systems are expensive to set up. As a result, many high-tech companies find it cheaper and easier to hire third-party contractors to handle their support operations.

But contract-based tech support can create a new set of headaches for customers. Third-party tech reps may have limited knowledge of the product brands that they field queries about. According to Kinikin, they may have minimal access to a vendor's bug fixes and advanced technical support. By the same token, a manufacturer's lack of direct involvement in the support process may slow its response to and correction of product flaws. "When something goes wrong, it often takes vendors a long time to notice and to react to it, in part because they aren't on the front line taking the [support] calls," says Kinikin.

Ted Cwiok is vice president of corporate technology at Cincinnati-based Convergys, which provides customer support for AT&T Wireless, Compaq, and other companies. He observes that the quality of third-party support often depends on the service level vendors are willing to pay for. "If they want 90 percent of support calls answered within 1 minute, we'll hire the staff to make that happen," Cwiok says.

HIGH-TECH SWEATSHOPS?

WHEN FORCED to seek support, you hope that whoever handles your question will be a technical guru, well-versed in your problematic hardware or software. In too

50 Problem-Solving Tips

goes black, make sure that an errant keystroke didn't put the display into external-monitor mode. Press the key that switches display modes a few times (it's usually a function key) and see if things return to normal.

[5] Your notebook's dead, but you could've sworn you recharged the battery before you left home. Make sure the battery, CD-ROM drive, and other removable components are firmly seated. They may have jarred loose in transit.

5 GREAT RESOURCES

[1] Pull into PC Pitstop (www.pcpitstop.com) for a free suite of hardware diagnostics, including disk health checkups, speed benchmarks, and more. The site also lists troubleshooting advice for hardware snafus.

[2] Tom's Hardware Guide (www.tomshardware.com) offers hard-core techie help on topics such as CPUs, RAM, and graphics cards. Message forums let you solicit help from site visitors.

[3] Startdisk's Ultimate Boot Disk (www.startdisk.com), a free alternative to Windows' standard boot disk, has built-in troubleshooting features to help you recover from hardware disasters.

[4] Want a comprehensive PC guide at your fingertips? Invest $50 in Scott Mueller's *Upgrading and Repairing PCs* (Que, 2000). With 1600-plus pages of clear advice and diagrams, plus a CD-ROM full of videos, it's a hardware honcho's must-have.

[5] Got notebook woes? Try Ojatex's Laptop Tips (members.aol.com/ojatex), which covers everything from ancient 66-MHz portables to current speedsters.

Self-Help for Windows

5 QUICK FIXES

[1] Regular disk maintenance can prevent Windows disasters. Develop a long-term relationship with system tools such as Scandisk, which detects and repairs disk errors, and Disk Defragmenter, which rearranges files and disk space to enable programs to run faster.

[2] Windows Me's System Restore allows you to roll back your PC to a happier time—like when it ran correctly. Don't have Me? The $40 GoBack program from Roxio (www.roxio.com) does the same thing, only better.

[3] If Windows is hobbled by mysterious slowdowns, crashes, or both, make sure you're not low on hard-drive space. For safety's sake, keep at least 200MB of free space on your primary drive at all times.

[4] Other crashes stem from overaggressive graphics acceleration. To fix this problem, click *Start•Settings•Control Panel*, and then choose *System*. Click the *Performance* tab, followed by the *Graphics* button. Move the Hardware acceleration slider closer to None, click *OK*, and reboot. Experiment until you find the maximum acceleration that doesn't produce crashes.

[5] Windows' Safe Mode was designed to help you fix problems by loading only essential drivers. But Windows doesn't always enter Safe Mode automatically when it should. To force it into Safe Mode, reboot your PC while holding down the **<Ctrl>** key; then choose *Safe Mode* from the Startup Menu.

5 GREAT RESOURCES

[1] Windows Update, Microsoft's Web-based tool for driver and system file upgrades, gives you an easy way to keep your OS up-to-date. Click the *Start* button and look for Windows Update near the top of the menu, or go to www.windowsupdate.com.

[2] Visit Microsoft's Knowledge Base (www.support.microsoft.com) for more than 500,000 articles on known bugs that afflict various Windows versions.

[3] Trying to hunt down a driver? WinDrivers.com is a good place to start. You'll find links to vendor sites (where you can download drivers) and an abundance of support information on Windows.

[4] Every Windows user should own a thorough hard-copy guide to the operating system. For Windows 98 users, Paul McFedries's $35 *Windows 98 Unleashed* (Sams, 1998) is one of the best.

[5] FixWindows.com uses neat flowchart-style diagrams to step you through various common Windows troubleshooting tasks. The site's creators also field questions from visitors.

many cases, that's wishful thinking. And a look at the working conditions in a tech support operation reveals why. Tech support is a stressful, demanding job. The pay is low and attrition is high.

"It's a high-tech sweatshop," says a former PC support employee, who asked us not to reveal his identity. "I got ten calls back-to-back as my supervisor screamed at me to take more. I had to take as many calls as possible, not necessarily solve the problem. Even a saint would crack under that kind of pressure."

Do call centers really operate like sweatshops? Convergys's Cwiok says "probably in some cases and not in others. It really depends on the service level the [vendor] wants and how much they can afford."

Customer support isn't the path to riches, either. A job posting for a tech support rep on the Convergys Web site indicates that starting pay is $8.50 an hour. According to Salary.com, the national median salary for an entry-level customer service representative barely exceeds $25,000.

The combination of tedious work and low wages prompts high employee turnover. "A lot of companies that provide service and support are experiencing staffing problems," says Giga analyst Enderle. "There's a shortage of people who can provide adequate technical support."

That observation won't surprise people who've used tech support. In our June 2000 Reliability and Service survey, fewer than 40 percent of respondents rated the knowledge of the reps who helped them as Excellent—a slight decline from the percentage in our December 1998 data.

How do you get good support from an inexperienced technician? Have your PC's model number, OS, and configuration information ready. Keep detailed notes on such things as the exact wording of error messages and the applications you were using when the problem struck.

ENTER THE NET

THE TROUBLE and expense of maintaining telephone support have encouraged many vendors to steer customers ▶

Self-Help for Internet Access

5 QUICK FIXES

[1] If your internal modem won't respond, reboot your PC and try again. This is a common cure for hardware lockups. (If you have an external modem, simply flip its switch off and on.)

[2] Delete your voice-mail messages before dialing into the Internet. Some voice-mail systems place a tone on the line to indicate that you have messages, and this tone may interfere with the proper operation of your modem.

[3] Some ISP passwords are case-sensitive. If you keep getting a 'Password Denied' error message when you try to log on, make sure the <Caps Lock> button on your keyboard is disabled.

[4] Still can't connect? Call your ISP's dial-up access number with your regular phone, and listen for modem tones. If you do not hear any, try calling an alternate dial-up number.

[5] Broadband glitches often vanish if you unplug your DSL or cable modem from the power outlet, wait for a minute, and then reconnect the modem and reboot your PC.

5 GREAT RESOURCES

[1] For a treasure trove of modem advice and data, head to ModemHelp.org. The site covers dial-up, DSL, and cable, and its message board lets users share troubleshooting tactics.

[2] Curt's High-Speed Modem Page (www.teleport.com/~curt/modems.html) offers nuts-and-bolts advice for dial-up modem users, including strategies for boosting connection speed.

[3] DSL Reports (www.dslreports.com) isn't just for DSL users—it covers high-speed Internet access in general. Stop by for nifty free diagnostics that test your connection's speed and security from within your browser.

[4] Download Kissco's NetMonitor (www.modemwizard.com), a slick little free utility that monitors your Net connection's performance. (The site is also home to Modem Wizard, a more advanced utility that costs $25.)

[5] Even if you're just thinking about getting a cable modem, visit CableModemHelp (www.cablemodemhelp.com). Among its useful features are news, troubleshooting tips, and user ratings of service providers.

Self-Help for Printers and Other Peripherals

5 QUICK FIXES

[1] Can't print? Go to *Start•Settings•Printers*, and make sure the printer you're using is selected. If not, right-click that printer's icon and pick *Set as Default*.

[2] Store printer paper in its packaging so it doesn't dry out or absorb moisture from the air—either can cause printer jams.

[3] Your ink jet cartridge won't work? Remove it and take any protective tape off the printhead. Then make sure that the cartridge is firmly seated.

[4] PC freezes during printer software setup? Another program may be interfering. Press **<Ctrl>-<Alt>-<Delete>** to get the Close Program window. Click *End Task* for every program except Explorer and Systray. Close the window and install the software.

[5] If your new scanner or digital camera seems to produce speckled images, your display settings may be too low. Right-click the Windows desktop and choose *Properties*. Go to the Settings tab, and set the color palette to 16- or 24-bit color.

5 GREAT RESOURCES

[1] Visit About.com's Peripherals page (peripherals.about.com) for information on PC add-ons.

[2] For helpful printer tips, go to CPPFAQ.com, home to the comp.periphs.printers newsgroup's FAQs page.

[3] ScanTips.com, Wayne Fulton's site, has scanner tricks that boost image quality and advice on how to get help from vendors.

[4] Consult PalmGear H.Q.'s Palm FAQ (www.palmgear.com/faq) for help with Palm troubles, plus tips, rumors, and more.

[5] Solve your USB and serial woes with the guides at John's Solutions (home.earthlink.net/~johnsheldon/windowspc.html).

away from the phone and toward the Internet. Web-based chat between a support rep and a customer costs the vendor half as much as phone support—between $5 and $7 per incident, according to analyst Kinikin—because a rep can handle multiple requests at once. And self-service help on a vendor's Web site, in the form of FAQs and troubleshooting tips, is even more cost-efficient for companies—a piddling $1 or less per incident. For this type of help, a company requires only enough staff to maintain its site.

But while Web-based support may save PC companies money, it's been a disappointment to many users. In our Reliability and Service surveys, between 65 and 70 percent of respondents who have tried to use e-mail-based support say the answers they received didn't solve their problems. Those numbers didn't improve between our 1998 and 2000 surveys, despite PC vendors' assurances that they were pouring resources into online support.

Beyond the low cost of Web support, vendors say, online help makes sense because many PC problems involve software, not hardware. Users can easily fix them by downloading and installing a new driver or software patch from the Web. IBM's customer support handles close to 5 million calls a year, 85 percent of which involve nonhardware issues, according to Dan Ransdell, IBM vice president of worldwide service and support.

THE BLAME GAME

JUDGING FROM the letters we receive at *PC World* from users of PC-related products, buck passing between hardware and software companies is all too common, particularly in connection with the crash-prone Windows 95, 98, and Me operating systems. Consider the story of David Maris of Plainview, New York. He bought a Gateway laptop with Windows Me preinstalled, only to discover a conflict between AOL 5, the bundled Lucent modem, and Windows. "I've talked to AOL, Gateway, Microsoft—and even once to Lucent—techs repeatedly, and they all point the finger at the other," Maris laments. After weeks of back and forth, Gateway eventually replaced his notebook. "I still don't know what caused the problem in my old laptop," says Maris. "I ▶

Get Expert Advice on the Web

IF YOU'VE concluded that your vendor can't help you, consider a site that provides free or fee-based assistance from computer experts.

We evaluated five such Web sites—Askdrtech.com, AskMe.com, Exp.com, Expertcity.com, and PCsupport.com. Each offers a quick, efficient alternative to lousy vendor support. But nearly all will cost you. Fees vary from site to site—some experts charge for each problem; others charge by the hour. Sound technical advice, an easy-to-use chat tool, and reasonable fees make Expertcity our top choice.

If you use tech support frequently, a site such as Askdrtech.com or PCsupport.com that charges a yearly membership fee may suit you. It may also be a good choice for a small business that doesn't have an IS department yet requires regular technical assistance. On the other hand, if you need only occasional tech advice, choose a site whose experts charge per problem. If the matter isn't urgent, AskMe.com is a good option because advice there is free.

How do these sites work exactly? At Askdrtech, AskMe, and Exp, you simply register, specify your topic, and find a list of experts. Read the experts' profiles, their ratings from users, and their answers to past questions. Choose an expert, and ask that person your question. You can get your answer via e-mail or (in some cases) by phone. At both Expertcity and PCsupport, you sign up, post your query, and then talk to a technician through live chat, e-mail, or phone. Expertcity and PCsupport also offer remote diagnosis, where users allow technicians to access their PC remotely to troubleshoot and, with luck, fix the problem.

I visited each site several times, asking for advice on three problems related to printers, viruses, and Windows. Most of the tips were helpful; only a couple didn't work out. Response time depended on the site's communication method. Live chat gets you instant help: You can read the step-by-step instructions immediately rather than waiting for e-mail or a phone call. Responses via phone usually came within an hour. E-mail replies took anywhere from 3 to 24 hours, though some experts say that they may take up to four days to answer.

The value of these sites depends on the user and the problem. If your issue is unresolved after a response, you can at least try to get a refund. —Grace Aquino

FOR REVIEWS of the five sites here, go to www.pcworld.com/features/june2001/support.

EXPERT SITE	Cost	Support via e-mail/ phone/live chat/ remote diagnosis	Users rate experts	Comments
Askdrtech.com	$79 or $99 per year [1]	●/●/○/○	○	**PRO:** Immediate contact with reps; many self-help tips and how-to guides. **CON:** Lacks live chat.
AskMe.com	Free	●/○/○/○	●	**PRO:** Free advice; covers general-interest topics. **CON:** E-mail responses tend to be relatively slow.
Exp.com	Varies	●/●/●[2]/○	●	**PRO:** Easy-to-navigate advice files; many experts. **CON:** Most advisers respond via leisurely e-mail.
Expertcity.com	Varies	●/●/●/●	●	**PRO:** Easy-to-use chat tool; knowledgeable advisers. **CON:** Fees can add up if problem persists.
PCsupport.com	$150 per year	●/●/●/●	○	**PRO:** Free PC maintenance tools; helpful live-chat assistance. **CON:** Pricey for one-on-one help.

Best Bet ● Yes ○ No

[1] Membership $79; $99 Premier membership includes PC insurance.

[2] Only a few experts offer live chat.

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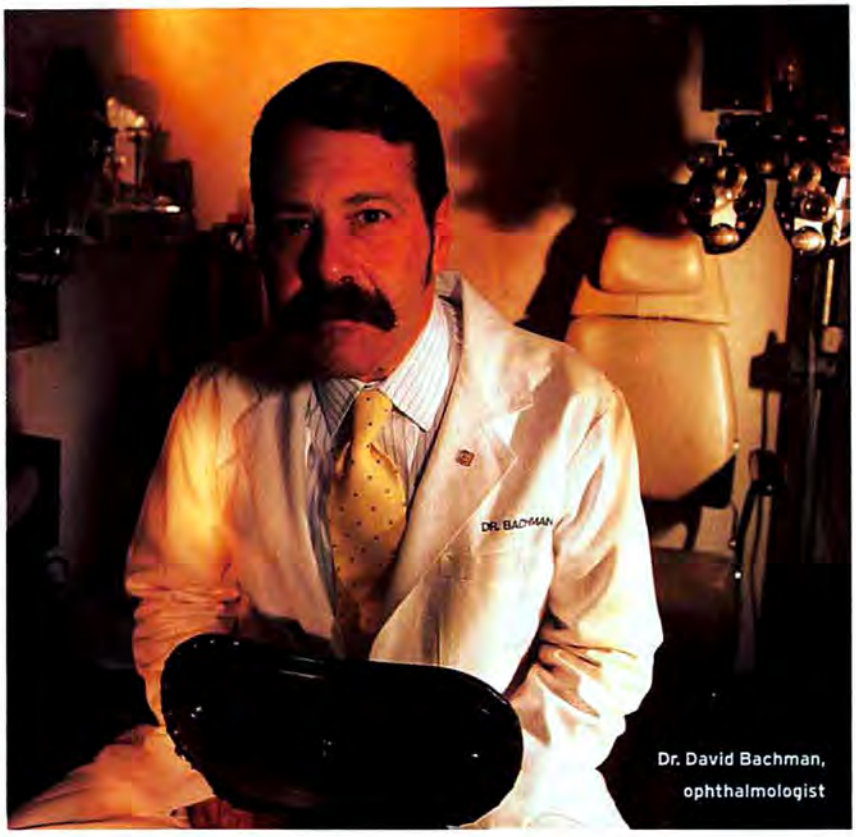
hope I never have to go through that again."

Acknowledging this blame game, some PC makers say they encourage reps to answer any questions they can, even those involving products the company isn't obligated to support. "We now tell our techs, if you have the experience and the knowledge, share it," says Jim Hobby, Gateway's vice president of consumer client care. Yet in Maris's experience, that kind of service didn't happen.

Anytime you encounter a Windows-related glitch, turn to your PC vendor first for assistance. If your copy of Windows came preinstalled on your machine, the PC vendor is contractually obligated to support it, according to Microsoft. But if you're running a version of Windows that you bought elsewhere (at a retail store, for instance), you'll have to contact Microsoft for technical support.

Microsoft promises that it will improve the way it integrates help features into forthcoming Windows software. The latest version of Media Player, for example, features a Web Help button to clarify error messages that occur within the program. When you click the button, Windows automatically launches your default browser and loads Microsoft's Knowledge Base article about the error message you encountered.



Dr. David Bachman, ophthalmologist

David Bachman spent one hour

online with a Dell rep, who couldn't solve his PC's woes.

REMOTE CONTROL INCLUDED

FOR PC MANUFACTURERS, the costliest form of support is an on-site service call. Anything they can do to avoid dispatching that truck saves them money. So some vendors have adopted the maxim, computer, heal thyself. Some Gateway systems, for example, come with Adaptec's GoBack utility, which allows you to reset a misbehaving PC to a time when it worked properly. (Windows Me has a similar but more primitive feature.)

More sophisticated still is the remote-control technology that Dell, Gateway, IBM and other manufacturers now use. This technology typically allows a technician to access your system over an Internet connection and obtain information about your PC such as its OS and its hardware configuration. In many cases, remote access allows a support rep to run various diagnostic tests on a PC and download patches or updated drivers that may solve a software problem. Where's the user during the whole process? Usually at the keyboard, chatting interactively with the technician.

Gateway's Hobby says his company's Co-Pilot remote diagnostic tool improves on conventional phone support. "With tech support calls, you're looking for a needle in a haystack," he says. "But with Co-Pilot, the tech can look into the customer's system, check different settings, and fix the PC remotely."

Similarly, IBM PCs include a remote diagnostic tool from Support.com that allows technicians (with your permission) to scan your system and find the culprit.

Dell's Resolution Assistant, an online tech support tool represents yet another approach. "We're trying to say that Web support is an option for users," says Dell electronic support group manager Romi Lessig. "Just give it a try."

Dr. David Bachman of Bethesda, Maryland, did. When he couldn't use the Windows 98 image preview feature on his Dell Dimension desktop, he tried Resolution Assistant. But he came away from the experience disappointed.

A Dell technician told Bachman to make several changes to his Windows configuration, reboot, and return to Resolution Assistant. He followed the instructions carefully. But when he returned to Dell's site, the tech was gone. He tried Resolution Assistant again the next morning, this time with a different support rep. After an hour online, "she couldn't resolve the problem, either," says Bachman. Finally, he phoned Microsoft tech support, which fixed the glitch.

PHOTOGRAPH: MANUELLO PAGANELLI

FAREWELL, PHONE SUPPORT?

IN MANY INSTANCES, remote diagnostic tools do their jobs perfectly. But as Bachman's story illustrates, some people and some problems require phone support from a live human being.

Your preference for phone-based help or online assistance may depend on your level of technical expertise. If you're an experienced and tech-savvy PC user, you may be comfortable with self-help tools. "An IT manager who needs a new driver doesn't want to wait on hold for 30 minutes for something he or she could find in 5 minutes on the Web," says IDC's Volpi.

"It's analogous to an ATM," says Gartner Group principal analyst Charles Smulders. "I prefer to get cash myself rather than stand in line at a bank."

Sometimes, though, Web-based tools don't work. Dan Hagman, a former Gateway Country Store manager in Montclair, California, says Gateway's site often had outdated information on orders posted. "People called the store saying, 'I just checked the Web site and my order hasn't even gone to production.' But my database system in the store would show that their PC had already been shipped."

Gateway spokesperson Cory Baker says the order status system at Gateway.com is updated twice daily. But if a product ships after the second daily online update, the customer's revised order status won't be updated until the following day.

The bottom line? "If the Web is a more effective medium, more people will choose it," Microsoft support technology director Kurt Samuelson says. Of course, some people will always prefer to talk. And some problems prevent users from accessing the Internet. After all, if you can't get online, Web tools are worthless.

Oh, there's one other reason some vendors aren't rushing to do away with phone support: Once they get you on the phone, they can take the opportunity to sell you something. "If a user calls tech support because they need more RAM to run a game, [the vendor] can sell it on the spot," says IBM's Ransdell. Ah, capitalism!

Jeff Bertolucci is a freelance writer based in Denver. Grace Aquino is a PC World *associate editor. Kristina Blachere contributed research to this article.* ■

When You Just Can't Take It Anymore

YOU HAVE DONE everything you were supposed to do, given the technicians all the information they've asked for, and followed their instructions to the letter, but the product still doesn't work. And the company refuses to provide further help. Here's how to vent—and make sure it does some good.

[1] When repeated phone contact with a vendor doesn't resolve your gripe, send a letter—by snail mail, not e-mail—to the company's CEO. True, the big boss may not read it, but an assistant probably will. Outline your case succinctly and politely, and you just might get results.

[2] Still stuck? Register a complaint with a local, state, or federal consumer affairs agency. Consumerworld.org offers a comprehensive list of these agencies, complete with links to their Web sites.

[3] The Federal Trade Commission's Consumer.gov site offers dozens of helpful tips for resolving complaints, along with a link to the FTC's online complaint form.

[4] Contact your local Better Business Bureau (www.bbb.org) to file a complaint about your experience with any company. The BBB may be able to help resolve the issue—and it will factor your complaint into its overall rating for the vendor.

[5] Web Guardian (www.webguardian.com) is a consumer rights site designed specifically to protect you in the world of virtual shopping malls. You can file a complaint here about an ISP or an online vendor.

[6] Check the vibes at PlanetFeedback (www.planetfeedback.com), a consumer advocacy Web site that posts people's comments about companies. If you submit a complaint yourself, PlanetFeedback will forward your letter directly to the company.

[7] Another site that posts the grievances of unhappy consumers is Complaints.com. It covers everything from clothing to cruise lines, but tales of technology products and services gone wrong dominate the discussions.

[8] If you're dissatisfied with an online merchant or would like to recommend a stellar one, head to ResellerRatings.com. As its name indicates, you can rate your reseller and read reports by other customers, some of whom may have useful advice.

[9] For really serious disputes, log a complaint at the Federal Trade Commission's Web site (www.ftc.gov). The FTC won't resolve your specific problem, but consumer complaints help this government agency investigate fraud.

[10] If all else fails, you may be tempted to go to small claims court. But doing so can be expensive and exasperating—and you may have agreed to a user license that precludes you from suing. Legal-advice site Nolo (www.nolo.com) offers sound counsel on the subject. —Jeff Bertolucci

Laser
Printers
½ MILE

LONG-HAUL LASERS

The hardest-working device in your office? It's your printer, and we put 13 of the fastest new monochrome lasers to the test.

BY DAN LITTMAN

THOUGH NOT AS GLAMOROUS as the latest tiny PDA (or even a new color printer), that trusty, dust-covered black-and-white laser printer in the corner is the workhorse that keeps your organization going. But as your business expands, your workload can outgrow the printer that's served it faithfully. And if you haven't shopped for a new printer in a while, you'll find that monochrome laser printers aren't the dull plodders you expected: They're faster, print better, and have productivity-enhancing features and options that probably weren't available the last time you looked. ▶

PHOTO ILLUSTRATION BY MARC SIMON

When you start thinking about a new laser for your office, price is probably your first concern. Before you decide, though, also consider the size and needs of your office or workgroup.

Amount of traffic: Will the printer serve one person or ten? Do you usually print 100 pages a month or 1000? Once you have determined how much traffic your printer must handle, you'll be able to figure out which models are best suited to meet your needs—a fairly inexpensive unit such as our small-office Best Buy, the $249 Minolta-QMS PagePro 1100L, or a relatively full-featured printer like our corporate Best Buy, the $1299 Xerox DocuPrint N2125, whose paper-handling features can adapt to almost any office.

A printer's speed becomes more important as workgroups get larger. A printer can process complex files with lots of graphics or nonresident fonts much faster if it has adequate memory; if your workgroup produces graphics-rich documents and reports, buying a unit with extra memory could give you very cheap insurance against bottlenecks. Most workgroup printers can generate a regular status sheet that identifies the number of pages printed. Before you settle on a new printer, consider printing and dating several status sheets to obtain a rough idea of how much paper traffic your printer must handle.

Paper capacity: If you're part of a workgroup, consider how much paper you've used in the past. Do you run out every few days? Adding paper trays may do the trick, or you may want to get a higher-capacity printer, like the Lexmark Optra T614N, which can hold over 2800 sheets with optional trays in place. Or you might choose to reorganize your printer workgroups altogether: It may be cost-effective to divide your print workload by buying two slower, cheaper printers instead of one top-of-the-line machine.

Print quality: The business documents you send to people outside your organization must have a sharp, authoritative look, whereas your colleagues may not mind a few smudges on copies intended just for them. Either way, just about all the printers we tested produce clean, precise text that looks great on almost any business document. Gray-scale print quality, on the other hand, varies noticeably among the printers we compared. If you plan to use your monochrome laser for page-layout proofs or photos, pay close attention to graphics print quality.

Features: Flexibility separates today's printers from the old-timers. Laser printer makers are differentiating their products with timesaving standard features and options. Printing envelopes, for example, used to mean standing at the printer and hand-feeding each envelope—a time-waster that you can eliminate by using a mechanical envelope feeder, available on seven of the corporate printers we reviewed.

Laser printers that come with standard or optional hard drives can perform timesaving tricks as well. When printing financial reports or complex forms containing large bitmaps, you can decrease printing time by creating overlays—preprocessed images you store on the printer's hard drive to combine with smaller files that you send for each document.

And have you ever sent a confidential

MONOCHROME PRINTERS — FEATURES COMPARISON

	SMALL-OFFICE LASER	Street price (4/16/01)	Overall rating	Vendor's rated speed (ppm)	Tested speed for plain text/full-page graphics (ppm)	Print quality for text/graphics	Standard/maximum RAM (MB)	Maximum resolution (dpi)	Standard paper capacity (input/output)
1	Minolta-QMS PagePro 1100L 877/778-2687 www.minolta-qms.com	$249	84	10	8.6/4.7	Very good/Adequate	4/4	600 by 600	150/100
2	Brother HL-1240 800/276-7746 www.brother.com	$299	84	12	8.2/3.0	Very good/Good	2/2	600 by 600	250/150
3	IBM Infoprint 12 800/358-6661 www.ibm.com/printers	$399	83	12	9.5/3.1	Very good/Good	4/68	1200 by 1200	350/350
4	Samsung ML-6060 (NEW) 877/388-2567 www.samsungusa.com/printer	$369	80	12	9.7/3.1	Good/Adequate	4/68	1200 by 1200	650/100
5	Lexmark Optra E312 888/539-6275 www.lexmark.com	$399	79	10	7.9/0.7	Very good/Adequate	4/68	1200 by 1200	150/100
	CORPORATE LASER								
1	Xerox DocuPrint N2125 877/362-6567 www.xerox.com/officeprinting	$1299	85	21	11.7/3.7	Very good/Very good	32/192	1200 by 1200	650/500
2	IBM Infoprint 21 800/358-6661 www.ibm.com/printers	$1179	84	21	12.2/1.5	Very good/Good	32/256	1200 by 1200	650/500
3	HP LaserJet 4100n (NEW) 800/752-0900 www.hp.com	$1579	82	25	13.6/4.5	Excellent/Good	32/256	1200 by 1200	600/300
4	Brother HL-1670N (NEW) 800/276-7746 www.brother.com	$749	82	16	10.8/3.2	Very good/Very good	16/144	1200 by 1200	350/250
5	Samsung ML-7300N (NEW) 877/388-2567 www.samsungusa.com/printer	$1149	81	21	13.2/4.4	Very good/Good	16/144	1200 by 1200	600/250

Best Buy

HOW WE TEST The overall rating for monochrome laser printers is based on print quality (25 percent), price (25 percent), features (15 percent), ease of use (15 percent), speed (10 percent), and service and support (10 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center.

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BEST BUYS

SOHO Best Buy
Minolta-QMS PagePro 1100L

THE $249 PAGEPRO 1100L, below, ranks as the least expensive model to make the SOHO list. It produces clean text and prints graphics more speedily than most corporate lasers.

Corporate Best Buy
Xerox DocuPrint N2125

THE $1299 DOCUPRINT N2125, above, includes a high-capacity paper tray and options for increasing the printer's volume to 1750 sheets. Print quality and speed are good enough to satisfy busy offices.

PHOTOGRAPH: MARC SIMON

document to your workgroup's printer and gone to retrieve it, only to find that someone else had already walked off with it? A few models come with drivers that let you store a password to complete printing a document when you're standing at the printer. To learn more about password protection and other advanced features available on new printers, see "Tap the Power" on page 105.

We sought out state-of-the-art monochrome office lasers suitable for a variety of workgroups. The PC World Test Center benchmarked 13 new monochrome lasers, ranging from single-user printers to units that can serve large workgroups, and matched these against 16 previously tested models. Then we picked our 5 favorite lasers for the small-office environment and our top 5 corporate machines. Read on for individual reviews of these printers, and check our features comparison chart for buying information and more details. To see expanded charts listing the 10 best models in each class, plus full reviews of all the printers we tested, go to www.pcworld.com/reviews/june2001/lasers.

Maximum number of input trays	Maximum paper input capacity	Comments
2	650	The 1100L is very inexpensive and offers lightning-quick graphics printing. Standard paper tray holds only 150 pages, but you can add one optional paper tray. There is no USB port.
1	250	The HL-1240 is inexpensive and fast enough for most home-office printing needs. It offers only 2MB of RAM, and optional ethernet costs $299, so it works best as a single-user laser.
3	900	Speedy printing and a $205 ethernet option make this a good choice for small workgroups. Toner is expensive, however, and costs will add up if you do a lot of printing.
3	1200	Fast printing and a large main paper tray distinguish Samsung's new laser, and you can add another 550-sheet tray. Its print quality doesn't match most competitors', though.
1	150	The Optra E312 prints sharp, clean text quickly enough for a home office. Its biggest downside is the lack of paper options. The standard tray doesn't hold much, and you can't add trays.
4	1750	Detailed prints and lots of paper-handling features make the N2125 ideal for larger workgroups. With optional trays, it can hold up to 1750 sheets.
4	1750	Well-suited for large offices, the Infoprint 21 prints quickly and offers tons of options, including two additional trays, an envelope feeder, a duplexer, and a collator.
4	1600	HP offers an optional infrared port on top of its standard ethernet, so notebook users can print directly from their laptops. It also prints graphics speedily, but its price is a bit steep.
3	600	Built for small workgroups, Brother's inexpensive new corporate laser is reasonably fast and produces clean prints. Its options are limited, so it's best for smaller-volume printing.
3	1100	The ML-7300N holds a lot of paper, can expand to hold even more, and includes a duplexer. The control panel is easy to understand, and the backlit LCD makes it easy to read.

online For an extended *Top 10 Printers* chart, go to www.pcworld.com/reviews/june2001/lasers.

Small-Office Lasers

1) MINOLTA-QMS PAGEPRO 1100L

WHAT'S HOT: At a bargain price of $249, the Minolta-QMS PagePro 1100L costs less than any other laser printer on our chart. It keeps pace with the pack on text speed at 8.6 pages per minute, and its graphics speed of 4.7 ppm moves it far ahead of the competition. This unit does a great job of printing black, even text and lines (though the graphics are a bit dark and have a somewhat rough texture). A nice touch: The 1100L's paper tray folds tightly against the rest of the case, and the output tray folds down over the top, so when no paper is loaded, the unit can save lots of space by closing up like a turtle.

WHAT'S NOT: This printer's main drawback is its less-than-optimal graphics. In addition, the 1100L has a separate toner cartridge and imaging drum, and we discovered that getting them in and out of the case required a fair amount of muscle. The printer offers only a parallel-port connection—a hint that the 1100L may be based on an older design. The paper tray holds 150 sheets, and the auxiliary feed tray handles only a single sheet or envelope at a time. The unit that we tested seemed somewhat flimsy, with a wiggly feel and some loose parts.

WHAT ELSE: The 1100L is attractive and takes up minimal desk space, even when its paper trays are open to their full extent. Minolta sells a 500-sheet feeder, which fits neatly under the printer to retain its svelte profile, for a mere ▶

BROTHER HL-1240 IBM INFOPRINT 12

$149. The printer includes a rear exit for heavy stock, and Minolta-QMS sells a rear-exit paper tray for only $19 more.

BEST USE: The 1100L is an outstanding choice for any small workplace that has no need for a USB connection or for high-quality gray-scale graphics.

2) BROTHER HL-1240

WHAT'S HOT: Brother's practical HL-1240 has been a regular denizen of our *Top 10 Printers* list for over a year. And we think it's still among the best home-office laser printers out there. For $299 you get a quiet, simple system that delivers crisp, black text at a speed of better than 8 ppm. The unit also prints smooth gray-scale photos—something that few laser printers do particularly well—at 3 ppm. The HL-1240 is easy to set up and operate—for example, installing and removing the toner cartridge and clearing paper jams are a cinch—and the documentation on its CD-ROM includes videos that show how to perform tasks.

WHAT'S NOT: The printer comes with only 2MB of memory, which is not upgradable; that may be too little to handle complex print jobs. One other minor weak point: The auxiliary feeder doesn't have a paper support, so you must hand-feed envelopes into the printer.

WHAT ELSE: The HL-1240's paper tray holds only 250 sheets—not a serious drawback for a single user. And you'll probably be the only person using it: Brother sells a $299 external ethernet adapter for the HL-1240, but that's as expensive as the printer itself. (Brother's networked version of the HL-1240—the HL-1270N—costs only $200 more.)

BEST USE: This entry-level laser printer is a fast and efficient single-user model.

3) IBM INFOPRINT 12

WHAT'S HOT: Big Blue has adopted charcoal black as a signature case color for identifying its products, which makes the Infoprint 12 look about as cool and sophisticated as you can expect a plastic box to look. But your $399 buys more than cachet. The Infoprint 12 races through text at a stellar 9.5 ppm and handles graphics at 3.1 ppm. The IBM prints very sharp documents—text is dark and crisp, and straight narrow lines remain distinct. Gray-scale graphics are attractive, too, with gradual shading and good detail. You can easily switch the paper path to exit at the rear, which helps the printer avoid bending the media and reduces the risk of card stock wrinkling or labels peeling off partway through.

WHAT'S NOT: A couple of things about the Infoprint 12 annoyed us: Like most small printers, it has no LCD on its control panel to explain functions. Instead, several lights flash in complex ways to indicate various error conditions. You'll need to keep the brief, well-illustrated manual on hand to decipher them. And IBM charges $150 for a toner cartridge—more than any other vendor here asks for replacement SOHO-model cartridges.

WHAT ELSE: The Infoprint 12 holds 250 sheets of paper in its main tray and an additional 100 sheets in a fold-out auxiliary tray; you can add a 550-sheet feeder for $215. The printer is affordable for a home office and has the performance and capacity to serve a small workgroup, so you can use it on a network once you add a $205 ethernet interface.

BEST USE: Inexpensive enough for a no-frills home office and fast enough to serve small workgroups of five to ten people, this adaptable printer will work well in almost any small office.

4) SAMSUNG ML-6060

NEW **WHAT'S HOT:** The Samsung ML-6060 uses the same engine as Xerox's new DocuPrint P1210 (see our review of the latter at www.pcworld.com/reviews/june2001/xerox), but at $369 the Samsung costs $130 less, and its 550-sheet main paper tray holds more pages. The ML-6060 also has an auxiliary paper feed tray that accommodates 100 sheets, and you can add a second 550-sheet tray for $199. We clocked the ML-6060 at 9.7 ppm for text and 3.1 ppm for graphics—fast for a small-office printer.

WHAT'S NOT: Unlike most monochrome lasers, the ML-6060 produces merely acceptable (not excellent) text: Though clean and crisp, it's somewhat light; very small typefaces tend to fade away, and curves and serifs lose their sharpness.

SAMSUNG ML-6060

Gray-scale graphics look even worse, showing a pronounced dot pattern.

WHAT ELSE: Samsung labels the control panel's lights and buttons with intelligible words instead of esoteric icons, but you'll still need the manual to interpret some error codes. The ML-6060's large paper capacity may impel you to share it; an ethernet interface costs $179. ▶

PHOTOGRAPHS: MARC SIMON

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Technology Business Research Corporate IT Buying Behavior and Customer Satisfaction Study.
— 3rd Quarter 2000, December 14, 2000

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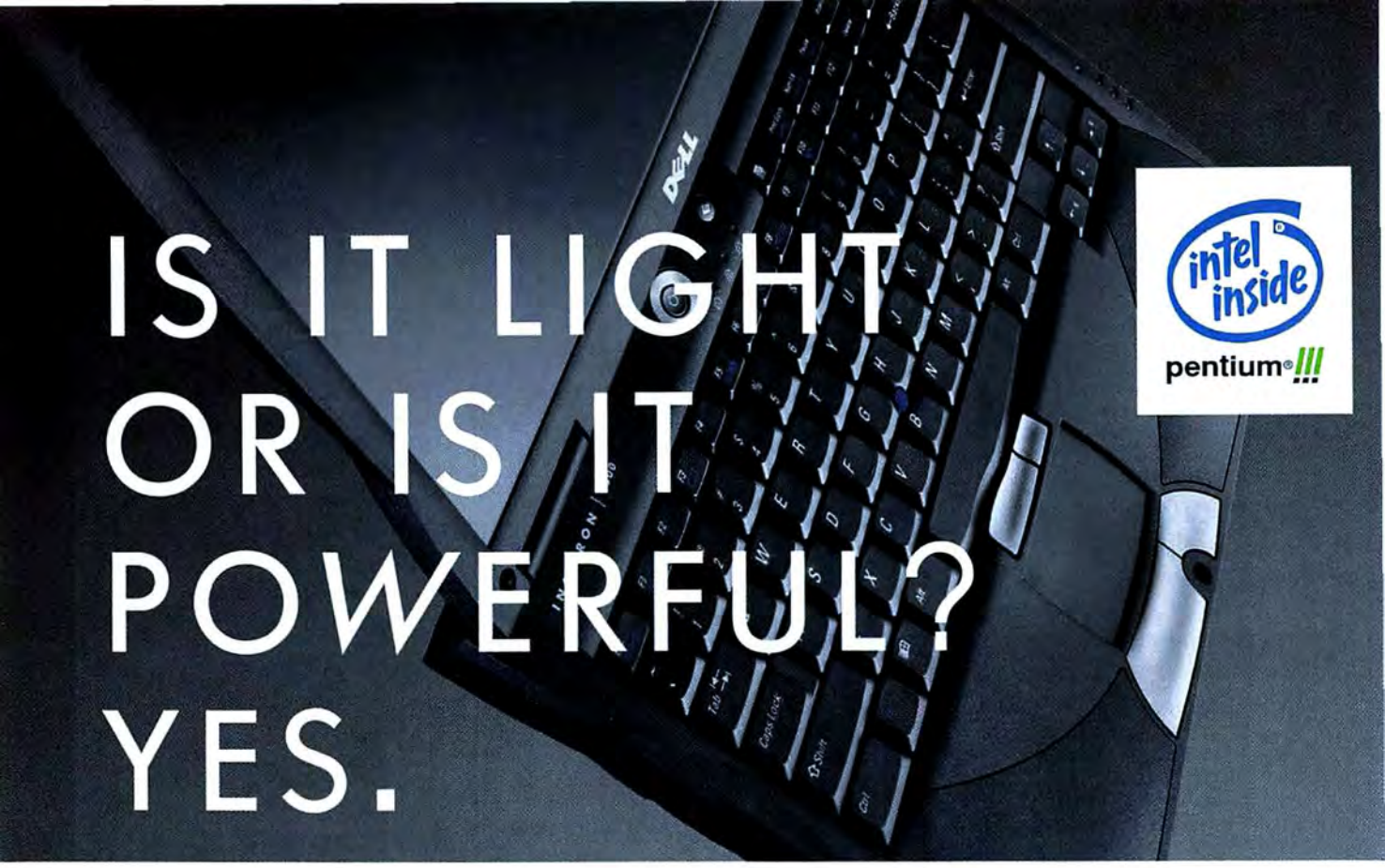

Dell™ Rated #1 in Notebook Satisfaction, 10th Consecutive Quarter
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BEST USE: People who want a fast, easy-to-use laser printer and who don't need top print quality will like the ML-6060.

5) LEXMARK OPTRA E312

LEXMARK OPTRA E312

WHAT'S HOT: Clear text and a cute design mark the Optra E312. This printer connects via a Universal Serial Bus or parallel port, and it prints high-quality text at almost 8 ppm, which is fast enough for a typical small office. The Optra E312 is small, permits easy setup and maintenance, and provides easy access for clearing jams. Lexmark includes a well-written and thorough user manual, too.

WHAT'S NOT: At $399, the E312 isn't cheap, considering its pared-down features. The 150-sheet main paper tray is a bit small, the auxiliary paper feed tray holds just one sheet or envelope at a time, and no optional trays are available. The printer's 0.7-ppm graphics speed is the slowest on the chart, and its graphics output is weaker than its text—narrow lines are smudged and seem unevenly weighted, and gray-scale images look dark and muddled and lack detail.

WHAT ELSE: Removing the toner cartridge is easy, but it requires enough of a yank to pull the featherweight printer right off your desk. Lexmark's $136 toner cartridges are relatively expensive. The company offers an optional 10/100 Base-T external print server, so it is possible to network the E312. The cost of this option ($255) is quite steep, however.

BEST USE: The E312's pedestrian speed, limited paper capacity, and lack of ethernet mark it as a single-user printer. ▶

Tap the Power: Take Advantage of Your Printer's Hidden Extras

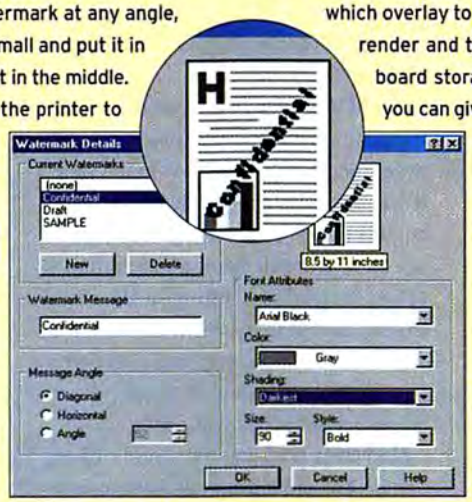
BECAUSE VIRTUALLY ALL current monochrome lasers produce professional-looking text, and most run at similar speeds, printer makers have to find other means to distinguish their products. What differentiates the newest lasers from their competition? In a word, features.

Following are a few of the most useful extras now available on certain office printers. Some of these options make ordinary chores more convenient, while others let you perform tasks that would otherwise be impossible. To gain optimum efficiency from your printer, it's wise to determine which models have the features your office needs.

Watermarks: When you circulate preliminary documents for comment, you don't want anyone to mistake your inspired but half-developed ideas for a final report. In the old days, people labeled drafts with rubber stamps and red ink. Most of the printers we reviewed can superimpose text—called a watermark—on your documents. The printer driver's watermark settings generally provide canned text strings ("Top Secret") and let you create new ones ("Molly in Accounting"). Most drivers' watermark settings let you place the watermark at any angle, anywhere on the page—so you could make it small and put it in a corner. A few drivers, however, can only plop it in the middle.

Separator sheets: By the time you walk to the printer to pick up your document, it's probably buried in a stack of print jobs. To make it easier to find, Xerox's DocuPrint N2125 can insert separator sheets between jobs, with information about who created each document. This arrangement works well if you can devote a paper tray to colored paper for these sheets.

Fax friendliness: Xerox's N2125 also includes a "fax-friendly" setting. Gray-scale graphics such as logos, charts, and photos often come through unreadable when they're faxed because the printer's dots don't mesh well with the dots that the fax machines capture when they scan. The fax-friendly setting creates patterns that a fax machine can more easily register. The output doesn't look great, but it faxes better than a typical gray-scale image, and your recipient is more likely to make sense of it.



THE HP 4100N includes a watermark setting that lets you change the placement, size, font, and color.

Internal storage: Several printer capabilities require either flash memory or an internal hard drive. (If your machine has either of those options, chances are it can perform the tricks described below.) First, a printer with its own storage can keep your office's font library onboard, thereby reducing network traffic—fonts don't have to travel with each document. Similarly, you can create templates of frequently printed documents (usually called overlays) and store them on the printer. Of the printers we reviewed, the Brother models, the Xerox N2125, the IBM Infoprint 21, the Lexmark T614N, the Ricoh AP-1600, and the Samsung ML-7300N offer optional storage. Overlays are especially practical for forms, which often have complex backgrounds that remain unchanged, and some simple data fields that change with each version. When you print a stored form, the driver sends just the data and tells the printer which overlay to use; this reduces the time the printer takes to render and then print the document. Another use for onboard storage: Before printing a confidential document, you can give it a password. The printer processes the document and stores it until you enter the password at the control panel. A variation on the process-and-hold feature (available on the Xerox N2125, the HP 4100n, and the Lexmark T614N) lets you examine a single page or copy of a document before running the whole job.

Printer agent: Nobody has time to hang around the printer replenishing supplies and clearing jams. But if the print job ahead of yours uses up all the paper, your document will sit in limbo until someone refills the tray. The best solution is to set up the printer to notify someone via e-mail about maintenance issues that need attention.

PHOTOGRAPH: MARC SIMON

Corporate Lasers

1) XEROX DOCUPRINT N2125

WHAT'S HOT: The DocuPrint N2125 has the page-generating capabilities a busy office needs. It churns out text at a snappy 11.7 ppm and graphics at a respectable 3.7 ppm. Text appears crisp and bright, line art looks flawless, and gray-scale images are detailed, albeit somewhat dark. In addition, the N2125 earns points for being unusually easy to use. It has an intelligently designed control panel with a clear hierarchical menu and buttons for navigating each level. (Unfortunately, the menu display is not backlit.) Xerox tops off the package with a first-rate manual.

WHAT'S NOT: At $1299, the N2125 is a bit of an investment. The main paper tray holds 550 sheets and the auxiliary tray holds 100—numbers that are a bit skimpy for a printer serving a big workgroup; you may decide to spend more for an extra 550-sheet paper feeder (you can add one or two, at $298 each, for a maximum capacity of 1750 sheets).

WHAT ELSE: The front panel flops open, so you can easily get inside to clear jams or replace toner. The power switch is conveniently located on the front, and it's recessed to lessen your risk of accidentally turning the printer off. The N2125 includes an ethernet interface as standard equipment, and it has additional features such as the ability to insert extra sheets to separate print jobs and a setting to print documents so that they'll fax more clearly (see "Tap the Power" on page 105).

BEST USE: Equipped with numerous extras, Xerox's DocuPrint N2125 has enough features and capacity for just about any large workgroup.

2) IBM INFOPRINT 21

IBM INFOPRINT 21

WHAT'S HOT: IBM's Infoprint 21 bristles with features that a busy office or big workgroup needs, including 12.2-ppm text-printing speed, 1.5-ppm graphics speed, and a suite of network-management software that should thrill any IS department. The Infoprint 21 includes an ethernet interface and can hold 650 sheets of paper; if that's not enough, you can add two 550-sheet feeders ($305 each), as well as an envelope feeder ($314), an internal duplexer for printing on both sides of the page ($339), and a device for collating and stacking multiple copies ($356). The printer's $1179 price is appropriate for its level of performance. The Infoprint 21 delivers great text with solid blacks and clean letters, and it's among the best at printing clean, narrow parallel lines. Gray-scale images are also smooth and detailed, though they appear somewhat light.

WHAT'S NOT: The Infoprint 21 is designed to produce 1200-dpi output in PCL or PostScript, but if you want to print high-resolution PostScript files, you'll have to buy extra memory—the standard 32MB probably isn't enough (it can accommodate up to 256MB total). The LCD is not backlit, making the control panel tough to read unless you're in a well-lit room or you give the printer a coveted window seat.

WHAT ELSE: Even before we turned the Infoprint 21 on, we knew that its control-panel menus would be easy to navigate: It has separate sets of clearly marked buttons for stepping through the menus, selecting a menu item, and setting its value. Instead of sending heavy stock around a curve to the main exit tray, you can send it straight out the rear door; a tray for the rear exit costs a steep $127, but you could get by without it.

BEST USE: Well-heeled small offices that do lots of printing would undoubtedly appreciate the Infoprint 21's well-conceived design, but the printer's performance, paper capacity, and extra features make it better for a big office.

3) HP LASERJET 4100N

NEW **WHAT'S HOT:** HP's new LaserJet 4100n prints graphics at 4.5 ppm—faster than all other corporate printers on the chart. Its 13.6-ppm text speed is tops, too. Yet it produced among the best text we saw in this comparison. Its type has an even, balanced look, with crisp serifs and details. The LaserJet 4100n prints graphics well, too. It generates balanced narrow lines in drawings and turns out smooth, detailed, somewhat dark gray-scale images.

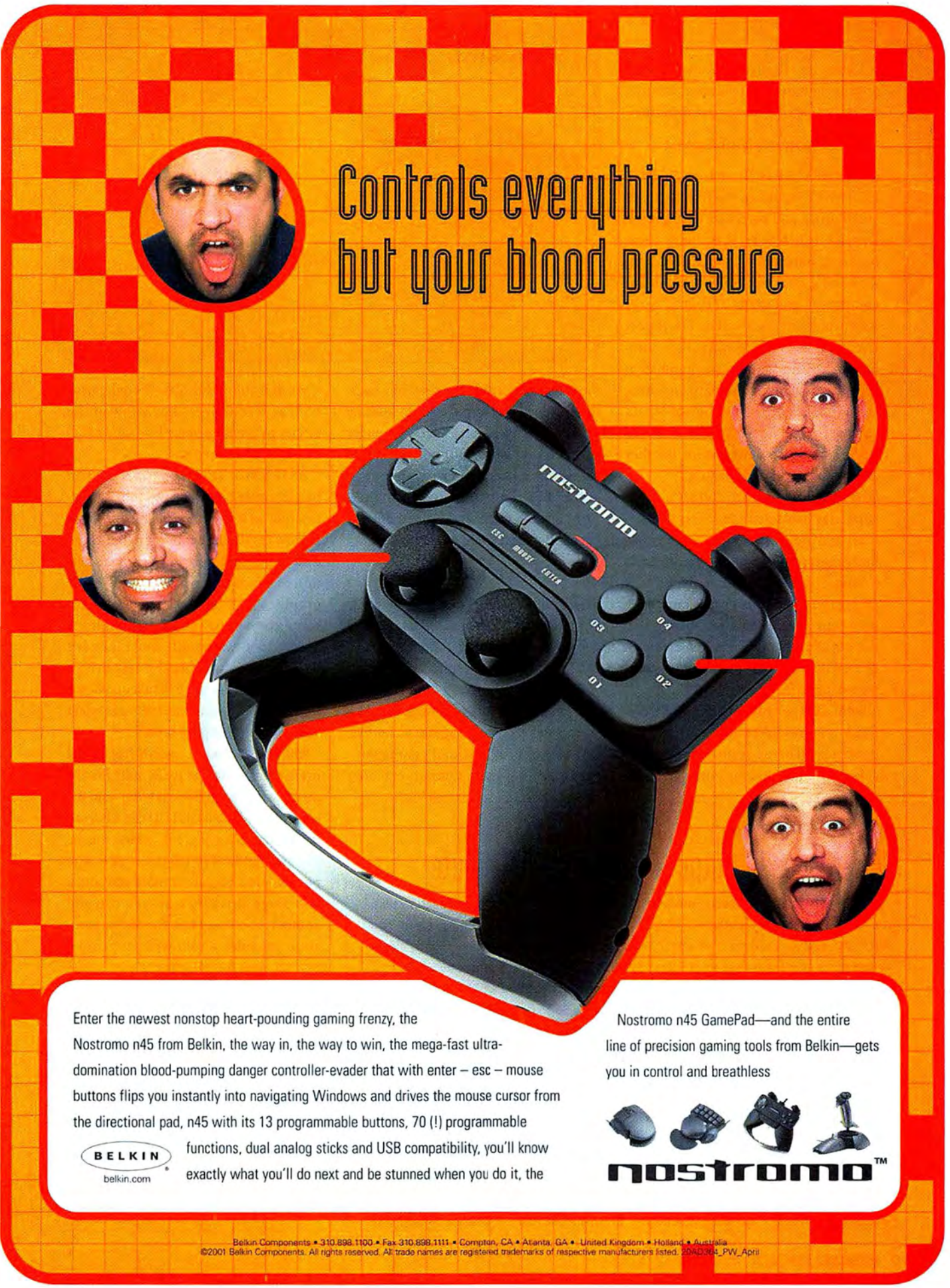
WHAT'S NOT: HP charges a hefty $1579 for the LaserJet 4100n—for that price the company might have beefed up the unit's paper capacity (it holds only 500 sheets in the main tray, 100 in the auxiliary tray) or built in a duplexer. With the two optional trays attached, the 4100n holds up to 1600 sheets, but those additions raise the price by a total of $500. The 4100n makes a racket while printing, so your colleagues will be happier if you sequester it in a closed room.

WHAT ELSE: The 4100n's big price covers some unusual and attractive extras, such as an optional infrared port that lets notebook users print without plugging into the network, and a backlit LCD display so you can see your way around the simple, logical control panel. And of course the 4100n includes an ethernet interface as standard equipment.

BEST USE: Workgroups on the lookout for a fast printer with extra features ▶

HP LASERJET 4100N

PHOTOGRAPHY: MARC SIMON


Controls everything
but your blood pressure
nostromo
ESC
03
04
01
02
Enter the newest nonstop heart-pounding gaming frenzy, the Nostromo n45 from Belkin, the way in, the way to win, the mega-fast ultra-domination blood-pumping danger controller-evader that with enter – esc – mouse buttons flips you instantly into navigating Windows and drives the mouse cursor from the directional pad, n45 with its 13 programmable buttons, 70 (!) programmable functions, dual analog sticks and USB compatibility, you'll know exactly what you'll do next and be stunned when you do it, the Nostromo n45 GamePad—and the entire line of precision gaming tools from Belkin—gets you in control and breathless
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will like the HP 4100n, though it isn't appropriate for high-volume printing unless you spring for the optional trays.

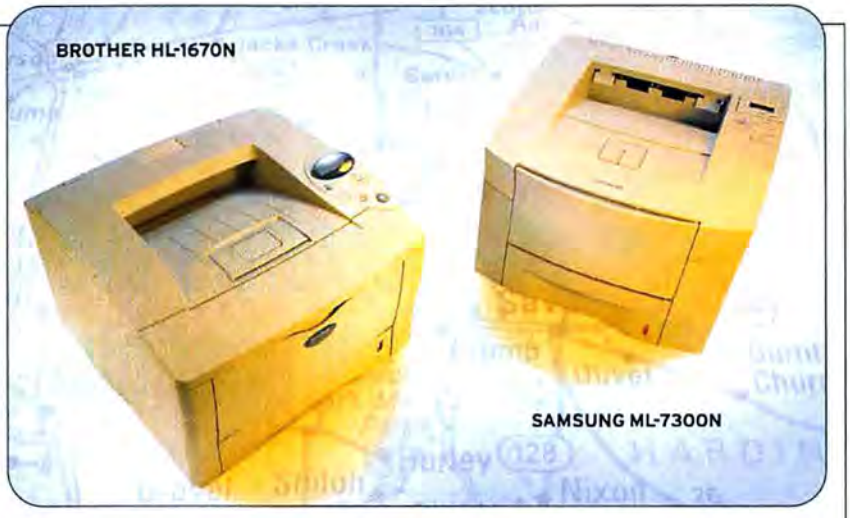
4) BROTHER HL-1670N

NEW **WHAT'S HOT:** Brother's new $749 HL-1670N straddles the line between small office and corporate workgroup. Despite its low price, it includes some high-end hardware: An ethernet interface and a duplexer come as standard equipment, and the LCD control panel is conveniently backlit. The HL-1670N also holds its own in performance, turning out text at 10.8 ppm and graphics at 3.2 ppm. Text output is sharp and even, and the HL-1670N does a great job on narrow parallel lines. Gray-scale graphics have a slightly dotty texture, but they show good detail and shading.

WHAT'S NOT: The HL-1670N's main paper tray holds just 250 sheets (an auxiliary tray holds 100 more), and it has limited expansion options: You can add a single extra 250-sheet paper tray ($199). Working with a paper capacity of only 600 sheets, your workgroup will run out of paper often if it uses the printer heavily. Also, the auxiliary tray and rear-exit tray feel a little flimsy.

WHAT ELSE: Removing the toner cartridge requires the manual dexterity of a pickpocket: There's scant extra space inside the printer, and the cartridge's handle is recessed inside the case. The backlit LCD display changes color to indicate the printer's operational state—green for normal, orange for offline, and red to signal that it needs special attention.

BEST USE: This unit's performance, print quality, price, and limited options best suit it for a small workgroup.



5) SAMSUNG ML-7300N

NEW **WHAT'S HOT:** Samsung's new ML-7300N costs a reasonable $1149 and comes with an ethernet interface and a built-in duplexer. Despite the printer's modest price, Samsung didn't cut corners on performance or design. The ML-7300N turns out text pages at a comfortable rate of 13.2 ppm, and graphics at a very zippy 4.4 ppm. Output text looks clean and quite readable—though not as bold as text delivered by a few of the pricier printers we looked at—and small details are rendered well.

WHAT'S NOT: The ML-7300N doesn't handle other types of print jobs as successfully as it does text. In line drawings, narrow parallel lines appear to bunch up a bit in places, conveying a faint suggestion of bands or stripes, and gray-scale graphics lack the detail you get with some competing models. Though the ML-7300N can handle most jobs it's likely to encounter in the text-driven business world—and with adequate performance, too—graphic designers won't want to use it for page proofs.

WHAT ELSE: The ML-7300N has logical hierarchical menus (with buttons for progressing through each level), and the control panel's backlit LCD can tilt from horizontal to 45 degrees, which means that people short or tall can read it. The printer has a 500-sheet main tray and a 100-sheet auxiliary tray; you can add another 500-sheet tray for $199. Samsung provides a well-written printed manual with the ML-7300N.

BEST USE: This Samsung is a reasonably priced choice for workgroups that produce mostly text documents and don't demand flawless graphics.

online *For an expanded version of the* Top 10 Printers *chart and for capsule reviews of each model, see www.pcworld.com/reviews/june2001/lasers.* PC World *Contributing Editor Dan Littman regularly covers printers.* ■

PHOTOGRAPH: MARC SIMON

FINE DISTINCTION

Differences in Output Quality Can Be Minute

THE CURRENT crop of monochrome laser printers produce such highly satisfactory text, it's hard to tell their output apart—almost all our test printouts look sharp, clean, and black. The quality of text from HP's $1579 corporate LaserJet 4100n is only slightly cleaner and more exact than that from Samsung's $369 small-office-oriented ML-6060. But with gray-scale graphics, lasers still deliver varied results: Brother's $749 HL-1670N produces subtle shading and sharp edges, while Okidata's $336 Okipage 24n (which finished ninth in our ranking of corporate models) generates smudged, dotted images.

HP LaserJet 4100n | Samsung ML-6060 | Brother HL-1670N | Okidata Okipage 24n

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Sites of Passage

Where are the best travel deals on the Web? We find the hottest sites for online booking—and round up essential tips and tricks for wired wanderers.

By Michael Shapiro

In 1961 in a classic futuristic episode of *The Twilight Zone*, Burgess Meredith played a librarian who was put on trial by a totalitarian state. His crime? Obsolescence.

Well, another profession might be facing that charge in the near future—conventional travel agents.

Sure, we've been saying for the past two years that the Web will never replace agents completely. And it's still true that far more travelers book through agents than online. But this year, according to Internet travel analyst Phocuswright, online bookings are expected to total $20 billion, more than 11 percent of the U.S. market, compared to less than 1 percent five years ago.

Over the past year, a slew of new travel sites, such as Hotwire, SideStep, and Travelbyus, has arisen to deliver more online booking choices for travelers than ever before. Long-standing sites such as Expedia and Travelocity have improved their services ▶

ILLUSTRATION BY NICK DEWAR

as well. Today you have more options for finding bargains online—from Web-only specials offered by some airlines to last-minute cruise discounts. And improved services let you hone searches and locate fares and itineraries that are exactly what you want. With travel agent commissions nosediving faster than dot-com stock prices, fewer agents are willing to spend time to save you money. So it's great that the Web gives you another option.

Services also exist for changing your itinerary with a wireless phone and for downloading destination guides into your PDA. The widespread use of handhelds has encouraged leading travel publishers like Lonely Planet and Frommer's to create miniature versions of their city guides for the Palm OS. (Frommer's is owned by *PC World*'s parent company, IDG.)

Web sites are far from perfect, though, and planning a trip online takes longer than calling an agent. A travel agent may still be more suitable for specialty trips, too, like spa vacations and complex overseas trips. But as agents begin turning to the Net themselves to ferret out deals and charge $50 fees for their services, more travelers will book trips on their own. And it's never been easier to do just that.

Improved online services let you hone searches and **locate fares and itineraries** that are exactly what you're seeking.

THE CONTENDERS

TO SEE HOW SOME newer travel sites compare with established ones, I tested four sites that launched in the past year against Priceline (the well-known bidding site) and Expedia (my pick for general booking because of its revamped, easy-to-navigate design). The four newer sites are Hotwire (which, like Priceline, sells blind tickets that don't state the flight time or the airline before you buy); Qixo (a price-comparison site that monitors fares from discount sites such as Cheaptickets.com); SideStep (a travel search plug-in designed to work with Internet Explorer); and Travelbyus (which uses a new booking tool that gives you several options for sorting results). I opted to test against Expedia instead of Travelocity, because its prices are often similar to Travelocity's but Expedia is easier to use.

And since most travelers look to the Web to book more than just their flight, I also checked innovative sites for booking hotels, planning sightseeing, and more.

SITE SHOWDOWN

TO TEST THE BOOKING sites, I compared them using three itineraries: a simple, short-notice, domestic round-trip; a three-legged journey with a longer lead time; and an international jaunt booked a month in advance.

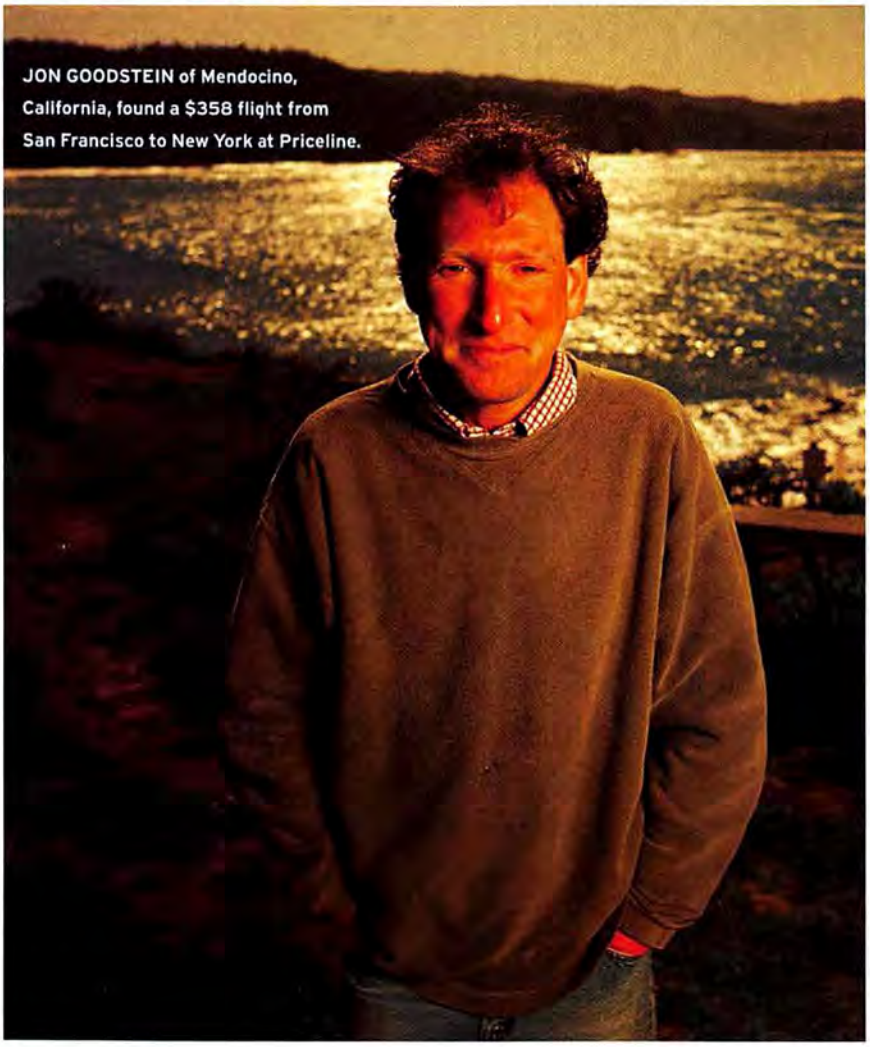
The ground rules were simple: I would fly any time of day (except overnight) and told the sites to show me the lowest fares first (as opposed to flight times or other criteria). I researched all bookings on the same day—as veteran travelers know, prices can jump or plummet overnight.

My conclusions? For last-minute deals, I like Hotwire, which can find some surprisingly low fares, as long as you're flexible about what time of day you fly. For complex itineraries involving more than one stop, Expedia is my pick, thanks to the variety of options it gives you for sorting your results. But no site will get you the top deal every time. Your best strategy is to research fares on several sites before you buy. That's what I did.

SIMPLE ITINERARY

I STARTED MY SEARCH with the basic domestic round-trip from San Jose, California, to any of New York's three major airports (Kennedy, LaGuardia, or Newark), booked five days in advance.

One disadvantage of booking on short notice, of course, is that airfare is typically stratospheric. Such is the price that



JON GOODSTEIN of Mendocino, California, found a $358 flight from San Francisco to New York at Priceline.

PHOTOGRAPH: ERIC BUTLER

TRAVEL BOOKING ONLINE FEATURES COMPARISON

SITE	Ease of use	Booking flexibility	Finding lowest fares	Sorting options	Comments
Expedia www.expedia.com	Excellent	Good	Fair	Price, airline, duration of flight, takeoff or arrival time	Good place to get an overview of your options; technically sophisticated.
Hotwire www.hotwire.com	Good	Poor	Good	None, since you get only one result	Good deals; lets you pick travel dates but not flight time or airline.
Priceline www.priceline.com	Fair	Poor	Good	None	Finds good deals, especially with less than seven days' notice, but won't let you specify the time or airline you want to fly.
Qixo www.qixo.com	Fair	Fair	Excellent	Price	Compares discounted prices from 17 sites so you don't have to.
SideStep www.sidestep.com	Fair	Fair	Fair	Price, number of stopovers, airline, duration of flight	Automatically searches alternate airports for lower fares; tracks your surfing and purchases.
Travelbyus www.travelbyus.com	Good	Excellent	Good	Price, number of stopovers, airline	New booking system gives you several sorting options.

Best Bet

Expedia (www.expedia.com) gave us for this trip: $1104 on America West.

SideStep (www.sidestep.com), a plug-in that displays its data in the left column of Internet Explorer browsers (a Netscape version should be available this spring), identified a best fare of $1299 from San Jose to Newark. (All prices quoted in this story refer to round-trip fares and include taxes and fees.) SideStep grabs the search terms you enter at Expedia, Travelocity, and other major online travel agencies and compares the best fares offered by 28 airlines, including some online-only fares not available at other general booking sites. It also automatically searches alternate airports (one trick for getting a lower fare). For instance, it showed a $360 overnight flight on JetBlue, a new discount carrier, from Oakland (about 40 miles north of San Jose) to JFK. But I decided it wasn't fair to include this option in my comparisons, since I didn't allow the other sites to search alternative airports.

SideStep rarely uncovers dirt-cheap deals, but it can save you 5 percent or more off typical fares. And because SideStep directs you to the airlines' sites to book your flight, you can earn bonuses—such as frequent flier miles—that sites such as United.com offer when you purchase your tickets directly from them.

Itinerary 1

Basic domestic round-trip from San Jose, California, to any of New York's three major airports, booked with five days' advance notice.

Itinerary 2

Music-lover's delight, a three-legged jaunt from Los Angeles to Nashville to New Orleans and back to Los Angeles, booked 24 days in advance.

Itinerary 3

An international flight going from Chicago to Paris, with 30 days' advance notice.

Travelbyus and Qixo both uncovered the lowest standard fare (a fare available through mainstream travel agents and sites): a $761 ticket that combined flights on Continental and American, with a stopover in each direction. Travelbyus (www.travelbyus.com) is the first online agency to adopt a new booking system from ITA Software that allows you to sort options based on price, flight times, stopovers, and airline. (Expedia recently added similar options to its site.) ITA's software is also the heart of Orbitz, scheduled to launch in June.

Qixo (www.qixo.com), the other site that found the $761 fare, compares bargain fares from 17 discount agencies and other sites—fares that don't usually show up at mainstream sites like Expedia.

BUYING SIGHT UNSEEN

THE PRICE RESULTS of my initial search were disappointing but not surprising, given the short notice. Most people who book at the last minute are business travelers who are less reluctant to pay high prices on their expense accounts. But if you want to avoid paying a lot ($761 really isn't a deal for a simple cross-country flight), it may be worth rolling the dice at Priceline or Hotwire. I decided to first try Hotwire (www.hotwire.com), which offers good deals even with less than seven days' notice. And unlike Priceline, Hotwire tells you the price up front, so you don't have to play a guessing game with bids.

Here's the deal: You can specify only the date you want to fly, not the time or the airline, and you can't obtain a refund if your travel dates change or you can't use the ticket for some reason. You also don't get frequent flier miles or assigned seats.

I prefer Hotwire to Priceline because it lets you compare fares for flights going to different airports before selecting. The site gave me a choice of all San Francisco–area airports and all New York airports. I picked San Jose for my departure and selected JFK, LaGuardia, or Newark for my arrival. (Testing the limits of my flexibility, Hotwire asked me to consider flying into Philadelphia instead, but I declined.) In a few seconds Hotwire turned up a $310 fare from San Jose to Newark. Alternatively, it offered a fare to the more convenient JFK for $320.

I had only 30 minutes to respond—if you don't book within that time, Hotwire restricts you from searching the same itinerary for another 72 hours (of course, you could try another username, credit card, and computer if it's worth the trouble), so I zipped over to Priceline.

Priceline, bowing to various consumer complaints, now pledges to respond to bids within 15 minutes (down from an hour), to keep layover times as brief as possible, and to streamline the bidding process by decreasing the number of screens you have to use to make a bid.

Using the Hotwire fares as a guide- ▶

line, I bid a slightly lower $270 for a flight from San Jose to JFK, LaGuardia, or Newark. But before I received results, Priceline told me I'd have to pay $29 in taxes and fees (Hotwire includes these in its fares). I clicked *OK* and sent the bid; within 15 minutes an "urgent" e-mail arrived saying "Congratulations Michael Shapiro, you got your price of $270" (for a total of $299 with taxes and fees).

PRICELINE PROS AND CONS

THE ONLY DRAWBACK was that the flight (on America West) included a stopover in Phoenix each way. But since Priceline had already accepted my bid, I had to purchase the ticket. Nonetheless, finding a coast-to-coast ticket for under $300 on less than a week's notice was a good deal, especially compared to the $761 fare quoted at the other sites—although Hotwire's flight straight to JFK for $320 would have been more appealing had I purchased it.

Jon Goodstein of Mendocino, California, also obtained good results at Priceline. He recently paid the site's $358 round-trip fare for a flight from San Francisco to New York. "It was a nonstop on Delta, and the flight times were convenient," he says. Even better: The flight was overbooked, so Goodstein volunteered to be bumped and got a $350 voucher toward a future flight as a reward. And he was upgraded to business class on the next flight.

But not all Priceline customers are so happy. Kathleen Caldwell of Sonoma, California, scored a $200 fare from Oakland to Chicago—with a catch: The flight had *two* stopovers each way. One of them was in Atlanta—talk about taking the roundabout route.

Both Priceline and Hotwire offer prices at less than half the standard fares. But the concessions you have to make aren't always worth the savings. You can't choose your flight times, and perhaps most important, you can't change your ticket. If your savings are in the hundreds of dollars, it may be worthwhile to accept these restrictions. Otherwise, if you plan ahead, you should be able to locate a decent fare elsewhere, collect frequent flier miles, and retain the right to change your plans (although you'll probably still have to pay the airline's fee for changing your booking).

COMPLEX ITINERARY

THE NEXT DOMESTIC TRIP I tested was more complex: a three-legged jaunt to music hot spots. Los Angeles to Nashville was the first leg, followed four days later by a flight from Nashville to New Orleans, and back to Los Angeles three days later. I planned the trip for 24 days later so I'd be eligible for advance-purchase discounts.

Because of the multiple destinations in this itinerary, several sites couldn't handle my ticketing request. Hotwire, Priceline, and SideStep book only simple round-trip itineraries, and Qixo books one-way trips one leg at a time (instead of as a single itinerary), so I focused on Expedia and Travelbyus. Here, the ITA Software that Travelbyus uses showed its value. I could easily find fares for primary airports, or I could consider alternative airports within 25, 50, or 100 miles of my first choice. I could also specify two departure airports, such as LAX and Orange County, and only the main airports for Nashville and New Orleans, or I could choose alternative days to find the best price. The only drawback in listing so many alternatives is that the search can sometimes take a bit longer to return results—and it may turn up too many.

At Expedia you can sort results by airline, price, or total flight time (including stopovers). So a one-stop flight with a short layover will be listed ahead of a one-stop flight with a longer layover. Ultimately, though, Travelbyus and Expedia found the same flights at the same price: a series of one-stops, all on Northwest Airlines, for $310, a very low fare considering that three flight segments are included. Having to fork over so little for the flights, I could afford to splurge a little in New Orleans and *laisser les bon temps rouler* (let the good times roll, as they say).

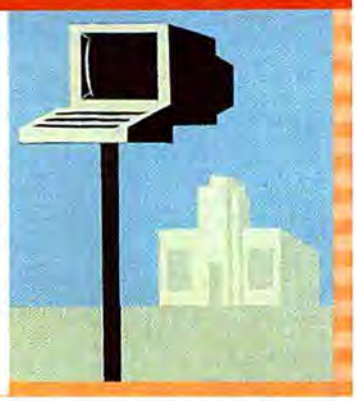
INTERNATIONAL ITINERARY

NEXT STOP: PARIS IN the springtime. For the third trip, I booked a flight from Chicago to Paris, with 30 days' notice. I brought in all the players except Hotwire, which didn't offer overseas bookings at the time I researched this article. (Hotwire has since added international air service.) I figured I could get a pretty good deal by booking 30 days in advance and traveling in March, before hordes of summer tourists dimmed the City of Lights.

Qixo found the lowest fare, a $420 ticket through a consolidator called TicketPlanet. Unfortunately, this flight stopped in Brussels. A nonstop trip on Air France cost $427 through Lowestfare, a much better bet. Expedia found the same ▶

Where to Eat on the Road

(www.roadfood.com)



Tired of zipping through fast-food drive-throughs every time you hit the road? Check **Roadfood.com** for thousands of more-promising suggestions. Choose a state and select from dozens of restaurant types—that's how I found the Bon Ton Café in New Orleans, featuring redfish bon ton, crawfish, and gumbo.

Gestures Around the World

(www.webofculture.com/worldsmart/gestures.htm)

When visiting Malaysia, don't put your hands on your hips—it's a sign of anger. In France, if you play an imaginary flute, you are signaling that someone is talking too much. To find out about what gestures mean in the country you're planning to visit, come to this entertaining site from the **Web of Culture.**

ILLUSTRATIONS: NICK DEWAR

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- harman/kardon® Speakers
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- MS® Works Suite 2001
- MS® Windows® Me
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- 1-Yr Mail-in Service
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$799 or as low as **$24** per mo. 45 mos.[12]

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- 1 Year of DellNet™ by MSN® Internet Access[10] Included

$1199 or as low as **$36** per mo. 45 mos.[12]

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DELL™ DIMENSION™ 8100 Series

Advanced Performance, Smart Value

- Intel® Pentium® III Processor at 1GHz
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- 40GB[5] Ultra ATA/100 Hard Drive (7200 RPM)
- 17" (16.0" vis, .28 dp) E770 Monitor
- 32MB NVIDIA® GeForce2 MX 4X AGP Graphics
- 8X/4X/32X Max CD-RW Drive
- 48X Max CD-ROM Drive
- Harman Kardon® HK-695 Surround Sound with Subwoofer
- 56K Capable[6] PCI Telephony Modem
- MS® Works Suite 2001 ■ MS® Windows® Me
- 1-Yr Limited Warranty[2] ■ 1-Yr At-Home Service[4]
- 1 Year of DellNet™ by MSN® Internet Access[10] Included

$1499 or as low as **$45** per mo. 45 mos.[12]

No payments for 90 days. E-VALUE Code: 03863-500514

DELL™ DIMENSION™ 8100 Series

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- 32MB NVIDIA® GeForce2 MX 4X AGP Graphics
- 8X/4X/32X Max CD-RW Drive
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- 56K Capable[6] PCI Telephony Modem
- MS® Works Suite 2001 ■ MS® Windows® Me
- 1-Yr Limited Warranty[2] ■ 1-Yr At-Home Service[4]
- 1 Year of DellNet™ by MSN® Internet Access[10] Included

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- HP® ScanJet® 4300Cse, add $99 after $50 HP® Mail-in Rebate[25] (Reg. $149)

Power Protection:
- APC Pro8T2 SurgeArrest Surge Protector, add $39

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- Family Game Pack[14], add $99

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  - 3-Yr Warranty[2] and 3-Yr On-site Service[4], add $219

intel inside
pentium® III

[10]Telephone access (call your phone co. for details) and other surcharges for access may apply. Must register within 30 days of receiving computer and accept DellNet/MSN Terms of Service. You agree to be billed monthly fees after the initial service period. You may cancel service at any time. Offer valid for new customers only in U.S. households and must be over 18 years old with major credit card. Limited time offer. [12]Monthly payment based on 13.99% APR FOR QUALIFIED CUSTOMERS. OFFER VARIES BY CREDITWORTHINESS OF CUSTOMER AS DETERMINED BY LENDER. Under 90 Days Same As Cash feature, interest accrues during first 90 days if balance not paid within 90 days. Customers not eligible for 90 Days Same As Cash feature may be offered standard 48-month financing with APRs ranging from 16.99% to 23.99%. Example: $1,650 purchase price, at 18.99%, 48 monthly payments at $50. Taxes and shipping charges extra, and vary. From American Investment Bank, N.A. to U.S. residents with approved credit. Availability may be limited in some states. Limited time offer.

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Air France flight and fare, while Sidestep and Travelbyus found flights on American and Delta, respectively, for $437.

With these low fares, it didn't make sense to try Priceline, because even if I could find a slightly lower fare, I'd probably sacrifice convenience. Priceline is a much better option when I have less lead time or when I'm trying to beat a peak summer fare. But just for the sake of comparison, I decided to bid $200 at Priceline. This, along with the $103.45 that the site would add in taxes and fees, meant I'd pay $303.45 if Priceline accepted my offer.

But a pop-up window informed me that my bid was so low it would have only a 3 percent chance of being accepted. It asked me to consider bidding $100 more, but I wasn't willing to do that for an itinerary I couldn't first approve. Minutes later my $200 bid was rejected, but the site informed me I could still buy the ticket for $388.45, including taxes and fees. Too little, too late. I wasn't about to trade a guaranteed nonstop flight on Air France for $40 savings on a mystery itinerary. When you fly overseas, it doesn't make sense to sacrifice convenience for a few dollars. In addition, choosing Hotwire or Priceline means you forfeit frequent flier miles, a big loss if you're flying 10,000 miles.

HAVE PALM, WILL TRAVEL

IT'S GREAT TO HAVE the convenience of the Web to plan and book flights, but let's face it, travel is all about mobility, and a PC and modem don't always fill the bill. That's why travel services for handhelds are helpful—even if they're not comprehensive. If you own a Palm VII or a properly equipped cell phone, you can check your flight status for delays and cancellations, or find out what gate your flight is leaving from. Three years ago, Travelocity introduced flight paging, a valuable service that sends a message to your pager if your flight is late or canceled. That service is being expanded later this year to let you choose notification via e-mail, voice mail, cell phone, or fax. Several airlines now offer the same kind of notification service if you book directly through them.

You can rebook your flight (only for another flight the same day) with Travelocity through your cell phone using Nextel, AT&T, and Sprint PCS. However, it's probably easier to just phone the airline directly to rebook.

Expedia has its own mobile and wireless services. If you have a Pocket PC, you can download maps for itineraries that you've booked through its site, including point-to-point driving directions. The wireless

Staying Connected on the Road

COMPUTERS AND the Net are great travel companions—e-mail, instant messaging, and chat are invariably cheaper than a long-distance telephone call, provided that you have the right tools and an ISP that offers national or international service. Here are some tips for staying connected when you're thousands of miles away from your desk.

➤ **Equip yourself** Find out *before* you go what kind of access the hotel offers (dial-up, broadband, or wireless), and pack the necessary cables and adapters. Longer cables are best, in case your room's outlets are not conveniently located. If you're going overseas, make sure your notebook adapter will work with the foreign power system. Most notebooks less than five years old are already equipped to work overseas. Check your adapter. If it says "Input 100-240V," you should be fine. If it lists only 120V, you'll need to buy a voltage converter, which costs approximately $40. A good source for cables and adapters is TeleAdapt (www.teleadapt.com).

➤ **Look for broadband** Some major hotels offer in-room high-speed access for $10 a day. Inquire before booking your room.

➤ **Guard against intruders** Hotel connections, depending on how they're configured, can open your system to hackers and corporate spies. Ensure that your system's security settings are in place, turn off file and printer sharing in Windows, and make certain you update your software with the latest security patches; also, install a good virus/Trojan-horse scanner.

➤ **Beware of café hackers** Cybercafés are notorious hacker targets (as are computers set up at conferences for attendees to use). Public terminals can carry a Trojan horse that sends your user name and password to a hacker. If you must use a public terminal, have Symantec's free security check (www.symantec.com/securitycheck) perform a thorough virus sweep of the system first. And be sure to sign off completely from any free e-mail services you use.

➤ **Think security** Frequent travelers who keep sensitive data on their notebooks should at the very least password-protect their systems. A $45 Kensington lock can prevent a thief from stealing your notebook. Or consider a fingerprint scanner or other biometric security system.

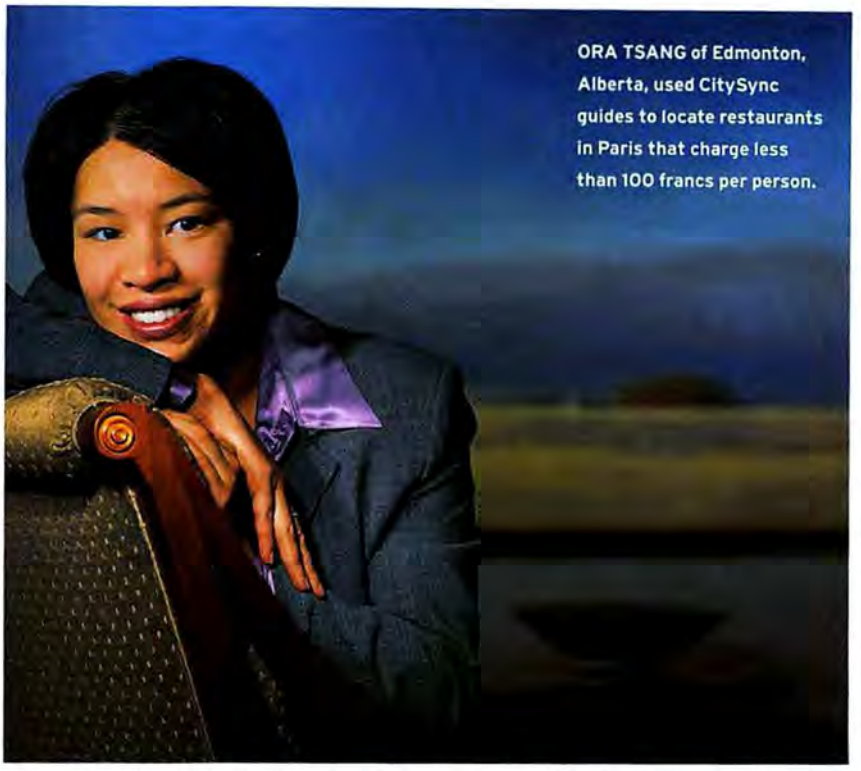
➤ **Get a national ISP account** Even if you love your local provider, get a low-cost, limited-use account with EarthLink, AT&T, or another service that has many local access numbers. Using it will be far cheaper than paying long-distance charges to dial up your regular ISP. You can also obtain temporary accounts in many foreign countries.

➤ **Note your e-mail settings** With your user ID, your password, and the names of your incoming and outgoing mail servers, you can check your POP3 e-mail, using any standard e-mail program—including Outlook Express, which comes bundled with Internet Explorer. —Yardena Arar

ILLUSTRATION: NICK DEWAR

service lets you access real-time data, such as when your flight is due to leave.

But booking flights through wireless handhelds, says Henry Harteveldt, travel analyst for Forrester Research, will not become common before 2003 or 2004. Low data transfer speeds and small screens are the main obstacles. "The devices, calling plans, and connectivity aren't there yet to provide a comparable experience to the land-based Web," Harteveldt says.



ORA TSANG of Edmonton, Alberta, used CitySync guides to locate restaurants in Paris that charge less than 100 francs per person.

PHOTOGRAPH: GARY CAMPBELL

BOOKING HOTELS

IN ADDITION TO flight bookings, the Net offers great deals on hotel bookings. And you can look at a room before you book it. HotelDiscounts (www.hoteldiscounts.com) is my pick for the best rates and the most extensive selection of hotels.

The use of streaming audio and video at hotel sites makes the experience of choosing accommodations almost interactive. Not only can you see pictures of rooms, but at HotelView (www.hotelview.com) you can take a virtual tour of hundreds of top-tier hotels and destinations worldwide. But don't forget that hoteliers only show the nicest rooms, not the cramped singles next to the ice machine.

When it comes to finding good deals, hotel chains, such as the Hyatt (www.hyatt.com), often have specials available only through their site. And discounters such as HotelDiscounts and Quikbook (www.quikbook.com) offer rates significantly below retail. These companies tend to buy blocks of rooms months in advance and sometimes offer space in a hotel listed elsewhere as sold out. Reservations booked through discounters occasionally fail to go through to the hotel, however. So it's a good idea to call or e-mail the hotel after booking to confirm your room.

Expedia and other major booking sites also negotiate deals with major properties. And TravelWeb, a general hotel-booking site, has a section called Click-it Weekends for last-minute rates. I found a rate of $95 per night at the Regal Biltmore in Los Angeles. (The regular rate was $259.)

The best thing about looking for a hotel room online is the selection of one-of-a-kind properties and nonchain accommodations. For vacation homes, try VacationSpot (www.vacationspot.com), which lists over 25,000 unique properties around the world. The best B&B directories are BedandBreakfast.com and InnSite (www.innsite.com), which let you explore properties through still images and in some cases read reviews by other travelers. BedandBreakfast.com lists over 25,000 inns, most of them bookable through the site. I checked out the Bahari Bed & Breakfast in Qualicum Beach, British Columbia, and saw the price for each room as well as availability for the night I wanted to visit. The listing included the innkeepers' names (Len and Yvonne), their toll-free number, and a link to the inn's Web page so I could learn more.

The **best thing** about looking for a hotel room online is the **selection of one-of-a-kind properties** and nonchain accommodations.

WEB TRAVEL GUIDES

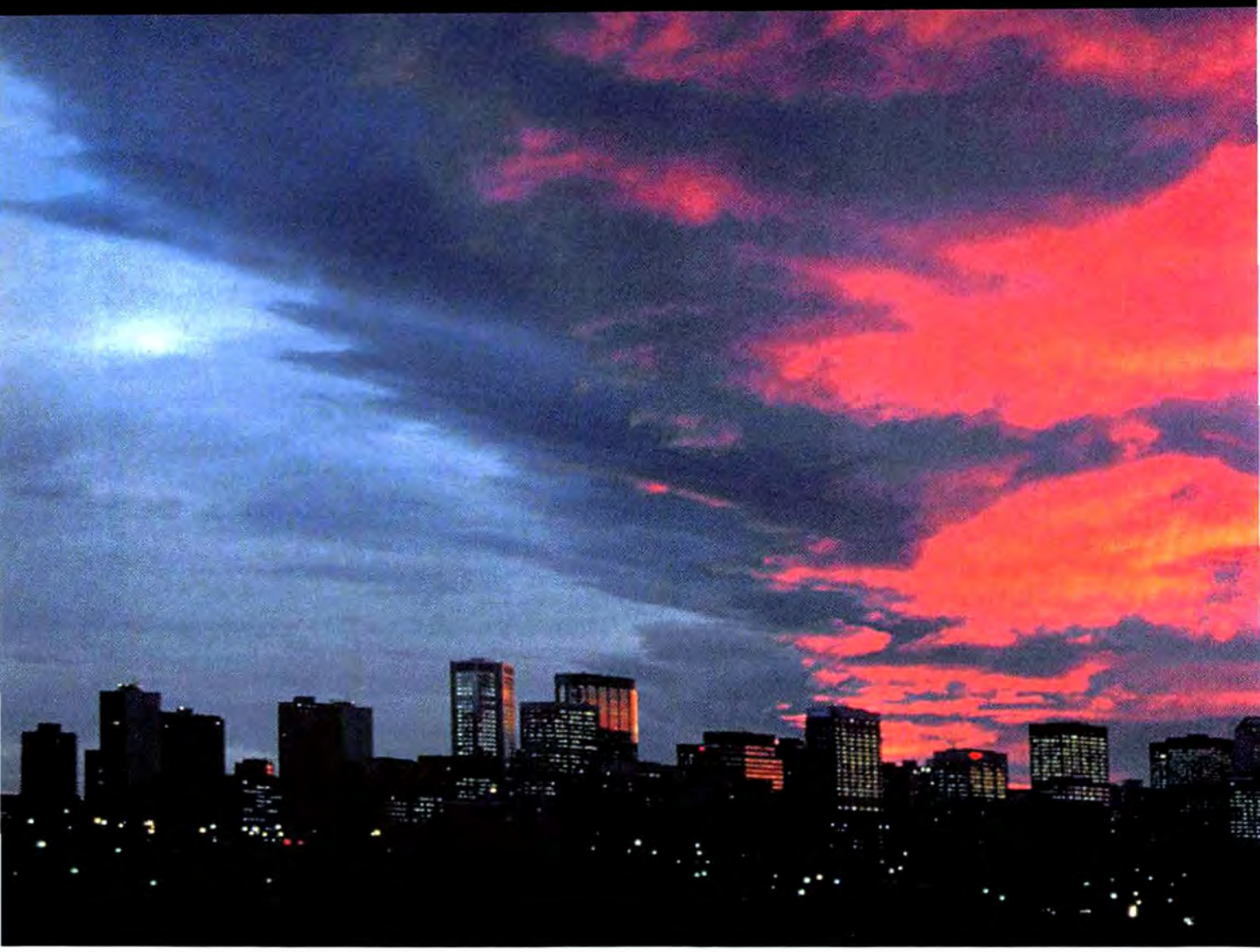
WITH MY AIRFARE and hotel booked, I turned to sightseeing and nightlife. Online guidebooks are almost as old as the Web itself: Fodor's (www.fodors.com), Rough Guides (travel.roughguides.com), and Frommer's (www.frommers.com) realized early on that the advantages of putting content online outweighed concerns about lost book sales. Frommer's and Rough Guides place the full content of all their books online.

Even more helpful than text is the advice available online from seasoned travelers. Frommers.com hosts chats with its authors and maintains an archive of recent talks (click on *Ask the Expert* under Travel Message Boards). Here I learned of bird-watching tours from the author of Frommer's South Florida guide.

Since even new guidebooks can be out of date in crucial respects, Lonely Planet (www.lonelyplanet.com) has an Upgrades section containing information updates to their books. So if your guide to Bangkok came out over a year ago, you can still find the latest advice on politics, visas, and events over the Web. The updates use Adobe's PDF format and are designed to be printed, not read on your monitor.

If you don't want to print a sheaf of pages or carry cumbersome "guidebricks," consider downloading advice into your PDA or accessing a wireless guidebook. Frommers.com is one of several firms that offer guides through wireless PDAs like the Palm VII. Capsule hotel ▶

Look into the southern sky. What do



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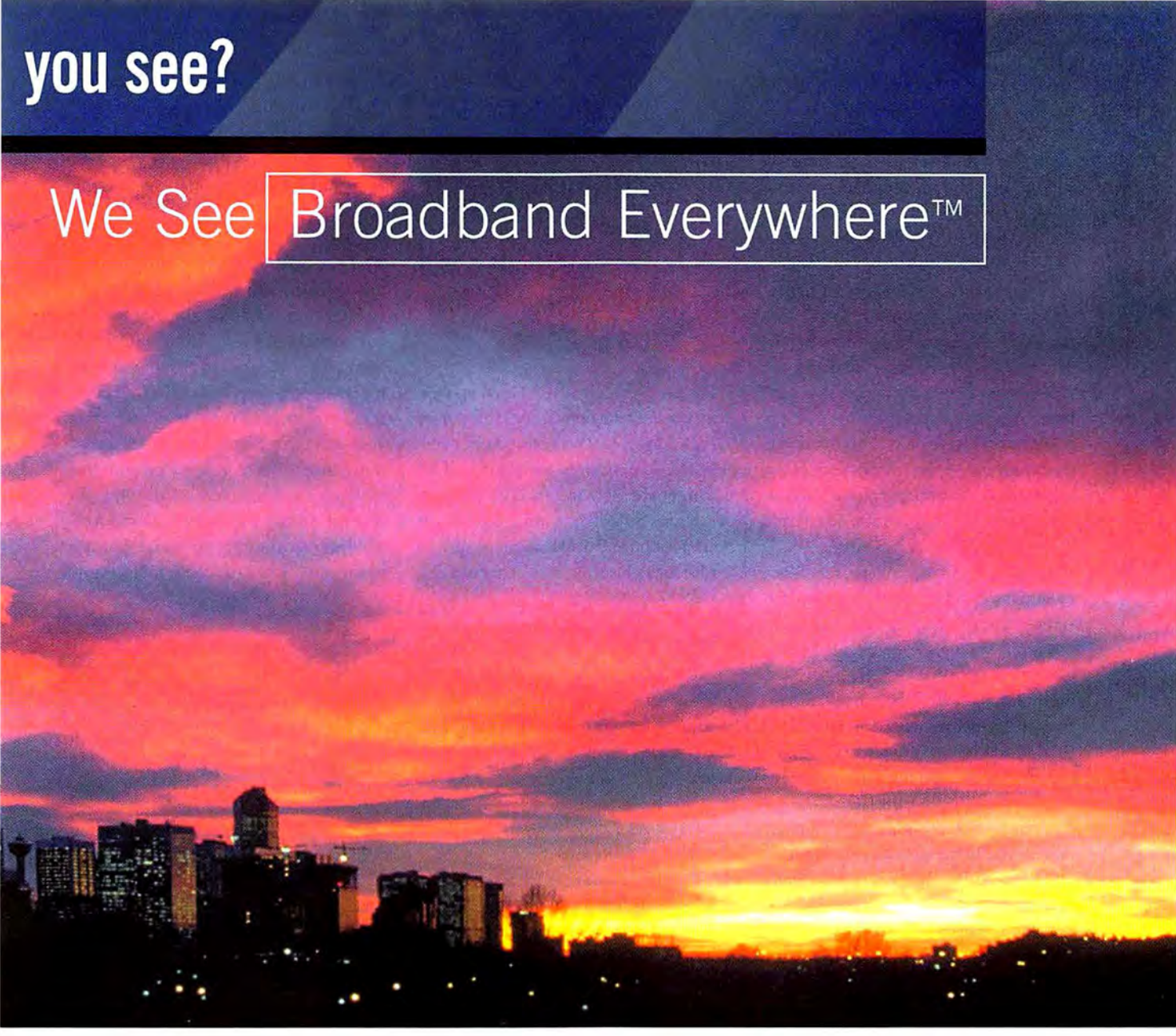

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$199

and restaurant reviews accompany lists of top attractions, and the service is free. Downloads can be frustratingly slow, though, and your wireless access fees will add up. In addition, depending on your wireless service, you may not be able to access the advice everywhere. My verdict: This site feels like a proof-of-concept demo, not a prime-time-ready killer app.

Lonely Planet's CitySync offers a much more sensible approach: Download a condensed city guide into your handheld, and access it anytime. This means you don't have to dial up for access, but the CitySync guides cost $20 per city. You can download them from www.citysync.com or buy a CD that offers any five of the available 20 cities for $50. You can also download a demo from the site before buying.

During a recent trip to Paris, Ora Tsang of Edmonton, Alberta, had a positive experience with CitySync, using it to locate restaurants and places to visit. For example, she could search for Left Bank restaurants that charge less than 100 francs per person. Tsang then used her Handspring PDA to add her own notes to CitySync's content and beamed the notes to a friend who was traveling to Paris later. "And you don't have to carry a guidebook, lightening the load in the daypack," Tsang adds.

CitySync currently offers downloadable updates only every few months. But Eric Kettunen, Lonely Planet's U.S. general manager, says the company envisions a "WorldSync" where hundreds of destinations are updated daily, with timely theater and event listings. That plan is a few years away from being realized, however.

DATA FOR HANDHELDS

ONE SERVICE THAT does offer daily syncing is Vindigo (www.vindigo.com), though it doesn't offer wireless updates and it covers mostly U.S. cities. Vindigo works with such partners as the *Washington Post* to provide daily updates on movies, nightlife, shopping, and dining for 19 U.S. cities and London. It works via syncing between the handheld's cradle and a computer. Sync before you leave, and your listings should be current for a week or so.

One interesting feature of Vindigo is its location-based listings—simply select a street corner, and Vindigo will spout advice on nearby shopping and dining.

Booking flights through **wireless handhelds,** says Henry Harteveldt, travel analyst for Forrester Research, **will not be common before 2003 or 2004.**

For more-precise advice based on location, consider the new Geode ($289) from GeoDiscovery (www.geodiscovery.com). The Geode plugs into the Handspring's springboard slot, and its GPS unit can locate you on a map within 2 meters of your position and deliver location-specific advice for sightseeing and dining in a city. If you're out hiking, it can even serve as a compass to get you out of the woods. (If only the kids in *The Blair Witch Project* had had one of these.) And it can record place-specific notes: If you find a hike with breathtaking views, you can beam your impressions to other PDA users so they can follow in your footsteps. All very cool. But are you willing to spend $300 to locate yourself on a map and play Scotty and Spock with your friends?

Other online sightseeing services include 12degrees.com and Guidebookwriters.com, which connect you with travel authors for expert advice. For a variable fee (it depends on the writer, but figure on $80 per hour for about 2 hours total), you can get a custom itinerary from writers like Joe Cummings, the award-winning author of Lonely Planet's Thailand guide, listing the spots that best suit your particular interests. The price may sound high, but if you're used to paying hundreds of dollars for guided tours, it could be a worthwhile ticket to unique experiences.

THE VERDICT

WITH ALL THE travel-planning options now available online, you can find bargain airfare, cozy lodgings, and sightseeing advice without ever calling your travel agent. From Web-only discount airfare to hotel videos to downloadable miniguides, the Net is making travel planning fairly easy and convenient. Sure, it still takes more time than phoning an agent, but travel sites give you more control over getting the precise trip you want. And with wireless services improving and growing in number, you can access more information while you're out on the road.

One development to note, however: As this article went to press, two airlines canceled their commission agreements with Travelocity and Expedia, with the aim of drawing customers from these sites to the airlines' own sites. This action, plus the impending launch of Orbitz.com (a site that's being backed by most of the major U.S. airlines) could mean that one-stop shopping sites like Expedia will not be able to offer better deals than the airlines' sites much longer. Stay tuned.

Michael Shapiro, author of Internet Travel Planner *(Globe Pequot Press, 2000), contributes to the* San Francisco Chronicle *and coauthors an online newsletter for* The Industry Standard. *Yardena Arar is a senior editor for* PC World. ■

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(www.globalfreeloaders.com and www.localsintheknow.com)

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ILLUSTRATION: NICK DEWAR

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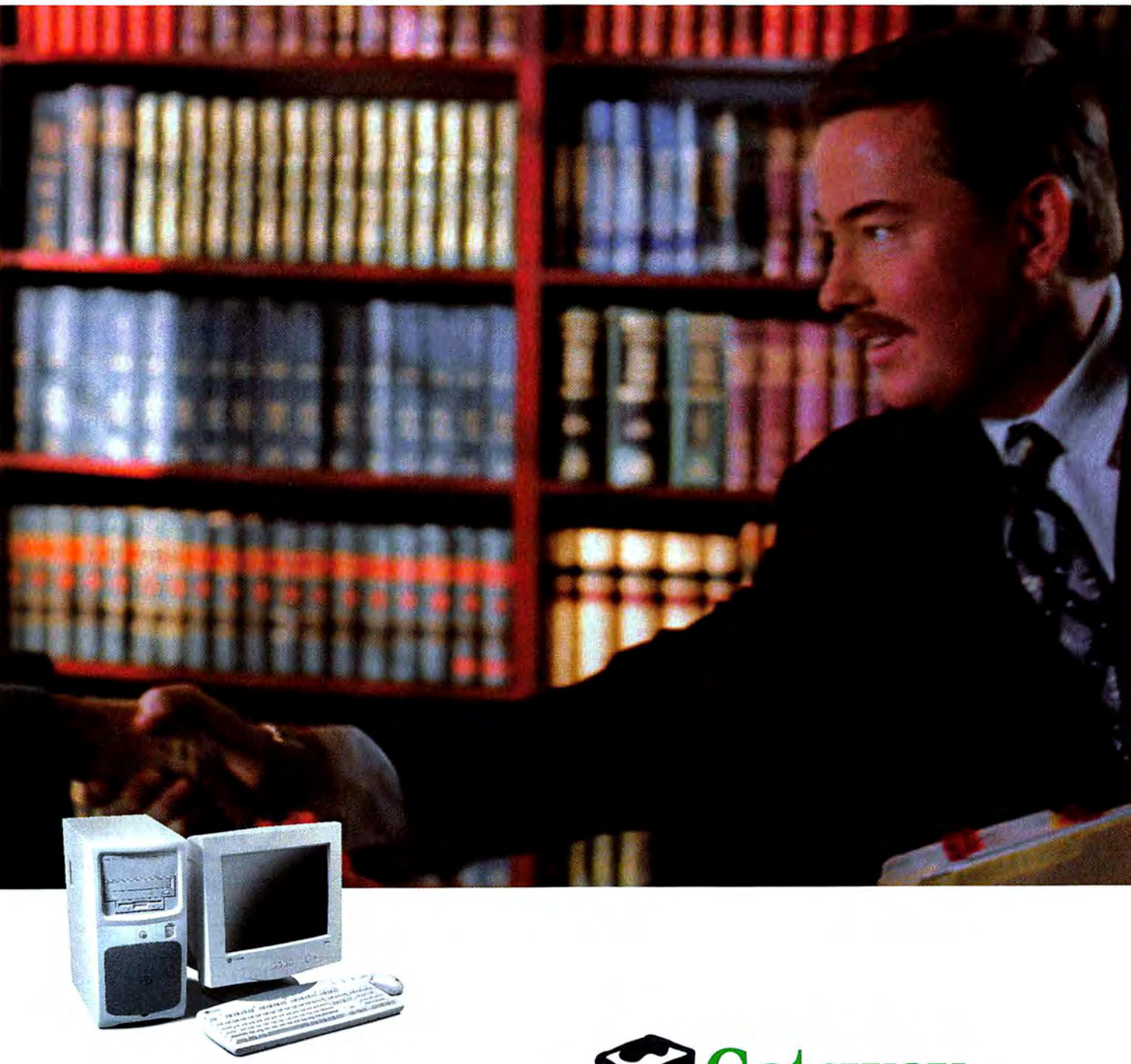

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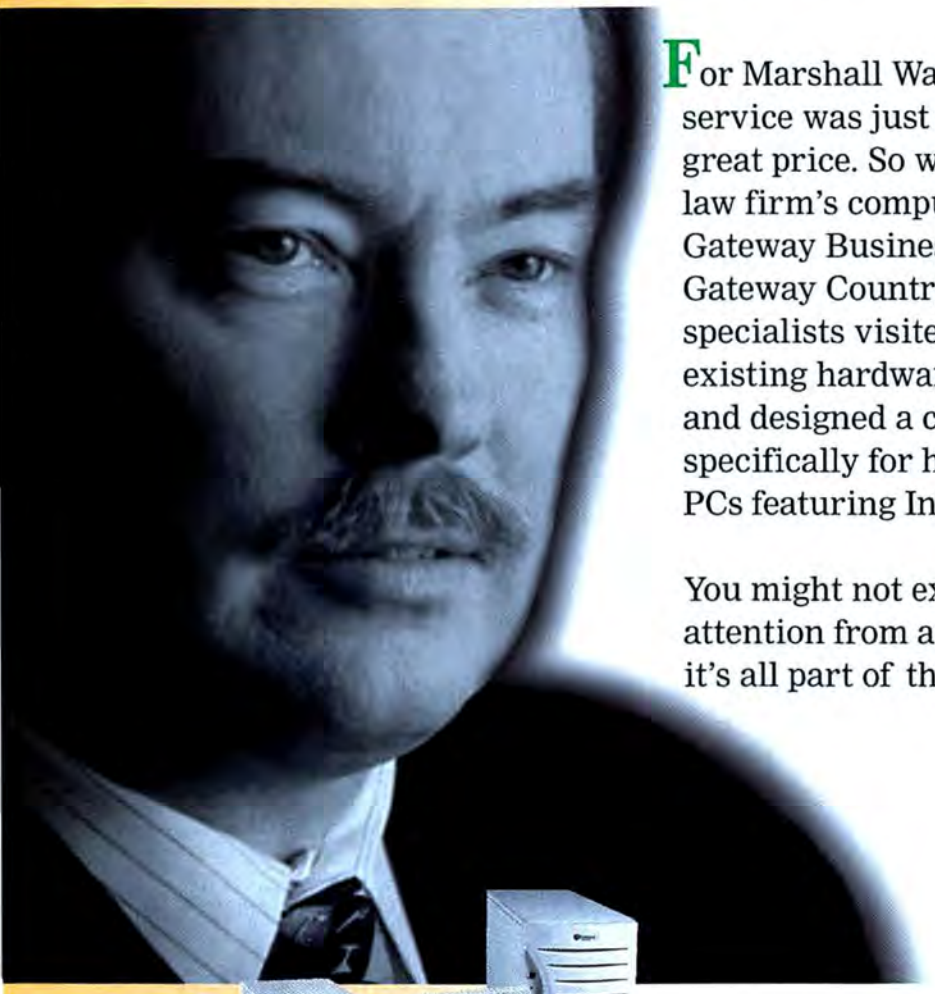
Marshall Waller — *Owner & Attorney-At-Law,* Feinberg & Waller



For Marshall Waller, getting great, local service was just as important as getting a great price. So when it was time to upgrade his law firm's computer network, he turned to the Gateway Business Advisor at his local Gateway Country® store. One of our network specialists visited his office, evaluated his existing hardware, discussed his future needs and designed a complete technology solution specifically for his business with servers and PCs featuring Intel® Pentium III® processors.

You might not expect to receive that sort of attention from a big computer company, but it's all part of the Gateway Value Promise.

Gateway Professional desktops, Solo notebooks and servers feature Intel Pentium III processors.

intel inside
pentium® III

Reliable Servers

Gateway 6400 Server

- Intel® Pentium® III Processor 933MHz (Supports up to 2 processors)
- 133 MHz Front-Side Bus Support
- 128MB PC 133 ECC SDRAM
- 9GB Ultra 160 SCSI (7200 rpm) Hard Drive
- 9-Bay Minitower with 7 PCI Expansion Slots
- Integrated Motherboard with Dual Channel Ultra 160 SCSI, 10/100 Ethernet and PCI Graphics
- HP® OpenView™ ManageX Event Manager
- 3-Yr. Limited Warranty[1] & 3-Yr. On-Site Service[3]
- FCC Class A Emissions Standard[4]

$1199 or **$42** per mo./36 mos.[2] business lease[2]

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We have a complete product line of business products featuring the latest Intel Pentium III processor-based Gateway Professional™ desktops, Solo® notebooks and servers. Visit a Gateway Country store today to test-drive Intel Pentium processor-based systems and find out how Gateway can design products and solutions that fit your business needs and budget.

Gateway Country Stores
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When you visit one of the nearly 300 Gateway Country stores nationwide you can speak face-to-face with a Gateway business advisor. We'll show you the latest in business computing technology and discuss how we can provide a complete solution for your business. You can even schedule an onsite networking consultation. And while you're there, ask about our free business seminars.

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Gateway is also your connection for training. We offer hundreds of classes — from basic software training for novices to network administration classes. We offer classroom training nationwide through our Gateway Country store locations, online courses and CD-ROM-based training.[6]

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At Gateway we're committed to helping you find the right technology for the best value. At Gateway you don't just get a PC — you get a team of people dedicated to your complete satisfaction, as well as unique services and benefits you won't find anywhere else.

- You have a dedicated sales and service team.
- If you've got a question, you'll get the help you need in a way that's most convenient for you.
- You can shop any way you want.
- You'll get the right technology for you specific needs.
- You'll be able to keep your technology up-to-date.
- You can learn how to get more out of technology.
- We won't leave your side until you're completely satisfied!

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These *quality products* solve your technology needs.

Powerful Desktops

Gateway Professional™ V1000SE

- Intel® Pentium® III Processor 1000MHz
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- 10GB Hard Drive
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- Integrated Intel AGP Graphics
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- Microsoft Windows® 98 Second Edition
- Microsoft® Works Suite 2001
- 3-Year Parts and Labor Limited Warranty[1]

$819

Gateway Professional S1400

- Intel Pentium 4 Processor 1.4GHz
- 128MB PC800 RDRAM
- EV700 17" Color Monitor (15.9" viewable)
- 16MB AGP Graphics
- 20GB Hard Drive
- Soundblaster™ PCI 128D
- 20X min/48X max CD-ROM Drive
- 10/100 Ethernet Network Card
- Mid Tower Case
- Microsoft Windows® 98 Second Edition
- Microsoft® Office 2000 Small Business
- 3-Year Parts and Labor Limited Warranty[1]

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- 14.1" TFT Color Display
- Intel® Celeron™ Processor 700MHz
- 128MB SDRAM
- 10GB Ultra ATA Hard Drive
- 8MB SGRAM 2X AGP Integrated Video
- Modular CD-ROM
- Integrated 10/100 Ethernet
- Integrated V.90 Modem
- Modular Floppy Drive
- 1.38" thin / 4.9 pounds[5]
- Microsoft® Windows™ 98 Second Edition
- 1 yr. Parts and Labor Limited Warranty[1]

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Upgrade to the Solo 5300XL
(from the Solo 5300LS)

Gateway Solo 5300XL

- Intel® Pentium™ III Processor 900MHz
- 10GB Ultra ATA Hard Drive
- 8MB SGRAM 2X AGP Integrated Video

$1799 or **$63** per mo./36 mos.[2] business lease[2]

Gateway Solo® 9500 LS

- 15.7" XGA Color Display
- Intel Pentium III Processor 750MHz
- 128MB SDRAM (expandable to 512MB)
- 10GB Ultra ATA Hard Drive
- 16MB 4X AGP Integrated Video
- Integrated 10/100 Ethernet
- Integrated V.90 Modem
- Modular CD-ROM Drive
- Modular Floppy Drive
- Microsoft® Windows™ 98 Second Edition
- 3 yr. Parts and Labor Limited Warranty[1]

$2199 or **$77** per mo./36 mos.[2] business lease[2]

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- Upgrade Microsoft Office Small Business Edition to Professional • Business Online Learning Library for Office Productivity[6]

$219 (savings of **27%**)[7]

Solo Traveler Pack

- Deluxe Carrying Case • Extra Battery
- 3-Year Accidental Damage Protection Upgrade

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Solo Docking Pack 3.0

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- Kensington® Lock • Keyboard • Mouse

$199 (savings of **28%**)[7]

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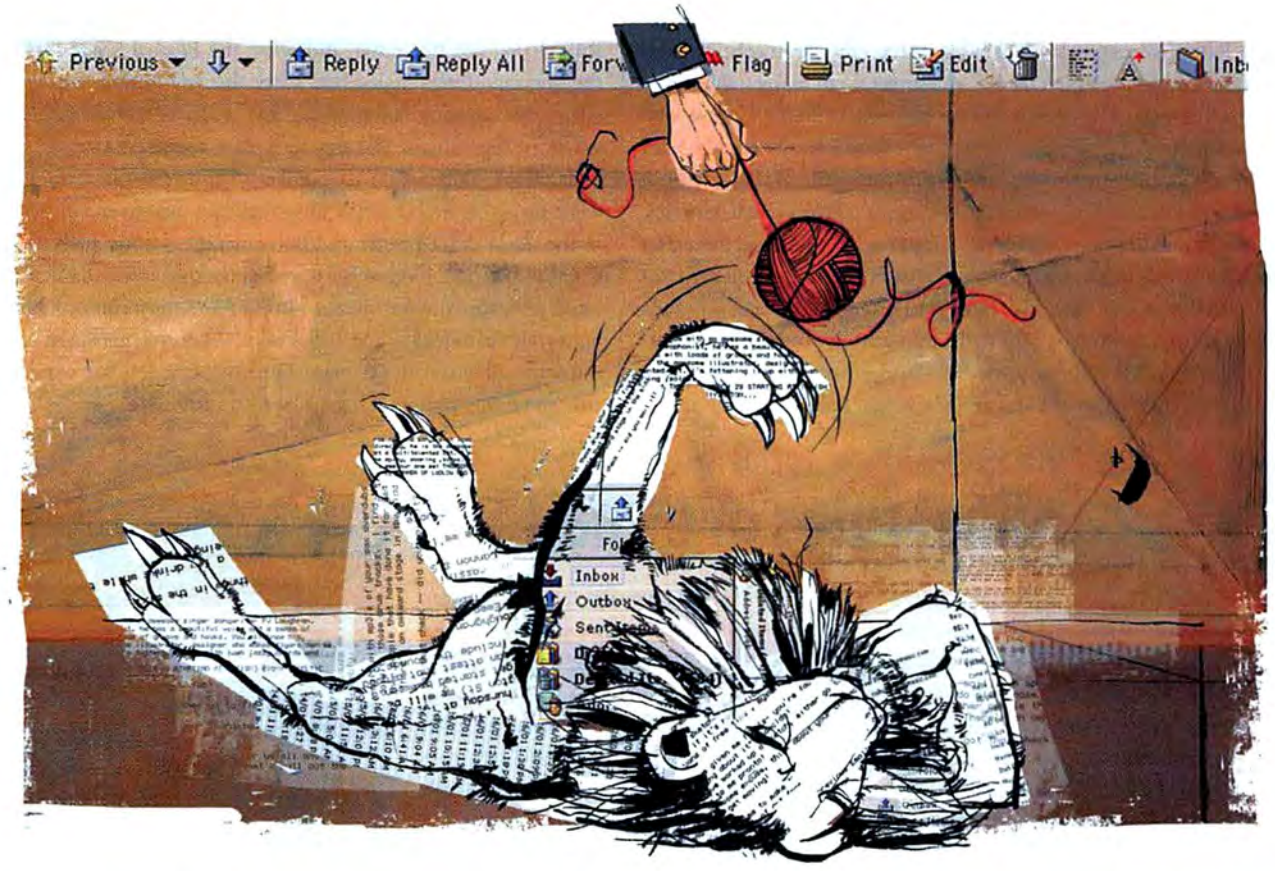
tame your in-box



Our resident e-mail addict offers 26 tips to help you get a handle on message mayhem.

BY STEVE BASS

DON'T EVEN TRY to kid me—e-mail has become a big part of your life. But are you in charge of your e-mail, or is it in charge of you? "There comes a time," as W. C. Fields once said, "to take the bull by the tail and face the situation." ▶

ILLUSTRATIONS BY P.J. LOUGHRAN

Sending and receiving e-mail is an easy habit to form because it's so effortless. I'll bet you get a ton of e-mail every day: Ubiquitous joke lists, annoying chain letters, obnoxious ads, and other uninvited garbage mingle with messages you really need. What's an e-mail user to do? I'm glad you asked. Let me explain how I use filters and rules to avoid spam. I'll also tell you how to handle attachments, and how to preserve your vital data. So before you reopen your in-box, read on.

FILTER OUT SPAM

A TRUE CONFESSION: I have more than 150 spam filters in Eudora, my e-mail client of choice. Okay, so I need a new hobby, but at least my in-box isn't loaded with spam.

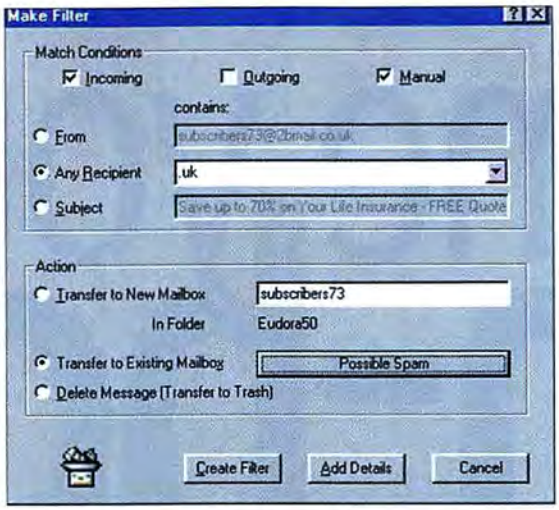


FIGURE 1: THE EUDORA E-MAIL CLIENT makes it easy to create a filter to block spam from a country, such as Britain.

Filters (sometimes called in-box rules) examine incoming messages, determine their origin, and direct them to the trash rather than to your in-box when they meet specific criteria. I know what you're thinking: Wouldn't it be easier to delete unwanted e-mail manually? Not in the long run. And creating filters is a snap once you've set up a few that identify common spam characteristics. Some e-mail programs let you copy existing rules and then alter a few words to block a new spam source. If you like, you can start with the generic filters I created for Eudora and the rules I made for Outlook 2000, along with instructions on how to import them. You'll find them at www.pcworld.com/features/june2001/filters. Then try your hand at the tips that follow.

A quick warning: Until you get the hang of creating filters, it's possible that one of them might send an important message from your boss into the trash. To cover my tuchis, I funnel filtered spam into a 'Possible Spam' folder and delete the junk manually every few days.

Experiment by creating a quick filter to block the domains of countries that spammers often use to route their junk. Their two-letter country codes are in the spam's header. Current favorites include South Korea (.kr), China (.cn), Chile (.cl), and Slovenia (.si). See the list of country codes at www.pcworld.com/features/june2001/codes.

In Outlook Express: Select *Tools•Message Rules•Mail*. Click the *Cancel* button to close the New Mail Rule dialog box (for now), and select the *Blocked Senders* tab in the Message Rules dialog box. Click the *Add* button, and enter either the spammer's e-mail address, such as **spammer@spams-r-us.com**, or the domain that sent it, such as **spamorama.com**.

In Outlook 2000: Select *Tools•Rules Wizard•New•Check messages when they arrive•Next*. Click the check box next to *specific words* in the 'Rule description', and enter a country code such as **.kr**. Choose *Next*, and then select *move it to the specific folder*. Click the blue, underlined word *specified* in the 'Rule description', highlight your spam folder, and click *Finish*. When you get spam bearing some other country domain, Outlook 2000 lets you copy this rule and easily modify it for the new country code.

cardinal rules of e-mail

EVEN SEASONED e-mail users may sometimes breach e-mail etiquette. Here's my take on writing e-mail that says what you mean.

Keep it private: Don't reply to a mail list message with "thanks" or "I agree." Reply privately instead. No matter what, cut the balance of a lengthy e-mail before replying.

Sign on the dotted line: Adding a signature line at the bottom of your e-mail ensures that the reader knows who's writing and provides other useful information as well. But keep it to three lines, including your e-mail address. **Bonus tip:** Add mailto: before your address, as in 'mailto:stevebassomatic@yahoo.com'. When people click the address, a new message window opens automatically.

Play it safe: Ten people are on an e-mail thread, and you're about to reply to the sender with some juicy gossip. Play it safe—double-check that you didn't hit Reply to All.

Keep it clean: Cursing somehow looks worse in e-mail, even to crusty old *PC World* writers like me. Avoid swearing, or at least soften it with asterisks. Harsh language often sounds even angrier in e-mail, and curt messages that aren't meant to be harsh at all can come off as cold. Think twice, dadgum it.

Don't showcase your lousy spelling: Take a second or two to spell-check your e-mail. I set Eudora to check automatically. You say you don't have a built-in spelling checker? Go to www.spellcheck.net: It's free, includes a thesaurus, and translates into French, German, and Spanish. Ordonné, non? Ja, ja, ja!

Don't cry wolf: Use your e-mail program's Return Receipt function only when it's critical that you know your message was received. Overusing Return Receipt wastes bandwidth, and if your message isn't terribly important, you may aggravate the recipient. If your message is *really* critical, try using one of those newfangled things called telephones. And another thing: Don't mark the mail 'high priority' unless it truly is a high priority.

For more e-mail tips, see "E-Mail Rules—Manage the Medium" in April's *Home Office* (www.pcworld.com/features/april2001/rules).

In Eudora: To create a filter in Eudora, right-click a spam message, choose *Make Filter*, highlight the field with the domain (it will be in either the From or the Any Recipient field), and delete everything that precedes the period and country name (see **FIGURE 1**). Choose *Transfer to Existing Mailbox*, scroll to the Possible Spam folder, and click *Create Filter*. In the ad-sponsored version 5.0.2, click the *In* button; select the *Possible Spam* folder, and click *Create folder*.

In AOL: If you want to create an AOL Mail filter, you must first establish a screen name that you will use to receive e-mail only from domains you trust (pcworld.com, for example) and from the people you choose to add to your 'accepted' list. First, log in with your Master screen name, choose *Preferences*, and select *Parental Controls•Set Parental Controls•E-mail Control•Customize*. Click *Next*, choose the option that allows mail only from the sources you list, and add the names of those sources to the list (see **FIGURE 2**). Your next step is to create new screen names—each with its own e-mail controls—to use for receiving e-mail from specific newsgroups, business associates, long-winded family members...you get the picture.

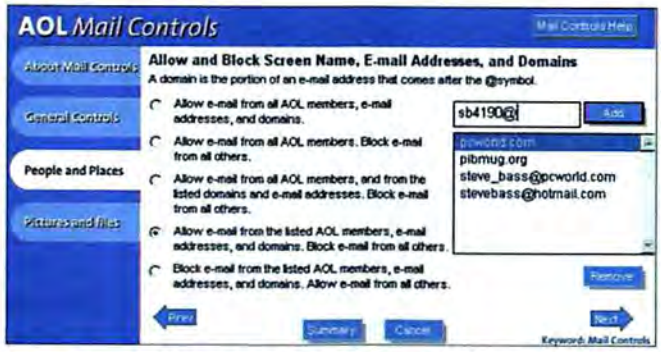


FIGURE 2: YOU CAN SET AOL'S MAIL PROGRAM to block incoming mail from all sources that you haven't approved in advance.

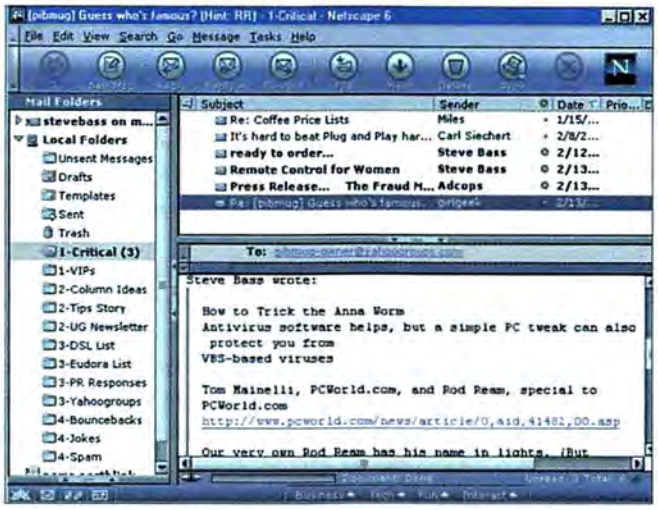


FIGURE 3: PRIORITIZE YOUR MESSAGE FOLDERS by placing a number before each folder name to keep them from being listed alphabetically.

When you get spam offering "Secrets to Spy on Others" or promising that you'll "Make Millions in 3 Weeks!!!" use a short, unique portion of the subject or message text in the filter. Don't use the entire subject—the next one will be different—and ignore the e-mail address because that changes, too. Spend just 5 short minutes a day for a week or so creating an effective filter using my patent-pending techniques, and I GIVE YOU MY PERSONAL GUARANTEE YOU'LL HAVE SATISFYING RESULTS!!!

ENLIST THE AID OF YOUR ISP

SPAM ISN'T GOING AWAY anytime soon (no matter what legislation Congress may have in mind). But with a little help from my ISP, I've managed to put a *huge* dent in the amount I get.

Perhaps your best defense against spam is to choose an Internet service provider that seriously defends you against the stuff. In an average month, my ISP keeps roughly 400 spam messages from reaching my in-box. AT&T WorldNet (www.att.net), EarthLink, and other major ISPs filter spam at the server level using Brightmail (www.brightmail.com). Web-based services such as Hotmail and Yahoo also provide excellent junk-mail filters. Other ISPs attempt to thwart the spam deluge by blocking known spamming domains. Ask your ISP about its approach to spam prevention and demand that it take action against spammers. For a look at one effective approach, read "Team Fights E-Mail Annoyances" at www.pcworld.com/news/safeguard. For details about how some people respond when their ISPs' spam filters block legitimate e-mail, see the May 2001 *Consumer Watch* (www.pcworld.com/features/may2001/spam).

SCAN ATTACHMENTS FOR VIRUSES

E-MAIL ATTACHMENTS come in many shapes and sizes, but they all have one thing in common: They're potential virus bombs that can damage your PC. Bass's Rule Numero Uno: Always save attachments to your hard drive and scan them with an antivirus tool before you view them. In either Outlook Express or Outlook 2000, open the e-mail message, select *File•Save Attachments*, and then browse to the folder where you want to save the attachment. Eudora will automatically send attachments to the folder of your choice. Choose *Tools•Options•Attachments*, and click the *Attachment directory* button. For maximum safety, give VBS Defender a try. It's a free tool that blocks all Visual Basic Script worms from entering any e-mail client. Get a copy of VBS Defender at PCWorld.com's Downloads.

EMPTY YOUR IN-BOX

TO DO THIS e-mail thing right, you have to organize your messages as they arrive. Keep your in-box empty: Reply quickly, file to another folder, or forward the e-mail right away. I bypass the conventional alphabetized list of e-mail folders by adding a number and space to my folder names to create my own order (see **FIGURE 3**). My other trick is to filter incoming messages based on events and people. For instance, when a filter in Eudora recognizes my editor's e-mail address in a message, it plays the sound of a foghorn, something that gets my attention. The message goes into the e-mail folder for my *Home Office* column, and it pops open immediately on my screen. Heck, simple filters can color-code messages from friends, joke lists, meetings, you name it. You'll be amazed at how much easier these filters make sorting your mail. For more tips, read "Managing the E-Mail Explosion" (www.pcworld.com/news/manage_mail). ▶

THE TAMING OF THE SERVER

WHEN SOMEONE sends you an e-mail message, it goes to your ISP, which holds it on an e-mail server until your e-mail client fetches it. Your e-mail gradually accumulates, but most ISPs limit you to between 5MB and 10MB of server space to store the messages you receive. If your e-mail application doesn't delete retrieved mail from your e-mail provider's server automatically every few days—*especially* if you get large file attachments—your ISP will reject new e-mail once you exceed its storage limits. You may receive a warning, but if not, here's what to do.

In Outlook Express 5.5 and Outlook 2000: Click *Tools•Accounts*, select the proper account, click *Properties•Advanced*, check *Leave a copy of message on server* and *Remove from server after 5 days* (the default), but change the 5 to a **2** (see **FIGURE 4**).

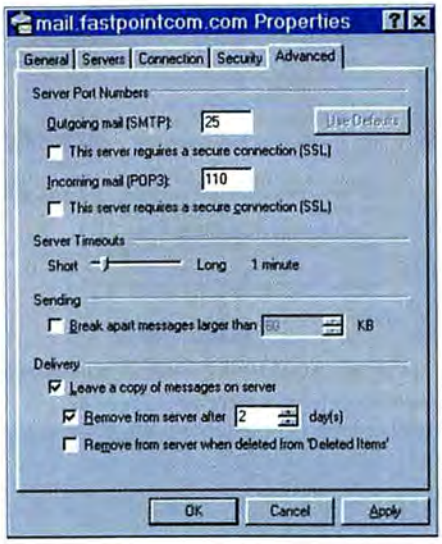


FIGURE 4: TO MAINTAIN in-box storage limits, set Outlook 2000 and Outlook Express 5.5 to delete messages from the server automatically.

In Eudora: Select *Tools•Options•Incoming Mail*, and check *Delete from server after 0 days*. Change the default zero to **2**.

In Netscape 6 Mail: Select *Edit•Mail/News Account Settings•Server (for Mail)*, and then make certain that the *Delete messages on server when they are deleted locally* option is checked.

Bonus Tip: If you frequently send and receive large files, use www.whalemail.com. This free service lets you store as much as 75MB of e-mail content for two weeks and gives access to the files to other people you specify.

BOUNCE IT BACK

HERE'S A SNEAKY way to get off a joke list or to avoid any other form of spam. Use the free Bounce Spam Mail utility to deliver a fake bounce message so the sender will think your e-mail address is invalid. You'll find Bounce Spam Mail at PCWorld.com's Downloads.

REPEAT AFTER ME...NOT

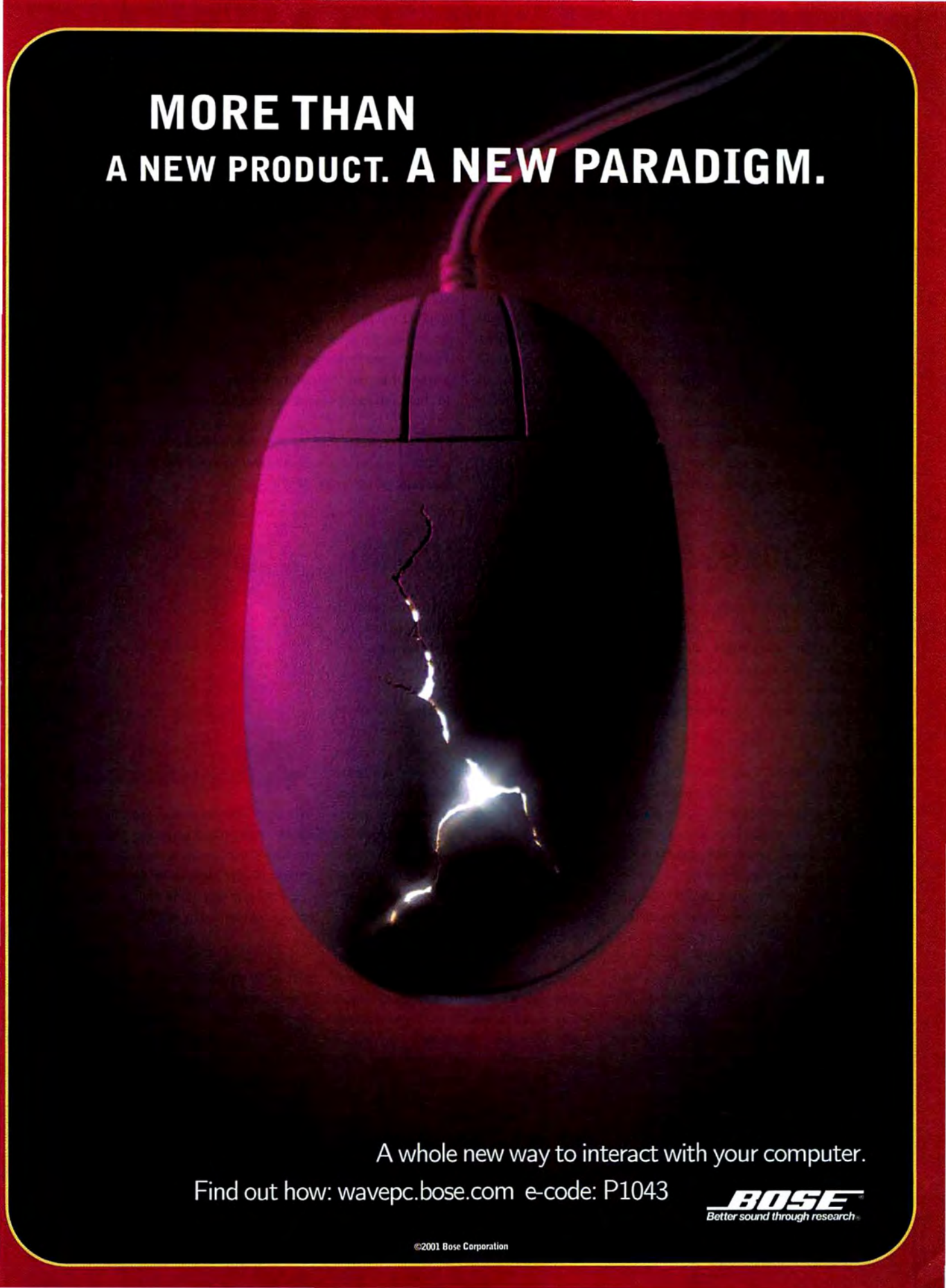
WHEN YOU REPLY TO E-MAIL, do you include all the text of the original message? Why? It's a waste of bandwidth, it makes your e-mail harder to read, and it's easy to avoid. By default, most e-mail clients include the original in replies. To change this setting in Outlook 2000, click *Tools•Options*, and under the Preferences tab, select *E-mail Options*. Click the drop-down list under *When replying to a message*, and choose *Do not include original message*. In Outlook Express, choose *Tools•Options*, select the *Send* tab, and uncheck *Include message in reply*. In Netscape, click *Edit•Preferences*, double-click *Mail and News-* ▶

get the message–which e-mail is best for you?

CHOOSING A NEW E-MAIL program or thinking of switching? Here are the best and worst features of each, plus a few of the best advanced tricks. Eudora wins the Bass Bet award–it's a little geeky but free, and terrific if you have lots of e-mail. Microsoft's Outlook Express 5.5 is next in line but only if you're a casual e-mail user. Need a Web-based product? Hotmail offers the strongest essential features–and it's free, too.

APP OR SERVICE	Pros	Cons	Advanced features	Who needs it
AOL 6 www.aol.com	E-mail and bookmarks are easy to use; multiple e-mail addresses; built-in buddy list; receipts confirm message was read.	Excessive ads; single address book; limited filters; many users have trouble upgrading; spam magnet.	Up to seven e-mail addresses.	Beginners; users needing e-mail, browser, chat, and messaging in one spot.
Eudora 5 www.eudora.com	Free (ad-based); keyboard shortcuts; embeds images; excellent incoming/outgoing filters; high virus safety; built-in file viewer; multiple e-mail names.	No calendar or appointment features; unintuitive interface; some complaints of high memory use and occasional crashes.	Provides usage stats; highly customizable features; many add-ons; obscure keystrokes.	Users who need to manage volumes of e-mail.
Hotmail [1] www.hotmail.com	Free; user can check e-mail with Outlook Express; automatically filters spam and scans attachment for viruses; checks up to four POP3 accounts.	Busy screen with flashing ads; attracts lots of spam; 2MB of space; single signature; few display customizing features.	Purely functional service with few advanced features.	Terrific for travelers–mail from Hotmail and other accounts available from any online computer.
Netscape 6.1 www.netscape.com	Free; integrated browser and e-mail; easily organized mail folders.	Filtering merely adequate.	Netscape doesn't offer lots of bells and whistles.	One-stop shoppers needing e-mail and browser.
Outlook 2000 www.microsoft.com	Shared calendar and scheduling; easily syncs with Palm handhelds and Pocket PCs; superb search tools.	Contacts/address book confusing; hard-drive space hog; vulnerable to viruses; filters not easily tweaked.	Customizable forms; excellent use of views for organizing and formatting information.	People with lots of appointments who need to share calendars and schedules.
Outlook Express 5.5 www.microsoft.com	Free; simple and easy-to-use; good address book import and export; allows access to Web-based Hotmail e-mail; handles newsgroups.	Filtering limited to incoming messages; vulnerable to viruses; no built-in spelling checker.	Terrific newsgroup reader.	Perfect for users with minimal e-mail requirements who are heavily into newsgroups.
Yahoo Mail [1] www.yahoo.com	Free; 6MB of space; spam and custom filters; POP3 access/forwarding; creates mail lists; scans attachments for viruses.	Yahoo's frequently slow servers can delay e-mail checking; occasional delivery delays; single signature.	Highly customizable screen layout; e-mail forwarded to pager or cell phone.	Ideal on the road, especially if e-mail has large attachments.

[1] Web-based e-mail.


MORE THAN
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Find out how: wavepc.bose.com e-code: P1043
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groups, select *Message Composition* from the list, uncheck *Automatically quote the original message when replying*, and click *OK*.

Even if you prefer to keep the original text in your reply by default, you can remove it case-by-case with two keystrokes. In any e-mail program, type **<Ctrl>-A** to select the original text, and start typing your reply. The text will magically disappear, replaced by your response. Eudora 5 has a more elegant solution: Simply highlight the text you'd like to include, and click the *Reply* button. The highlighted text is inserted in your reply automatically.

DON'T INVITE SPAM: MUNGE YOUR ADDRESS

IF YOU READ MAIL ON NEWSGROUPS, be sure to block (aka *munge*) spam by altering your e-mail address so that it won't work as typed but will clearly signal to people what your valid address is. Here's an example: If your e-mail address is stopspam@pcworld.com, change it to 'stopspam-at-pcworld.com'. For a complete munging primer, see the January 2001 *Internet Tips* (www.pcworld.com/heres_how/jan2001/net_tips). Or send me an e-mail at stevebassomatic@yahoo.com for a munge sample that you're free to use. Then check the Address Munging FAQ site located at members.aol.com/emailfaq/mungfaq.html.

EUDORA AND ME

HERE'S A SPAMMER'S SECRET: Much of the spam you get isn't really addressed to you. Luckily, two nifty Eudora filters send every e-mail not addressed to you to your 'Possible Spam' folder.

Select *Tools•Address Book•New*, create a nickname called **Me**, and enter all the e-mail addresses that send you e-mail regularly. Now choose *Tools•Filter* and click *New*. From the first *Header* pulldown list, select *Any Header*; change *Contains* to *Intersects Nickname*, and type **Me** into the field to the right. For *Action*, choose *Skip Rest* from the first drop-down list and leave the others blank. Follow the same steps to create a second filter, again choosing *Any Header* from the *Header* drop-down list, but this time leaving Contains in place and the field to the right blank. For *Action*, choose *Transfer To* from the drop-down list, and then select your spam folder. Finally, move these two filters to the bottom of your filter list. I learned this cool tip from the Eudora list, which I encourage you to check out at www.listmoms.net/lists/#eudora-win.

online *You can find the files mentioned in this article at www.pcworld.com/downloads. Steve Bass is a contributing editor for* PC World. ■

in-boxes need backing up, too

WHAT? YOU DON'T backup your PC every day? Well, neither do I, but why not play it safe for once and protect your vital e-mail messages and address book? Your best bet is to make your e-mail backups a part of your regularly scheduled systemwide backups.

Outlook

OUTLOOK STORES appointments, contacts, e-mail, and other critical information in a file named outlook.pst. Select *Start•Find•Files or Folders* (or in Windows Me, *Start•Search•For Files or Folders*), and enter ***.pst** in the Named field (or in the 'Search for files or folders named:' field in Windows Me). For 'Look in', select *Local Hard Drives*. Click *Find Now* (or *Search Now* in Me), and use Windows Explorer to copy the file to a different folder, a Zip disk, or another backup medium. If you want to back up Outlook's toolbar settings, mail rules, and nicknames, you should probably back up the entire C:\Windows\Application Data\Microsoft\Outlook folder manually.

To save your contact list, an e-mail folder, or some other file, select *File•Import and Export*, and choose *Export to a file*. I recommend selecting either a Microsoft Excel or Comma Separated Values (Windows) file because many programs recognize both. Then select the folder that you want to export, and specify the destination location. Slipstick (www.slipstick.com/config/backup.htm) has more information on Outlook backups.

Outlook Express

TO BACK UP Outlook Express's address book and e-mail files, select *Start•Find•Files or Folders* (or *Start•Search•For Files or Folders* in Windows Me) and enter ***.wab** ***.mbx** (leave a space between the two file extensions). Use Windows Explorer to copy the files to another folder, a Zip drive, or another medium. You can also use Outlook Express's own Export feature: Select *File•Export•Messages*, choose *All folders* or *Selected folders*, and highlight one (or more, by using **<Ctrl>**-click). Repeat the steps to back up your address book.

If you use Express 5.1 and have a Hotmail account, you can back up your address book to the Hotmail Web site. Add your Hotmail account to Express (*Tools•Accounts•Add•Mail*). Then, from the address book, select *Tools•Synchronize Now*. Just like that, all of your addresses are safe and sound.

Netscape

IN NETSCAPE 4.7, you'll find your critical files in C:\Program Files\Netscape\Users. There's probably a folder with your name on it. Back up the \mail folder, abook.nab, *.na2 (if you have other address books), and your preferences (prefs.js) and bookmark files (bookmark.htm). In Netscape 6, back up the files in C:\Windows\Application Data\Mozilla\Users50*yourname*; and while you're at it, back up all files ending in *.mab*, too.

Eudora

WHEN YOU install Eudora 5, select the option to keep data files separate from the program. Choose *Custom Data Folder*, create a new folder ('C:\eudora files', for example), and copy it to another location. Here's what you need to back up: Sigs, Stationary, and Nicknames folders; files with .fol (mailboxes with folders), .mbx, .pce, or .toc extensions; and uignore.tlx, lmos.dat, nndbase.txt, and Eudora.ini. BackDora ($20) backs up Eudora mailboxes, address books, and system files. Grab a trial version at PCWorld.com's Downloads.

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[1]MHz/GHz only measures microprocessor internal clock speed; many factors affect application performance. For mobile Intel Pentium III processors featuring SpeedStep technology, this denotes maximum performance mode; battery optimization mode is approximately 80% of maximum performance mode. [2]GB equals one billion bytes when referring to storage capacity; accessible capacity may be less. [3]CD-RW, DVD-ROM and CD-ROM drives list a variable read rate. CD-RW write and re-write speeds vary and list only the maximum possible. Actual CD-RW, DVD-ROM and CD-ROM speeds will vary and are often less than the maximum possible. The read and write results of the CD-RW drive depend on the quality and characteristics of the CD-R and CD-RW media used. Poor results may be obtained with some media suppliers. [4]Designed to be capable of receiving at up to 56Kbps with compatible phone line and server equipment, and transmitting at up to 31.2Kbps. Public networks currently limit maximum download speeds to about 53Kbps. Actual speeds depend on many factors and are often less than the maximum possible. [5]Some software may differ from its retail version (if available), and may not include user manuals or all program functionality. For non-IBM software, applicable third-party licenses may apply. Warranty, service and support for non-IBM products, if any, are provided by third parties, not IBM. IBM makes no representations or warranties regarding non-IBM products. [6]These model numbers achieved a ZD BatteryMark™ Version 3.0 or 4.0 Battery Rundown Time of the times shown above. This test was performed without independent verification by ZD; ZD makes no representations or warranties as to these test results. BatteryMark is a trademark of ZD Inc. in the US and other countries. A description of the environment under which the test was performed is available at *ibm.com/pc/ww/thinkpad/batterylife.html*. Battery life (and recharge times) will vary based on many factors including screen brightness,

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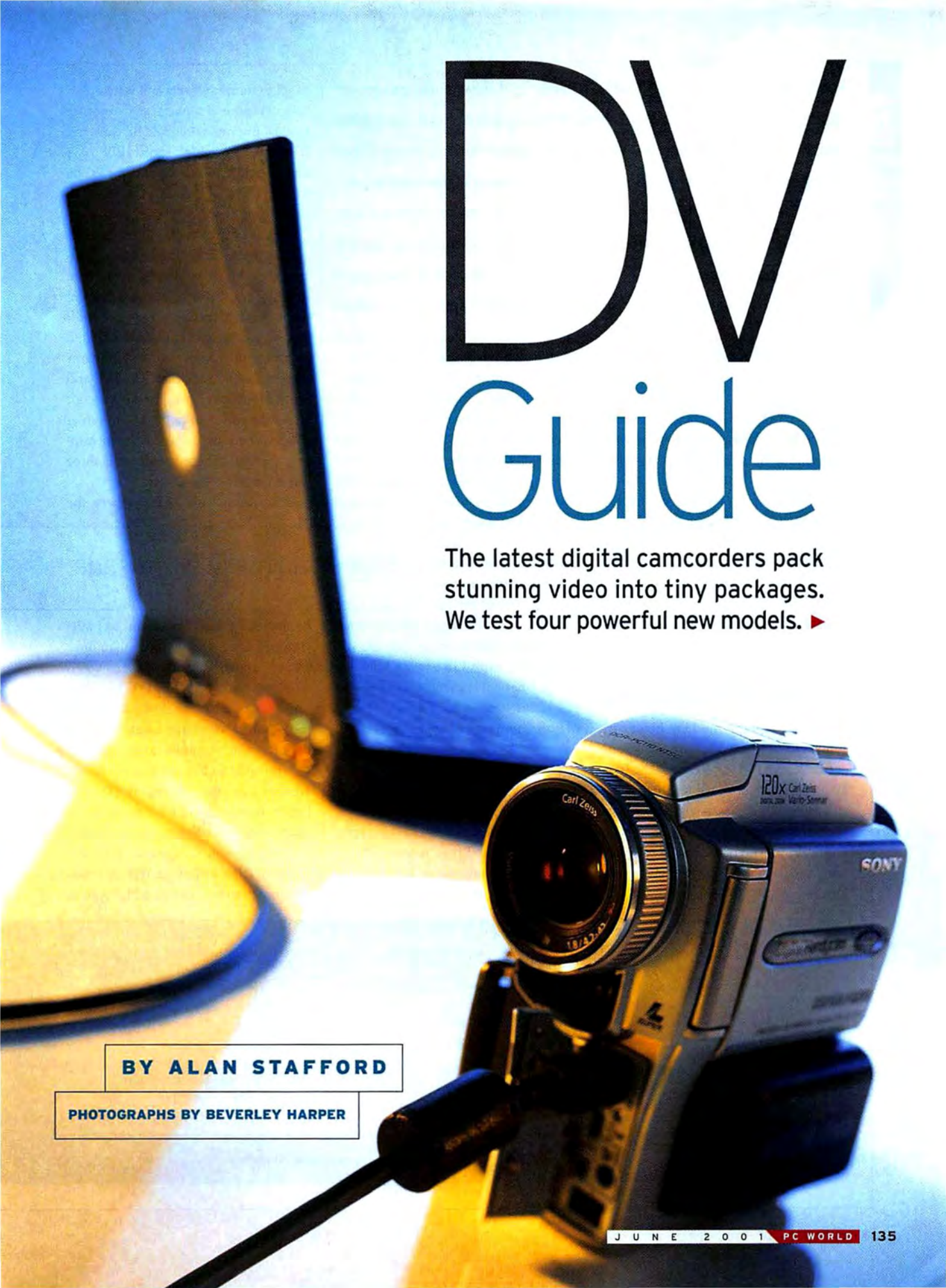
DV Guide

The latest digital camcorders pack stunning video into tiny packages. We test four powerful new models. ►



BY ALAN STAFFORD

PHOTOGRAPHS BY BEVERLEY HARPER

RAZOR-SHARP, CRYSTAL-CLEAR, and downright gorgeous. Digital video has always enjoyed those flattering descriptions, but it hid a couple of dirty little secrets—desktop computers simply weren't fast enough to deal with it, and digital video camcorders were expensive.

But the latest Pentium and Athlon processors make working with video files much more tolerable, and some new DV camcorders actually cost less than your computer. The combination of capable computer and digital video camcorder can be a powerful tool for capturing cherished memories or selling hot ideas. Even blurry, jumpy, faded amateur movies give viewers a sense of being witnesses to an event, but the high-grade footage that a DV camcorder produces can impart professionalism and quality to your next product demo or shareholder briefing. Video can make your message—whether it's a sales spiel or news that the aliens have landed—believable.

Mini-DV camcorders hold several advantages over analog models (see "DV vs. Analog" on page 138). They reproduce better color, deliver superior picture sharpness and sound quality, and let you import your work into a PC more easily. And the video that they capture won't degrade over time, as analog video will.

DV camcorders still cost significantly more than analog models, however. While you can easily find an analog camera for less than $500, three of the four DV models we looked at for this review cost more than twice that amount: $1299 for Canon's Elura 2, $1400 for JVC's GR-DVM90, and a daunting $2000 for Sony's DCR-PC110 (shown on page 135). Panasonic's PV-DV401 is the one DV camcorder here to crack the $1000 price mark—it's a relative bargain at $900.

We set out not only to see how these cameras stack up against one another, but also to find out whether digital video cameras can be easy-to-use tools for an individual or a small-business owner.

Though each model has features that will appeal to most users, we found that in most situations the Sony captured the best-quality video—of course it's also the most expensive. The Panasonic, at less than half the price of the Sony, works adequately in many settings. The Canon will appeal to users who value compactness over everything else. The JVC, though not a bad camera, doesn't perform quite as well as the others.

SIZE 'EM UP

THE FOUR digital video camcorders we looked at offer many features found in digital and even 35mm still cameras, including the ability to record still images. They all have zoom lenses, automatic and manual focusing, an LCD panel to frame subjects and watch playback, and several sophisticated exposure modes. But unlike digital still cameras, DV cameras use high-speed IEEE 1394 interfaces to transfer video to your PC (to work well, it should be a fast system with a monstrous hard drive).

Beyond those commonalities, the cameras we looked at vary in several significant ways—most obviously, in size and weight. The Canon, for example, is about the size of a standard package of Kraft singles and weighs slightly less than a pound, which makes it easy to carry around in a large pocket. The JVC and Sony models are roughly 20 percent larger than the Canon and weigh in at about 1.2 pounds. By far the largest camera in the group, the Panasonic is three times the size of the Canon.

As a rule, the smaller the camera, the harder it is to use. The Canon has tiny, cramped controls, and more than once we saw fingers covering the lens when we played back video. The JVC and Sony units also require nimble digits. In contrast, people with large hands will find the Panasonic's controls easier and more comfortable to use than those of the smaller cameras. (People with small hands, however, will have to stretch to reach some of the Panasonic's controls.)

> Video can make a message—

The Panasonic's large case gives it a couple of other advantages over its smaller competitors: It comes with a 3-inch

DIGITAL VIDEO CAMERAS

MODEL	Street price (4/1/01)	Weight (pounds)	Size (w/h/d, inches)	CCD pixels/pixels used for video (millions)	Image capture (video/still)	LCD viewfinder size (inches)	Optical zoom	Optical focal length (35mm equivalent)	Digital zoom	Aperture range or depth
Canon Elura 2 800/652-2666 www.canondv.com	$1299	0.9	1.9 by 4.1 by 3.4	0.68/0.36	Progressive/progressive	2.5	10X	33.6mm-336mm	40X	f1.6-f2.6
JVC GR-DVM90 800/252-5722 www.jvc.com	$1400	1.2	2 by 4.9 by 3.9	0.68/0.34	Progressive/progressive	2.5	10X	48.8mm-488mm	200X	f1.8
Panasonic PV-DV401 800/211-7262 www.panasonic.com	$900	1.5	3.4 by 4.3 by 6.5	0.68/0.63	Interlaced/progressive	3.0	20X	[4]	300X	f1.6
Sony DCR-PC110 800/222-7669 www.sony.com/di	$2000	1.3	2.4 by 4.9 by 4.9	1.07/0.69	Interlaced/interlaced	2.5	10X	48mm-480mm	120X	f1.8-f2.2

[1] Vendor specified; lumens per square meter. [2] Approximate number of continuous minutes while using LCD screen. [3] An interface that allows you to control the camcorder from certain VCRs or editing decks, or from a PC.

LCD display (0.5 inch larger than the screens of the others); and because its optical viewfinder rotates upward, you don't have to hold the unit directly in front of your face while you shoot.

All the camcorders share a drawback: You can't use most functions by feel. If you hold the Panasonic in your right hand supported by its strap, your thumb won't reach the tiny menu control on the back of the camera, so you'll end up using your left forefinger instead. To cycle through the menus, however, you'll have to use your right index finger to spin and push a wheel on the right side. The Sony has so many controls that you must look before you push, lest you press the wrong one.

A MINI-DV cassette (left) is tiny next to an analog 8mm (middle) or VHS cassette. Right: The JVC GR-DVM90.

whether it's a sales spiel or news that aliens have landed—believable.

ROLL THE TAPE

THE PANASONIC USES its generous proportions to include a lens with a relatively powerful 20X optical zoom (compared to the 10X zoom of the others) and a large, rocker-style zoom button, which allows you to move in and out smoothly. The other cameras' small, switchlike zoom buttons are harder to operate and often result in jerky, too-quick transitions from a wide angle view to a close-up. All four cameras offer digital zooms that magnify far beyond what's practical. At the Canon's maximum magnification of 40X, for example, subjects appear so pixelated and grainy that the video looks like footage from a bad Bigfoot movie.

All the cameras have some built-in special effects to add to your videos, such as wipes, fades, and dissolves. The Sony and the JVC let you add title screens to your videos; you can create your own in the camera, or you can download additional ones from the companies' Web sites. For the most part, though, you'll do better to add your own effects using software on your PC.

All mini-DV camcorders log time codes as they record so you can keep the sequence of your clips in the correct order. Many video-editing applications feature the handy ability to read the differences in time codes when you import your footage to your computer's hard drive and separate the video into different files. The Canon, Panasonic, and Sony units can find the end or begin- ▶

FEATURES COMPARISON

Minimum light rating (lux) [1]	Rated battery life (minutes) [2]	Ports	Software	Tech support (hours/days, charge)	Warranty for parts/ labor	Extras
7.5	45	IEEE 1394, S-Video, composite, LANC [3]	None	8/5, toll-free	1 year/ 1 year	Docking station has microphone port, headphones, and LANC terminal
<1	55	IEEE 1394, JLIP,[3] and S-Video (on docking station)	Presto Mr. Photo, Photo Album, and Image Folio	10/7, toll-free	1 year/ 90 days	Docking station supplies S-Video, composite, microphone port, JLIP; 8MB MultiMediaCard for photos
0	75	IEEE 1394, USB, S-Video, composite	ArcSoft PhotoImpression, PhotoPrinter 2000 Pro, and PanoramaMaker 2000	12/7, [5] toll-free	1 year/ 90 days	8MB MultiMediaCard for photos
0	115	IEEE 1394, USB, S-Video, composite, LANC [3]	MGI Photosuite and VideoWave	14/5, toll-free	1 year/ 90 days	Has 4MB Memory Stick slot for still images; can capture short MPEG movies on card

[4] Panasonic could not provide a 35mm equivalent.

[5] 10 hours on Saturday and Sunday.

ning of a clip based on the time code, ensuring that you don't record over important footage. Once you remove the tape from the camera, however, the camera resets the code. (The Sony also accepts "memory" tapes, which retain time codes even after removal from the camera.)

You won't have to worry about the time code on your VCR—all four cameras send video directly to your television via an S-Video or composite video connection. To connect the Canon or the JVC to a TV, you must first attach a small docking station to the bottom of each unit. The Canon's diminutive size makes the compromise acceptable, but the JVC is substantially larger, making the absence of built-in ports harder to excuse. The Sony (which is only slightly fatter than the JVC) and the Panasonic come with all the necessary ports built in.

As already noted, all four cameras have an IEEE 1394 port for transferring captured video to a PC. All conform to the Open Host Controller Interface specification, which should ensure that they work with most IEEE 1394 capture cards and editing software. Using the $99 Pinnacle Systems Studio DV IEEE 1394 capture card and either its accompanying editing software or Adobe Premiere 6.0, we simply connected the cameras to the card, after which we could control each camera via on-screen buttons.

The Canon, JVC, and Sony come with remote controls (Panasonic's remote costs $30 extra). These remotes handle not only playback but also some recording and in-camera editing functions. Consider the remote an essential component—otherwise you must resort to punching the tiny buttons on the camcorder itself.

For the most part, the camcorders came close to matching their rated battery life (for those numbers, see our features comparison chart). When we set them to play back full tapes with their LCD panels on, the Sony ran strong for 2 hours, while the JVC pooped out after 50 minutes. Both the Canon and the Panasonic ran for more than 70 minutes.

The Canon, JVC, and Panasonic units come with external battery chargers; the Canon's module can charge two batteries at once. The Sony doesn't have an external charger, but instead charges its battery while it's attached to the camera.

DIGITAL PHOTOS

IF YOU'RE LOOKING FOR high-quality, high-resolution digital photographs, stick with a digital still camera—none of the DV cameras in this group can compare. The Sony gives you the highest pixel count, at just over a million, but that's still paltry compared to even inexpensive digital still cameras.

The JVC, Panasonic, and Sony store still images on a separate memory card. Our Canon lacked a card slot, but for $200 more you can upgrade to Canon's Elura 2 MC, which has a MultiMediaCard slot. The Sony's 4MB Memory Stick holds six images at the top resolution of 1152 by 864. Both the Panasonic and the Sony use a USB connection to transfer photos to your PC; the JVC uses a serial cable (on all three models, the IEEE 1394 interface won't transfer stills).

DV vs. Analog

MINI-DV CAMCORDERS cost more than analog models, but you get what you pay for. Footage from the $900 Panasonic PV-DV401 (top), the least-expensive digital camcorder in our group, looks much sharper and more colorful than that of the analog, $399 Canon ES420V.

NICE SHOOTING!

ALL FOUR CAMCORDERS yielded stunning footage—at least some of the time. The Sony, however, produced high-quality video in the widest range of settings—on bright days, in semidark rooms, and even in the dark of night.

As with still cameras, lighting plays the most important role in determining picture quality. Shoot in bright sun or throw enough light at a subject, and almost any camera can deliver professional-looking images. We couldn't see much difference in image quality among the four camcorders when we shot outdoors under sunny skies, although we thought the Sony's images looked a bit sharper than the others'. (The Sony also autofocused more quickly.) Each camera accurately reproduced colors and contrast. When shifting from having the sun over the user's shoulder to shooting with the sun in front, the Panasonic adjusted its contrast more slowly than the others, but it still did well overall.

To minimize the effects of camera movement, all four models in our roundup use digital image stabilization, which depends on an oversize CCD imager (in our features comparison chart, for each camera, we list the total number of pixels present and the number actually used to create the image).

Canon's and Sony's implementations work well. The JVC suffers most under unstable conditions; the Panasonic requires a firm hand or a tripod in anything stronger than a mild breeze.

Of course, sound is an important component of compelling video. All four models can capture 12- or 16-bit sound (the latter is better than CD quality), but to do so they depend on tiny integrated microphones. Panasonic puts its microphone on the front of the camera—it mustered the best volume of the group, but even so, its sound was rather weak. Canon, JVC, and Sony put their microphones on top, and as a result, their models picked up even less sound. Working in low-volume settings—for example, recording a presentation when you can get only so close to the speaker—could therefore pose a problem.

The Canon at least captures reasonably clear sound, so you might be able to salvage it by bumping up audio levels in a video-editing application. No such luck with the others—their audio sounded as if it were emanating from a far-away coffee can. The Sony's volume was the weakest of the bunch.

Luckily, all four cameras offer a port that accepts an external microphone, though on the Canon and the JVC that port is located on the dock. Better yet, the Sony has an "intelligent accessory shoe" on top that accepts either an external light or a microphone (but not both). Similarly, the Panasonic offers a shoe to which you can attach a light, but the Canon and JVC require large adapters ($60 for the Canon, $25 for the JVC) that attach to the bottom of the units.

THE INSIDE STORY

START EDGING into the shadows or retreat indoors, and these camcorders break ranks, especially when you're relying on limited light. If you're taping a presentation, you may not be able to illuminate your subject. Under these conditions, the Sony comes out on top, with accurate colors and contrast. It focused well, even in a room dark enough that you might bump into furniture.

The Panasonic comes in second indoors: It had slight difficulty focusing in the darkest settings; colors looked a little dull; and we noticed a small amount of "noise" (grainy defects) in our videos. Selecting the "gain-up" setting helped the PV-DV401 handle low light levels, but that setting slowed the shutter speed, causing trouble with movement.

SMALL SHOT: Canon's Elura 2 (above) is one-third as big as Panasonic's PV-DV401 (right).

The Canon fared worse. We saw substantial noise in its images when filming in subdued light, and some video looked fuzzy, even though the camera's focus seemed to have no trouble locking on. Its low-light mode helped the unit capture a brighter image. The Elura 2's colors looked fairly accurate, though a tad dull.

The JVC focused slowly in dark settings, frequently swimming back and forth in an attempt to lock on to moving subjects. We noticed minor noise and artificial vertical texture, and colors looked slightly exaggerated. Like the Panasonic, the JVC offers a gain-up setting, with the same problematic results.

Switches on the Sony and the Panasonic allow them to shoot in *zero-lux* settings—in other words, total darkness (a feature that might be particularly useful to night owls). Both camcorders emit an infrared light that works like a spotlight at distances up to about 10 feet (an optional $70 attachment for the Sony lets it work at distances up to 100 feet). Both cameras focus adeptly in this mode, and even when we put each camera in a closed box, the video looked bright. JVC says the GR-DVM90 can shoot in less than 1 lux, but we think that specification is extremely optimistic. It doesn't perform as well in low light as the Canon, which requires a minimum of 7.5 lux.

AND THE EMMY GOES TO...

IF YOU'RE GOING to shoot outdoor training films, any of these camcorders will work well. If you can stomach its price, the Sony beats the others in all-around performance and packs a long list of features. We had few complaints about it, except for its weak audio. The Canon wins points for its pocketable size. JVC's model is neither extremely small nor a great performer. We'd rather own the Canon, for $101 less.

If you're looking for digital video on a budget, Panasonic's PV-DV401 is a good choice. It isn't as impressive as the Sony, but for the same money you can buy two. The device's chief drawback: Its ungainly size will make many people leave it in the car rather than lug it up the trail.

Alan Stafford is a senior editor for reviews at PC World. ■

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PC WORLD'S ENTERPRISE TECHNOLOGY

New customers are at your doorstep. At least that was the promise of electronic marketplaces when they burst onto the scene a few years ago. E-markets would bring together buyers and sellers from around the world, streamline business transactions, and make everyone a little richer. But something happened on the way to e-market euphoria: No one came to the party. E-markets enjoyed few successes and endured many failures. But don't give up on e-markets just yet. In this month's *Enterprise Technology*, we look at why e-markets have struggled and how they can eventually benefit your business. In fact, several companies have already learned how e-markets can work for them.

Have comments on this *Enterprise Technology* section? E-mail suggestions and feedback to enterprise@pcworld.com.

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The **Rise and Fall** (and

They were supposed to change the way buyers and sellers did business, but so far e-markets haven't caught fire. Will new opportunities open doors for your company? **By Brad Grimes**

NOT ALL E-MARKETS have enjoyed success the way FreeMarkets and its vice president Jim Zuffoletti have.

Rise?) of E-Markets

DURING THE 1990s, Dell Computer could do no wrong. It built reliable PCs to order, supported them with outstanding service, and watched its stock price go through the roof. And when e-commerce took hold at the end of the decade, Dell created one of the best sales sites on the Web and reaped even greater rewards.

So it's unnerving to see the computer giant admit defeat.

In February, the company announced that it was closing Dell Marketplace, an online business-to-business bazaar for computer-related products that it had launched only four months earlier. The e-market was intended to connect Dell visitors to suppliers of office products and services. But as Dell spokesman Ken Bissell admits, "We didn't see as many customers as we had hoped for." And Dell Marketplace never attracted any suppliers beyond the three it began with (3M, Motorola, and Pitney Bowes).

Bissell insists that sales were ramping up and says the problem was just that "electronic marketplaces are still immature." But if even mighty Dell can't create a successful B2B e-market, why should your company consider using one?

Good question. When electronic marketplaces burst onto the scene several years ago, they represented a new surge in dot-com madness. Independent startups, flush with venture capital, claimed they could bring buyers and sellers together online to save money by broadening their markets, streamlining connections, and cutting out middlemen.

Since then, many of these ventures have trimmed their forecasts, folded, or been sold. Others, however, remain profitable for both the participants and the owners. FreeMarkets.com, for example, claims that companies using its e-markets—which focus on industry niches like packaging, logistical services, and shipping—have traded $14 billion in goods and services and saved some $2.7 billion. And despite the broader e-marketplace's struggles, research firm International Data Corporation predicts that the amount of money flowing through online markets won't tail off between now and 2004, but instead will go to the e-markets that best meet the customers' needs.

With that in mind, we set out to survey electronic marketplaces—both the winners and the losers—to help you judge whether and where to participate. "No one still believes that if you build a great ▶

E-Market Checklist

Will Your Company Fit In With E-Markets?

IF YOU'VE BEEN WONDERING whether your company would perform well in an e-marketplace, here are seven questions that you should consider:

1 Is your industry big enough to support an e-market? It's simple logic: The more companies in your industry, the more potential buyers and sellers, and the better an e-market's chances of success.

2 Is your industry diverse or well consolidated? In general, the less your industry is dominated by a few players, the better the opportunity for an e-market. But this rule is not hard-and-fast. In industries dominated by a few companies, the big firms often dictate how the e-market will work—and this may set standards and contribute to operating efficiency.

3 Is your product a commodity? In many cases, e-markets that deal in predictable goods function better than those that rely on brands. For instance, energy is energy, no matter who sells it—which makes it easier to trade online.

4 How broad is your product's appeal? Might companies outside your industry participate in your e-market? For instance, if you're in the hotel supply business, would other customers, such as large office complexes, buy your products? If so, the pool of potential e-market participants increases dramatically.

5 Are your customers and competitors involved in the venture? An e-market needs to be liquid. If only you and a few of your buyers sign up, there won't be enough liquidity to sustain a real marketplace over the long term, and eventually it will dry up.

6 How complex is your fulfillment process? If your company faces trading regulations—for instance, in the sale of chemicals—the potential gains an e-market offers may be offset by logistical headaches on the fulfillment end.

7 What goals do you hope to achieve? Are you trying to get a better deal on products you buy? Or to trim your cost of doing business? Or to identify the best suppliers? Answering these questions can lead you to an optimal e-market.

PHOTOGRAPH: DAVID ASCHKENAS; ILLUSTRATION: JOYCE HESSELBERTH

online marketplace, buyers and sellers will just show up," concedes Jim Zuffoletti, vice president for diversified manufacturing at Pittsburgh-based FreeMarkets. "But e-markets are here to stay, and anyone trying to avoid them will have to change his or her thinking."

E-Market Success Story

VALUE PROPOSITION

TO BEGIN WITH, e-markets (sometimes referred to as exchanges) can take a variety of forms. Independent e-markets are formed by third parties with the intention of bringing buyers and sellers together online. They may feature everything from reverse auctions, in which the sellers bid for the buyers' business, to group buying, in which many buyers pool their purchases in order to get a lower price on goods and services. But independent e-markets have lost popularity in favor of industry-sponsored e-markets, which are formed by groups of large companies.

The original promise of independent

Setting Up Your Own E-Market Doesn't Have to Hurt

YOU DON'T HAVE TO join a huge electronic marketplace to reap the benefits of trading over the Web. Consider the case of Larkspur Hospitality, a hotel chain headquartered in Corte Madera, California, that has profited from aligning itself with an independent e-marketplace provider.

In the past three years, Larkspur Hospitality has grown rapidly, opening 2000 rooms in 16 hotels scattered across three Western states. "During all this development, we did not have sophisticated purchasing procedures in place," says Jim Hansen, the company's executive vice president and chief administrative officer. "So once the rooms were opened, we started to look closely at our processes."

TAKING THE PLUNGE

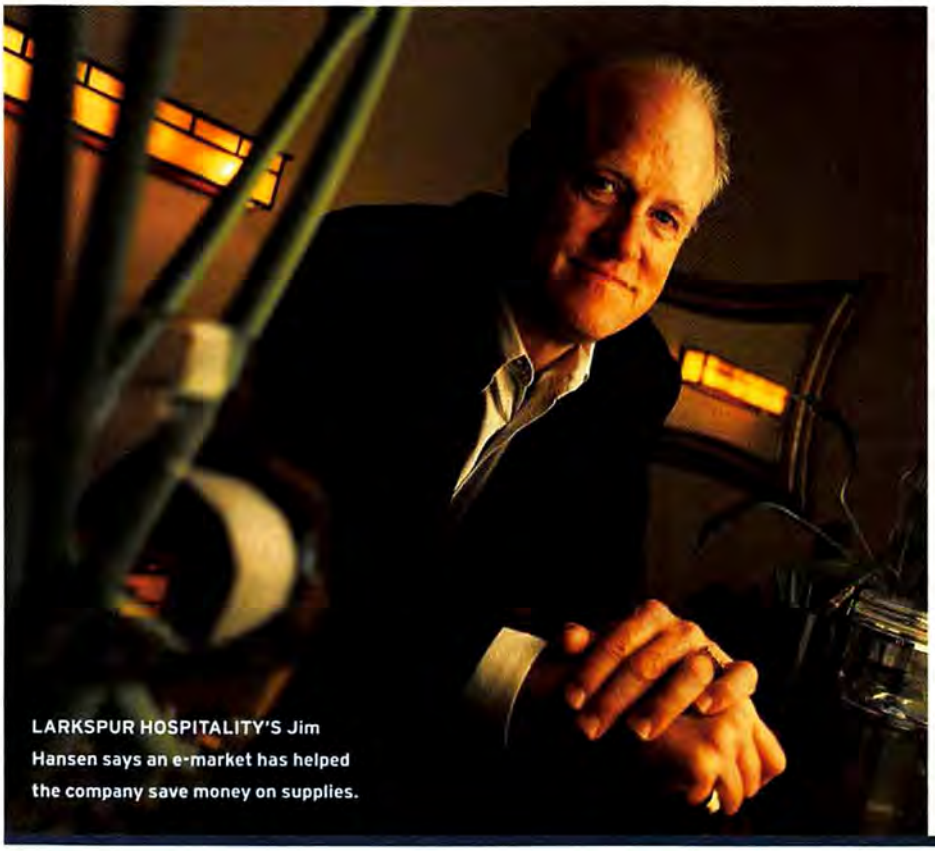
AT THE TIME, there were relatively few e-markets available—so the company began searching for a solution provider to help out. "We'd always been on the forefront of technology, so an online marketplace was a natural progression," Hansen says. "With properties and people spread out over three states, we wanted the solution to be easy to use and available right away."

Larkspur eventually settled on Zoho (www.zoho.com), a Sunnyvale, California–based independent market that serves the hospitality industry, to help it build an e-market where companies can buy and sell paper products, sheets, towels, vacuum cleaners, and other everyday supplies. "We basically go to our suppliers and ask them to join the system. They have to pay a transaction fee to Zoho. This is usually the hardest part of the negotiation. But ultimately, by getting their catalog on the Zoho system, they're exposed to other potential customers such as Starwood Hotels and Resorts and Harrah's Entertainment," says Hansen.

After five months of participation in the e-market, Hansen says, the majority of his company's suppliers now use Zoho. On top of that, the system helps streamline the procurement process with those that don't. "We can do off-catalog ordering that still goes through the central reporting system. For us, reporting is the key part of the online marketplace because we can see in one place exactly what we're ordering, when, and for how much," he says.

A little cost savings doesn't hurt either. Buying supplies through the Zoho marketplace has saved Larkspur about 5 percent over the first five months, and Hansen expects that figure to rise to 7 percent as more catalogs move online.

"There were some technical problems when we started out, but they were quickly ironed out," he says. "It's a little early to understand the full impact of the online marketplace, but we're pleased so far."



LARKSPUR HOSPITALITY'S Jim Hansen says an e-market has helped the company save money on supplies.

PHOTOGRAPH: ROBERT HOLMGREN

e-markets, of course, was that they would eliminate supposedly wasteful middlemen by bringing buyers and sellers into direct contact.

Naturally, this spooked the middlemen, who scrambled to protect their livelihood. In the health-care industry, for example, existing firms collaborated to launch sites such as New Health Exchange and Global Healthcare Exchange to counter independent e-markets like Neoforma. And in the automotive industry, DaimlerChrysler, Ford, General Motors, and other heavyweights formed Covisint.

Neither the independents nor the industry-sponsored e-marketplaces have done especially well, however. "The independents preached direct contact. But what they really did was establish themselves as the new intermediaries," says Eric Levin, vice president of marketing for Cambridge, Massachusetts–based Frictionless Commerce, which provides electronic sourcing solutions to help companies identify potential suppliers.

And both independents and industry-sponsored markets have endured failures and consolidations. Neoforma, for example, eventually hooked up with Novation, which manages more than $16 billion in annual purchases on behalf of some 7200 health-care organizations. And NECX, an independent marketplace for computers and electronics, was bought by e-market giant VerticalNet and then sold to Converge, an industry sponsored e-market launched by high-tech companies such as AMD, Compaq, and Hewlett-Packard.

On the industry-sponsored side, Integrion Financial Services Network, formed in 1996 by IBM and 18 large U.S. banks, closed in March 2000. Meanwhile, the auto site Covisint finally got off the ground last December, but at press time it still didn't have a CEO.

LESSONS FROM THE FRONT

LOOKING BACK AT THE CARNAGE, it's possible to draw a variety of lessons about what makes an e-market work successfully (see also "Will Your Company Fit in With E-Markets?" on page 143).

For one thing, a successful marketplace has to be good business for buyer *and* sellers. "Many independent e-markets lacked a compelling reason for people to participate in them," says Leo Lipis, senior analyst for IDC's EMarketplace Services research program. "They were perceived as buyer-driven. Imagine going into an exchange featuring something like reverse auctions, which are designed to drive prices as low as possible. The seller is going to wonder if it's worth the trouble."

Reality Check

Industries That Are E-Market-Friendly

LAST YEAR, AS E-MARKETS struggled to survive, Boston-based research firm the Yankee Group studied 37 industries to determine which were most and least likely to spawn successful e-markets.

MOST LIKELY TO SUCCEED IN E-MARKETS

- Computer/electronic product manufacturing
- Utilities
- Paper manufacturing
- Truck transportation
- Transportation equipment manufacturing

LEAST LIKELY TO SUCCEED IN E-MARKETS

- Mining (except oil and gas)
- Pipeline transportation
- Support activities for transportation
- Miscellaneous manufacturing
- Leather and allied product manufacturing

Source: The Yankee Group, June 2000

The ideal business-to-business e-market should also let buyers evaluate suppliers on more than just price, although the marketplace as a whole lacks a widespread technical infrastructure to allow such comparisons. Meanwhile, independent e-markets—those not affiliated with a particular manufacturer or industry—should concentrate on trading commodities or near-commodity goods rather than brand-name items. "Suppliers don't want to sign up for independent e-markets because they can't control their brand," says Lipis. "Neutral e-markets specializing in commodities are more successful because there are no branding issues."

But don't give up e-markets for dead. Many businesses of all sizes have benefited from setting up their own e-markets or from joining others. (For an example, see "Setting Up Your Own E-Market Doesn't Have to Hurt" on page 144.)

COVERING THEIR BASES

OTHERS HAVE DONE both. Paper and building products company Boise Cascade, for example, created a proprietary extranet to offer e-market services to its regular customers. At the same time, though, Boise Cascade has joined ForestExpress, a soon-to-launch e-market for the industry. "Some customers want a deep relationship with us and will operate through our extranet system," explains vice president of information technology Robert Egan. "Others want to deal with a broader spectrum of vendors. For them, we will be available on ForestExpress."

E-market proponents contend that you must look beyond the volume of business to evaluate whether this model makes sense for your firm. "People have begun to look away from transactions as a driving factor to join e-markets," says Tim Clark, senior analyst for Jupiter Media Metrix. "Now they're looking toward collaboration. This can take the form of designing products, which happens faster if suppliers and manufacturers work together. In the retail industry, e-markets can help with replenishment and demand forecasting through private trading networks. This kind of demand-side activity prevents things like inventory build-up, which has a cost associated with it."

In addition, e-markets are looking to develop services that help companies make better use of them. One challenge that e-markets raise is also a potential benefit: access to more customers. But from the point of view of a buyer, having to choose from among hundreds of new suppliers may be a problem.

"Which vendors do you do business with?" asks Frictionless Commerce's Levin. "Research shows that 73 per- ▶

cent of the total cost savings in electronic procurement comes from addressing sourcing issues like these."

Levin's company sells a solution called Frictionless Sourcing. Working within a company's firewall, the software determines the best sources and ways of purchasing products. While most current purchasing systems help companies find suppliers based on lowest price, Frictionless Sourcing adds a level of intelligence that can help find suppliers based on service policies, product availability, and more. It also helps with supplier negotiation, expenditure analysis, and vendor management. Currently Hasbro, John Hancock Financial Services, and the U.S. Army all use Frictionless Sourcing.

Even an e-market that never records a transaction may play a valuable role in setting industry standards. To take just one example, the health-care industry currently lacks a universal product numbering scheme for hospitals, distributors, and suppliers to use in describing their goods. Industry e-markets—and e-markets in general—can help establish common computing languages and protocols that will enable one company's internal systems to communicate with others.

If you think your firm might eventually participate in an e-market, you should probably start investigating now (you might start with the established e-markets listed below). Among the advantages of starting early, according to a study by CAPS Research and McKinsey & Company, are improved operating efficiencies, ample time to learn the new system, and the opportunity to help establish trading rules.

Everyone interviewed for this story agrees that e-markets are an important, viable, and even inevitable way of doing business online. As Dell's Bissell puts it, "Clearly, companies are interested in buying and selling goods through e-markets. The fact is, more and more companies are going to do it eventually."

Brad Grimes, former PC World *executive editor, is vice president of Content Foundry, a provider of consulting services and editorial content to high-tech companies.* ▶

E-Market Resources

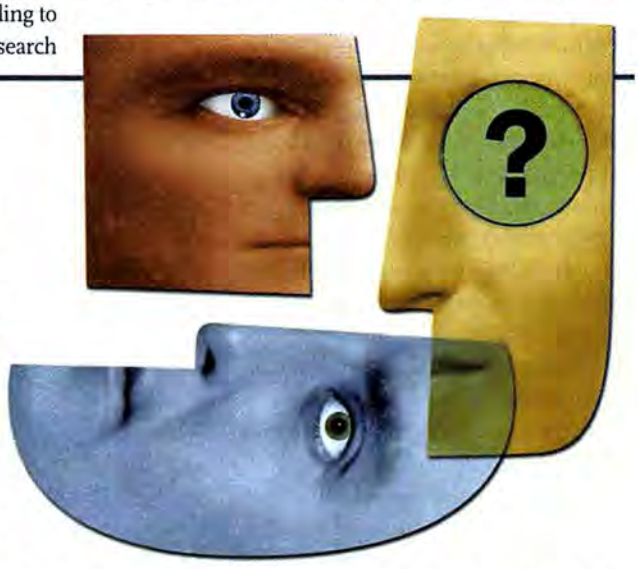


ILLUSTRATION: JOYCE HESSELBERTH

Who's Who in E-Markets

E-MARKETS HAVE been a gold mine for creative types who get paid to coin catchy corporate names. But we'll eat this page if you've heard of every e-market listed here (e-market analysts need not try to claim this prize).

CommerceOne.net: An independent online marketplace maintained by CommerceOne, a company that sells e-market solutions to big-name clients such as Covisint and Exostar. The site's Trade Zones include vertical e-markets for such varied industries as energy, financial services, and process manufacturing. www.commerceone.net

Converge: E-market for high-tech buyers and sellers. Converge changed its name from EHitex after it acquired NECX from VerticalNet. Its founders include AMD, Canon, Compaq, Gateway, Hewlett-Packard, Hitachi, Quantum, and Western Digital. www.converge.com

Covisint: The granddaddy of industry-led e-markets, created by and for the auto industry by DaimlerChrysler, Ford, General Motors, Nissan, and Renault. www.covisint.com

E2open: Converge's leading competitor, started by Acer, IBM, Lucent, Nortel, Panasonic, Seagate, Toshiba, and others. The emphasis at E2open is more on supply-chain collaboration than it is on individual transactions. www.e2open.com

Exostar: Industry-sponsored e-market for the aerospace and defense industries, backed by Boeing, Lockheed Martin, and Raytheon, among other companies. www.exostar.com

FreeMarkets: This is perhaps the most successful independent e-marketplace. FreeMarkets covers a range of industries, from aerospace to diversified manufacturing, that span 165 buyers and 9300 suppliers in 55 countries. www.freemarkets.com

Global Healthcare Exchange: Recognized in its field as the manufacturers' exchange for the health-care industry. GHE was founded by Abbott Laboratories, Baxter International, GE Medical Systems, Johnson & Johnson, and Medtronic. www.ghx.com

Novopoint: This successful e-market for the food and beverage industry is supposedly independent. But among its minority investors is Cargill, one of the largest food distributors in the world. www.novopoint.com

Transora: A global business-to-business e-market for consumer goods. Backers include Coca-Cola, H.J. Heinz, Kraft Foods, Sara Lee, and Procter & Gamble. www.transora.com

Ventro: Once a leading independent e-market host for the health-care industry, Ventro has more recently shuttered two major e-markets—Promedix and Chemdex—and explored partnerships with health-care companies, including Tenet Healthcare. www.ventro.com

VerticalNet: One of the original success stories in independent e-markets. It created venues ranging from E-Dental.com to TextileWeb, and it still serves nearly 60 industries. VerticalNet has struggled recently, however, and begun to sell its software and services to other companies that want to set up e-markets. www.verticalnet.com

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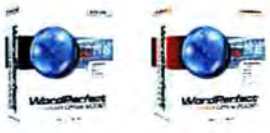

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The Microsoft/Sun Battle Heats Up

FOR MONTHS, YOU have been hearing about the grand Web-enabled development schemes offered by industry giants Microsoft and Sun Microsystems. And for months, you could safely avoid choosing between Microsoft's .Net and Sun's ONE (Open Net Environment), since both of these efforts remained largely vaporware.

The situation is now changing. In March, for example, Microsoft unveiled HailStorm, a key underpinning of the .Net framework.

HailStorm enables applications and services to interact over the Internet and offers authentication, instant messaging, and transaction services to create a unified Web development platform.

Given this advance, and others coming soon from Sun, now would be a good time to take a second look at both these efforts—especially since your choice will shape everything from the way you create desktop documents to how your company does business over the Internet.

CUT FROM ONE CLOTH?

BOTH MICROSOFT and Sun want to create an environment where applications and services are aware of each other on the network. A next-generation flight tracking service, for example, could tell whether you were away from your desk and could send flight updates to your cell phone or pager.

To achieve this, both companies have rallied around key industry standards: EXtensible Markup Language; Simple Object Access Protocol; and Universal Description, Discovery, and Integration. XML, the successor to HTML, allows programmers to embed data, context, and applications into Web pages. SOAP lets applications and services talk to each other on a network, and UDDI acts as a yellow pages for services.

Although Sun and Microsoft share a common vision, the two companies are blazing divergent paths. Sun relies on Java, the popular cross-platform programming language that it created. Microsoft believes that developers should be able to code in any language they want—though if they want to use a language optimized for .Net, they should use C# (C sharp), Microsoft's successor to C and C++.

Microsoft gains the upper hand in the breadth of its offerings, according to William Zachmann, vice president of the Stamford, Connecticut–based research company Meta Group. "Microsoft has been building XML into its products since Office 97. It's way ahead in terms of tools you need." He also points to the spate of high-profile .Net partnerships that have been announced since March, including deals with EBay and Reuters.

For its part, Sun feels it can appeal to developers with its established building blocks, including the IPlanet application server platform. "In order for this to work well," says Curtis Sasaki, director of technical advocacy at Sun, "it's got to be powered by a robust, scalable application server environment."

Tale of the Tape

MICROSOFT .NET

PRO: Most comprehensive and well-defined vision; support for multiple development platforms; ready audience for .Net services in the form of Windows desktops and ubiquitous client applications.

CON: Support for non-Microsoft development platforms is unlikely; questions linger about reliability of Microsoft server OSs; .Net service providers may eventually see competition from Microsoft in the services space.

SUN ONE

PRO: Tailor-made for Java development; IPlanet's application server platform is well established; Sun Solaris server platform is industrial-strength; AOL alliance could open 25 million doors.

CON: Less clearly articulated vision and road map; less comprehensive than Microsoft .Net; ill suited for developers short on Java skills; Star Office client productivity applications are little used.

THE BOTTOM LINE

SO WHICH SHOULD you choose? There are no simple answers, but the experts we quizzed offer these guidelines:

If your company is rich in Java programming expertise or has standardized around Sun's Solaris-based servers and IPlanet server solutions, the Sun ONE effort seems a logical path.

Businesses in the Microsoft camp, on the other hand, will want to look at .Net, particularly if they plan to migrate servers and development platforms to Windows 2000, which already includes .Net runtime capabilities and infrastructure. Likewise, companies that are heavy on C and C++ programming talent would do well to check out .Net's C# language. Moreover, aggressive adopters will find that Microsoft .Net offers a more comprehensive suite of services today than Sun ONE.

In the end, you need to assess whether your company can afford to wait longer to develop new Web-centric services. If so, you have time to let the Sun-Microsoft battle run its course. If not, start reviewing your developer resources to see which route makes more sense for you.

—Michael Desmond

ILLUSTRATIONS: JOYCE HESSELBERTH

Harness the Power of **E-Mail**

GROUPWARE SEEMS LIKE a good idea, especially in this time of electronic communications and dispersed workgroups. The problem is that some colleagues e-mail documents to one another rather than placing them in the central repository, and e-mail threads go back and forth so often that you can easily lose track of which of the various messages contains the latest details.

New software from firms like Abridge (212/924-9814, www.abridge.net), an application service provider in New York, aims to solve this problem.

Abridge for Enterprises lets people work naturally, using e-mail to power the workgroup. When a workgroup uses Abridge, each member copies an Abridge e-mail address on all correspondence (something like bigproject@thecompany.abridge.com). The software then organizes those messages into folders on Abridge's secure servers. Meetings show up in a calendar; document attachments go into a separate folder; and contacts are collected in their own list. Group members can access all this material from a browser wherever they are.

Boston-based advertising firm Holland Mark switched to Abridge to ease communication among its account management teams. "Information was being distributed in hallways, over e-mail, and through voice mail. We never knew if everyone had seen the latest documents or where they were stored," says Drayton Martin, vice president and brand director. "Abridge accommodates how we work."

It isn't perfect, of course. If workers forget to copy the Abridge e-mail address on their correspondence, the software can't act on their messages. And if they don't use the correct keywords, Abridge can't organize the information.

Abridge is not the only company helping enterprises take better advantage of their e-mail. Zaplet (650/620-2900, www.zaplet.com) turns messages into mini-applications, so an e-mail message can update itself when workgroup members respond. That way the entire e-mail thread is contained in a single message.

"It's hard to find time to train people on new group applications," says Martin. Companies like Abridge and Zaplet want to make it so you don't have to.

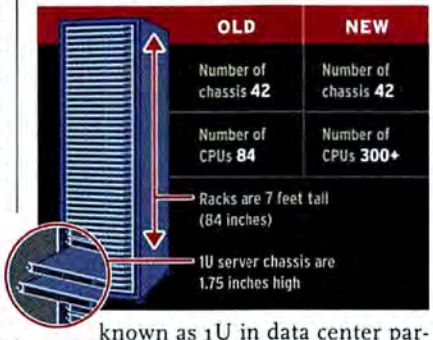
–Brad Grimes

Transmeta Powers **Ultradense Servers**

YOUR AVERAGE Internet data center faces a stiff challenge: cramming more servers into existing floor space. The problem is not so much insufficient space as excessive heat. Thousands of servers mounted in vertical racks can produce enough calories to melt a glacier. No wonder a new class of systems—known as ultradense servers—has emerged to solve the data center dilemma.

At the heart of these servers are low-power CPUs, which run cooler and consume less power than normal server processors. That's big news for data centers, where more processors spell more profits. Transmeta, the company known for its Crusoe line of mobile CPUs, is pushing its chips into servers.

Delivering the first Transmeta-based servers are three little-known companies: Rebel.com, FiberCycle, and RLX Technologies. Rebel.com's NetWinder 3400 (877/282-6735, www.netwinder.net), expected to ship later this year, will fit a 533-MHz Transmeta Crusoe CPU, a 60GB hard disk, and 256MB of RAM in a slim chassis 1.75 inches high—a form factor known as 1U in data center parlance. The firm currently offers a $1795 server appliance based on the 533-MHz Crusoe chip for small businesses.



The WebBunker 206 server from FiberCycle (408/354-4600, www.fibercycle.com) employs a thicker 2U design, but the unit packs up to a dozen processors in the chassis for greater processing density. A unit with six 633-MHz CPUs, 256MB of RAM, and a 20GB hard disk costs $11,230. Meanwhile, RLX Technologies (866/250-4667, www.rlxtechnologies.com) expects to release Transmeta-based servers in May.

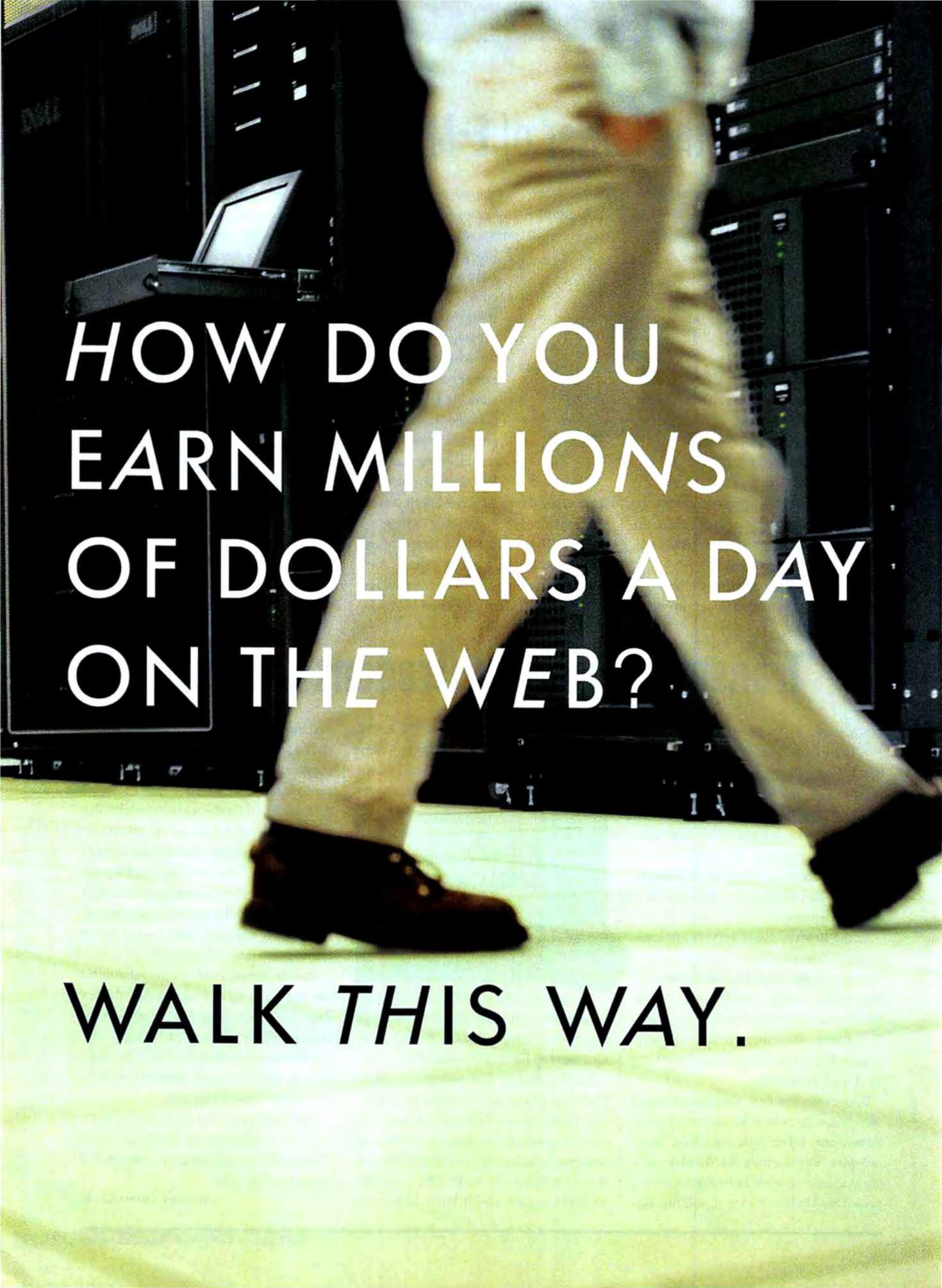
"A standard rack is 42U in height. But you don't want to pile 42 1U servers on top of each other because the heat doesn't dissipate well," explains Michael Swavely, president and chief operating offer of RLX Technologies. "The type of servers we are introducing will put a dozen or two dozen [processors] into a 3U space."

Nathan Brookwood, principal analyst for research firm Insight 64, thinks Transmeta faces long odds. "Their timing is good, but I'm not sure about their competitive position vis-à-vis Intel," he says. Case in point: Compaq plans to introduce ultradense servers this year.

Still, the market for cool-running servers is just heating up. Both Intel and Transmeta will release even lower-power chips later this year.

—Michael Desmond ■

INFOGRAPHIC: SEAN McDONALD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PC AMERICA: INVENTORY MANAGEMENT AT POINT OF SALE

www.pcamerica.com

The home page for PC America speeds you to the point-of-sale products you need.

While many motorists in Dimondale, Mich. say the family-owned Windmill Truck Stop is a home away from home, its controller, Kevin Edelmann, says it's been more like a house of accounting horrors. Besides monitoring retail fuel sales in the truck stop's "truckers only" area, he also has to keep an eye on commuters' and travelers' purchases in the king-sized complex's convenience store, family restaurant, motel, and auto service center. "Keeping track of all of that inventory has been a nightmare," Edelmann says.

The Point of Sale (POS) system that the Windmill had been using since 1982 did a fine job of ringing up sales, but it couldn't tell store managers anything about what was on the shelf. "The system only broke sales down by department," Edelmann says. "So it couldn't tell the difference between a tube of toothpaste and a bottle of shampoo."

Edelmann found only a few POS solutions that were easy to use, Microsoft Windows-based, and able to support multiple input devices. And none of them could manage the 20,000-plus items in the Windmill's convenience store and restaurant. "We desperately needed a solution that could bring all of these components of our business together," he says.

PC AMERICA

Things finally turned around at the Windmill once Edelmann deployed PC America's Cash Register Express (CRE 2000), a Windows-based POS program that works with ordinary PCs and peripherals, as well as barcode scanners, receipt printers, and pole displays (which show charges at the checkout counter). Now all of the Windmill's cashiers can use touch screens and barcode scanners to enter orders and update inventory. And setting up CRE 2000 could not be easier, says Edelmann. "PC America did an excellent job pulling all of the hardware together initially. But the great thing about their software is that I can grab any component I want off the shelf and throw it together in no time. This is one slick program."

The Windmill has processed more than half a million transactions with CRE 2000 and PC America's Restaurant Pro Express (RPE 2000) since October 1999. And Edelmann predicts that PC America will continue to develop the software he needs to keep things running smoothly. "PC America is constantly improving upon their products," he says.

Now PC America is helping retailers like the Windmill to move beyond the sale itself to increase revenues. A new feature in CRE 2000 gives businesses the ability to print coupons on the bottom of sales receipts on an Epson TM-T88II receipt printer. They can use the coupons to advertise specials on slow business days (e.g., "10 Percent Off All Purchases Every Tuesday"), or to give their customers discounts on overstock items (e.g., "Get a Free Six-Pack of Pepsi on Your Next Visit").

CRE 2000's couponing feature promises retailers an excellent route to a crucial dimension in retail sales. "Repeat business is the most important aspect of any business," says PC America's president, Howard Gosman. "With this addition to our POS package, we are giving our customers a quick and easy-to-use method for creating it."

Cash Register Express Software
for Windows...$495

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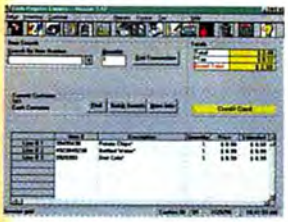

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All PC America Software requires Microsoft Windows. The software was written in Visual Basic using Microsoft Access Files. The source code is available.

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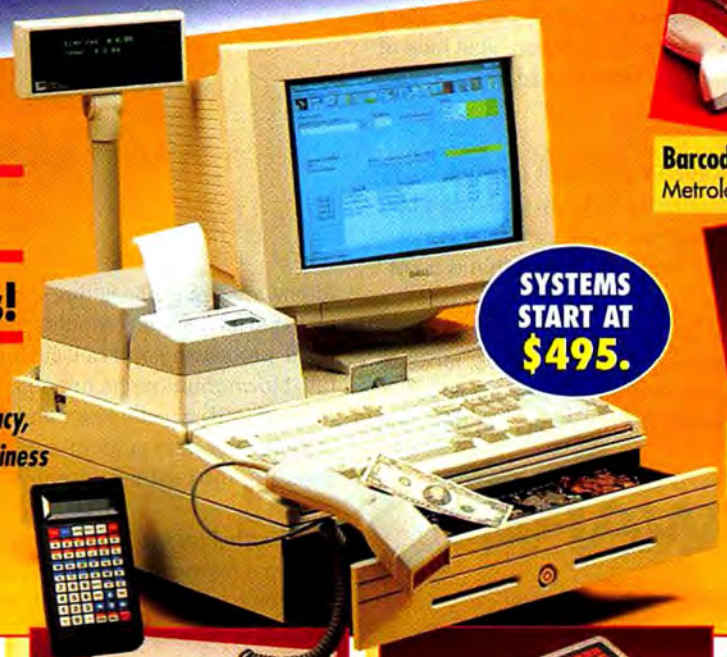

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If extra-terrestrials looking for high-performance PCs approach you with the order, "Take me to your leader," you'd do well to guide them to Alienware Corporation. Just look at some of the comments customers have posted on Alienware's web site:

"I just want to thank you for such a well-built product," says Marty. "My new Area 51 computer is truly 'all that and a bag of chips'.... I will be referring your excellent company to my friends who are looking for a computer system that is a cut above the rest."

Another user, David Shor, writes, "Thank you, guys, for building the best system money can buy! There are no false claims about performance level. The machine I got from you just smokes."

ALIENWARE
WORLD-CLASS PERFORMANCE

"Alienware, you are supreme," gushes Jack Powell. "I am now on my second Alienware system.... I fell in love with the first and am now in love with this one. There is no better-built computer on the market, and the components are absolutely cutting-edge.... I wouldn't consider buying a computer system from someone else."

"I have never had the pleasure of using a machine that was built to such perfection," Mario Viscardi adds. "The speed of the machine is amazing!"

Users aren't the only ones enthusiastic about Alienware's computer systems. "Alienware's top-of-the-line system packs a lot of brand-name punch into a reasonably priced package," writes *PC Gamer*, which has given Alienware its Editor's Choice award every year for the past three years. Alienware also won *Maximum PC's* "Kick-Ass Award" and was described by that magazine as "the fastest PC we've ever seen, bar none!"

Alienware's success is due in part to its vision of building high-performance computer systems that go beyond word-processing and net-surfing capabilities to include full-blown multimedia options. The company strives to use the latest 3D accelerators and the best hardware possible, allowing users to custom-configure their systems by choosing the best brand-name components.

The South-Florida-based company, which was recently named a Microsoft System Builder Gold Member, prides itself on its customer service and support, which is also praised by its customers.

"The minute I began talking to your service reps, I knew I was in good hands," explains Michael Cooke. "They made me feel confident in the product I was purchasing, offered suggestions, and gave their input on the hardware.... Keep up the good work and keep setting the standards for what should be expected from any company."

Abraham Egnor says, "I love you guys. I sent you a message about losing the Software DVD player. I expected to get a reply sometime this week, maybe asking me for more info. Instead I got a reply the next day, with the software attached. Two words: jaw droppage. And it works. I'm not used to things going this well, especially where computer problems are concerned."

High performance, service, and support. It's no wonder many consider Alienware "out of this world."

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"No doubt, Alienware goes the extra mile and then some"
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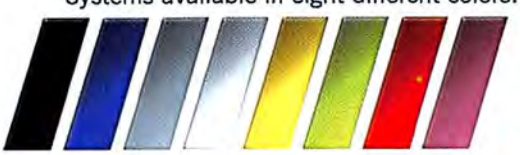

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A monthly update of the best desktop PCs, notebooks, monitors, graphics boards, CD-RW drives, and digital cameras

PC WORLD

TOP 100

160 Power PCs

164 Value PCs

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170 Home PCs

173 Monitors

175 Graphics Boards

177 CD-RW Drives

179 Digital Cameras

PRIME REAL ESTATE

Edited by Richard Baguley

SAMSUNG'S SYNCMASTER 1200NF: Almost 20 inches of screen space for under $825.

WHEN IT COMES TO MONITORS, bigger is usually better. Investing in a bigger monitor can change the way you work, allowing you to use higher resolutions and see more of your images or documents on screen at once. That's why this month's monitors chart looks at 21- and 22-inchers. These giants of the monitor world have a reputation for being heavy, expensive space hogs, but as with most other computer products, their prices have been falling. Take, for instance, Samsung's SyncMaster 1200NF, which debuts this month in first place on our *Top 10 Monitors* chart. This behemoth, with its huge 19.9-inch viewable screen area and diagonal .24-millimeter dot pitch, earned scores of Very Good and Excellent, respectively, in our tests of text and graphics quality. Although the SyncMaster's price of $824 is significantly higher than what you would pay for a smaller monitor (many 17-inch models now cost between $200 and $300), that extra screen area can make a big difference to those who want to see a lot of data displayed at one time.

TOP 10 PRINTERS ON HIATUS: The printers chart has been superseded by this month's comprehensive roundup on page 96. The printers chart will be in its usual spot next month.

1 GHz: TOP SPEED, HIGH TARIFF

LAST MONTH, WE LOOKED AT five of the first notebooks based on Intel's new 1-GHz mobile Pentium III chip. Those systems scored new highs on our PC WorldBench 2000 tests, although the improvement over the mean score for PIII-850 notebooks was only 4 percent.

This month we reviewed the HP Omnibook 6000 for our *Top 10 Notebook PCs* chart. The new 1-GHz Omnibook has many desirable features, including a high-resolution 15-inch screen and a 30GB hard drive, and it's fast, earning a score of 168 on our PC WorldBench 2000 performance tests. However, it failed to place on the chart because at $4099, it's too expensive. Its impressive features and high speed are not enough to compensate for its high cost.

The built-in aerials for 802.11b wireless networking represent yet another intriguing trend in notebooks. A number of vendors now build aerials into their notebooks, so adding wireless networking simply involves adding a Mini PCI wireless network card. This solution also frees up a PC Card slot for other uses. The first two notebooks with built-in aerials to appear on our Top 15 chart are the Dell Latitude C800 (number two on the power chart) and the Latitude C600 (the number one Best Buy on the midrange chart).

DELL TECH-SUPPORT ISSUES?

A RECENT UPTICK in the number of complaints about Dell's customer support is a surprise—the company has been a longtime fixture at the top of our reader-based Reliability and Service surveys. Although the company's Good support rating remains unchanged for the time being, we are keeping a close eye on the mail to see if this is a short-term support problem (caused in part by the launch of Windows Me) or a long-term change at Dell. We are also running another Reliability and Service survey. Stay tuned.

Micron announced in March that it will sell its PC business, MicronPC.com. Though the Micron brand will continue, we have no indication yet as to how the changes might affect Micron customers. We will keep an eye on the revamped company to see how capably it performs.

Freelance writers Jon L. Jacobi, Dan Littman, Kirk Steers, Joel Strauch, and Carla Thornton, and PC World *editors Richard Baguley, Tracey Capen, Lisa Cekan, Rebecca Freed, Alexandra Krasne, Kalai Murugesan, Kalpana Narayanamurthi, Melissa J. Perenson, and Alan Stafford contributed to this month's Top 100 section. Curt Buehler, Ulrike Diehlmann, Matt Halloran, Robert James, Elliot Kirschling, Jeff Kuta, Danny W. Lam, and Thomas Luong of the PC World Test Center performed testing.* *See page 14 for contact information.*

online **POINT YOUR browser to www.pcworld.com/reviews/topcharts for late-breaking reviews of desktop computers and other products covered in the Top 100. You can find details about the PC WorldBench 2000 test suite and how we run it at www.pcworld.com/benchmark.**

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following information should answer them.

How do the charts work? Each month we test a large number of PCs, printers, monitors, graphics boards, CD-RW drives, scanners, and digital cameras and compare them with previously reviewed products. Only the best products land on the charts, which are refreshed monthly. System configurations are shown as tested. Vendors may have since changed components.

What does the overall rating mean? This 100-point scale reflects results from our hands-on evaluations and performance tests. A score in the 90s is exceptional, while one in the 70s is above average.

What does the PC WorldBench 2000 score mean? It's a measure of how fast a PC can run a mix of common business applications as compared with our baseline machine, an HP Pavilion 8380 with a PII-400 CPU, 96MB of RAM, and an 8GB hard drive. For example, a PC that scores 200 is twice as fast as the baseline system.

Where do the scores for reliability, support quality, and support policies come from? Reliability and support quality scores are based on surveys of *PC World* readers and on anonymous support calls made by *PC World* staff. The policies score is based on vendor support policies.

PHOTOGRAPHS: MARC SIMON; COMPUTER SCREEN GRAPHICS: JOHN GODDARD; ICONS: JEFFREY PELO

PC WORLD

TOP 10 POWER PCs

	POWER SYSTEM	Month tested	★ Overall rating	Street price (3/16/01)	PC WorldBench 2000 performance score [1] (Faster ▶)	Base configuration
1	Micron Millennia Max XP2 800/642-7667 www.micronpc.com	NEW	87	Average: $2485	Outstanding 210	**Good:** Athlon-1200, 128MB of DDR SDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
2	Polywell Poly 880K7-1200 800/999-1278 www.polywell.com	NEW	87	Expensive: $2980	Outstanding 225	**Outstanding:** Athlon-1200, 256MB of DDR SDRAM, 256KB L2 cache, 92GB hard drive, 19-inch monitor, Windows 2000
3	Micro Express MicroFlex 1200B 800/989-9900 www.microexpress.net	NEW	86	Very inexpensive: $1099	Outstanding 184	**Good:** Athlon-1200, 256MB of SDRAM, 256KB L2 cache, 40GB hard drive, 17-inch monitor, Windows 98 SE
4	Gateway Professional S 1500 800/846-2000 www.gateway.com	May 01	84	Average: $2543	Very good 200	**Very good:** Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
5	NuTrend Athlon Ultra 2 888/482-6678 www.nutrend.com	NEW	83	Very inexpensive: $1799	Outstanding 169	**Good:** Athlon-1200, 128MB of SDRAM, 256KB L2 cache, 60GB hard drive, 19-inch monitor, Windows Millennium Edition
6	Sys Performance 1100T 800/613-9963 www.sys.com	Dec 00	83	Inexpensive: $1918	Very good 229	**Good:** Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows NT 4.0
7	HP Vectra VL800 800/752-0900 www.hp.com/desktops	Apr 01	82	Very expensive: $3748	Outstanding 208	**Outstanding:** Pentium 4-1500, 256MB of RDRAM, 256KB L2 cache, 40GB hard drive, 21-inch monitor, Windows 2000
8	Dell Dimension 8100 800/388-8542 www.dell.com	Feb 01	82	Very expensive: $3499	Very good 194	**Very good:** Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
9	ABS Performance Ultra 800/876-8088 www.abspc.com	Mar 01	80	Average: $2379	Very good 196	**Very good:** Athlon-1100, 256MB of SDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
10	HP Vectra VL400 800/752-0900 www.hp.com/desktops	Oct 00	79	Inexpensive: $2088	Good 188	**Good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows 2000
	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 159.

[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).

THERE'S BEEN A SHAKE-UP at the top of the power chart this month: New systems appear in the first three slots and at number five. All four newcomers feature 1.2-GHz Athlon processors, and the top two—Micron's Millennia Max XP2 and Polywell's Poly 880K7-1200—pair the CPU with speedy DDR memory.

1 MICRON MILLENNIA MAX XP2

NOTE: Micron Electronics has recently announced that it is selling its MicronPC.com business; NEW see page 159 for details.

WHAT'S HOT: The 19-inch Micron 910EX monitor displays deep, rich colors, and its text remains sharp and readable even at our maximum test resolution of 1600 by 1200. Inside the case, three open PCI slots and three open bays provide expansion options, and all of them are accessible without tools; the slots have a flip-up cover, and you can add or remove drives by pressing a tab on each side. The case has two front-mounted USB ports—for a grand total of four—which makes it easy to plug in peripherals. Micron earned a rating of Good in our most recent reader survey of vendor technical support.

WHAT'S NOT: Our review system shipped with only a modem; a network card is an additional $19, and you lose one of the open slots. Typing is smooth on the basic, flexible Micron keyboard, but the keys clack loudly and feel loose.

WHAT ELSE: With a 1.2-GHz Athlon CPU and 128MB of DDR SDRAM and running Windows 2000, this speedy Millennia achieved a score of 210 on our PC WorldBench 2000 tests. The ample documentation includes a setup poster, a getting-started guide, and a technical reference manual. Microsoft's Office 2000 Small Business Edition comes bundled, and the 8X/4X/32X CD-RW drive, while not the fastest burner out there, makes a nice data-backup option.

BEST USE: With its easy upgradability, very respectable performance, and excellent display, this Millennia Max has the chops for any small office.

2 POLYWELL POLY 880K7-1200

WHAT'S HOT: This Athlon-1200 system screamed to a PC WorldBench 2000 score of 225—the NEW highest mark we've seen under Windows 2000. Some of that oomph comes from the Poly's 256MB of 266-MHz DDR memory, as well as from its two 46GB hard drives connected by a RAID controller that offer up a whopping

Extra features	Design and expandability [2]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Very good: Creative Labs NVidia GeForce2 Ultra graphics card (64MB DDR SDRAM), 8X/4X/32X CD-RW drive, V.90 modem, Microsoft Office 2000 Small Business Edition	**Good:** front-mounted USB ports; midsize tower; 3 open drive bays, 3 open slots	Good	Good/ Outstanding	24/7, toll-free	Varies [3]/1
Very good: Leadtek WinFast GeForce2 Ultra graphics card (64MB DDR SDRAM), 16X DVD-ROM drive, 8X/8X/32X CD-RW drive, network adapter	**Very good:** neat and spacious case; midsize tower; 5 open drive bays, 2 open slots	[4]	Fair [4]/ Good	24/7, toll-free	3/5
Very good: Gainward CardExpert GeForce2 Pro graphics card (64MB DDR SDRAM), 12X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem, network adapter	**Very good:** easy to open case; midsize tower; 3 open drive bays, 4 open slots	[4]	Fair [4]/ Outstanding	24/7, toll-free	4/4
Very good: ATI Radeon SDR graphics card (32MB SDRAM), 8X/4X/32X CD-RW drive, V.90 modem, network adapter, Microsoft Office 2000 SBE	**Good:** tool-less slots and bays; midsize tower; 4 open drive bays, 2 open slots	Good	Fair/ Outstanding	24/7, toll-free	3/3
Outstanding: Leadtek WinFast GeForce2 GTS graphics card (64MB DDR SDRAM), 16X DVD-ROM drive, 12X/10X/32X CD-RW drive, V.90 modem, network adapter, Corel WordPerfect Office 2000	**Good:** drives don't match case color; midsize tower; 3 open drive bays, 2 open slots	[4]	Fair [4]/ Good	9/5, toll-free	3/lifetime
Good: Matrox Millennium G450 Dual Head graphics card (32MB SGRAM), 12X/8X/32X CD-RW drive, network adapter	**Very good:** cluttered but roomy case; midsize tower; 5 open drive bays, 3 open slots	[4]	Good [4]/ Good	24/7,[5] toll-free	Varies [4]/5
Very good: HP NVidia GeForce2 GTS graphics card (32MB SGRAM), 12X DVD-ROM drive, network adapter, HP's EDiagTools, ProtectTools 2000, TopTools management software	**Satisfactory:** top panel difficult to replace; desktop; 2 open drive bays, 4 open slots	Good	Fair/ Good	24/7 toll call	3/3
Very good: Dell NVidia GeForce2 Ultra graphics card (64MB DDR SDRAM), 12X DVD-ROM drive, 12X/8X/32X CD-RW drive, V.90 modem, network adapter, MS Office 2000 SBE, case lock	**Good:** well-organized interior; midsize tower; 3 open drive bays, 3 open slots	Outstanding	Good/ Good	24/7, toll-free	3/1
Outstanding: Creative Labs 3D Blaster Annihilator 2 Ultra graphics card (64MB DDR SDRAM), 16X-40X CD-ROM drive, 12X/10X/32X CD-RW drive, V.90 modem, Microsoft Office 2000 SBE	**Good:** tidy interior; midsize tower; 2 open drive bays, 3 open slots	[4]	Fair [4]/ Fair	9/5, toll-free	3/lifetime
Good: Matrox Millennium G450 Dual Head graphics card (16MB SGRAM), 8X/4X/32X CD-RW drive, network adapter, HP's EDiagTools, ProtectTools 2000, TopTools management software	**Good:** easy to access memory; midsize tower; 2 open drive bays, 5 open slots	Good	Fair/ Good	24/7 toll call	3/3
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent		

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

[4] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech-support quality, this rating may also depend on our anonymous support-quality calls.

[3] Support hours drop to 9 hours Monday–Friday after one year.

[6] Six years on CPU and main RAM, three years on other parts.

92GB of speedy storage. Powered by a Leadtek WinFast GeForce2 Ultra graphics board, the 19-inch ViewSonic GS790 monitor displayed rich colors in our tests, and text remained sharp and readable to the maximum resolution of 1600 by 1200.
WHAT'S NOT: All this power comes at a hefty price—just a hair under $3000. The stickers that label the rear ports could come off after extended use. We rated the quality of Polywell's tech support as Fair.
WHAT ELSE: This nifty aluminum midsize tower will elicit a few oohs and ahs from coworkers. After you remove two thumbscrews from the rear of the case, the side panel pops off easily. The system is neat and spacious inside, even with the RAID drive cables. Two open PCI slots and five open bays provide expansion room, and each slot has a thumbscrew for tool-free card installation. Though no longer state-of-the-art, the 8X/8X/32X CD-RW drive provides a handy backup option. A sturdy box houses the spiral-bound system manual, and thorough component documentation ships with the PC. Microsoft's ergonomic Natural Keyboard allows smooth, quiet, and comfortable typing.
BEST USE: From day-to-day computing tasks to making presentations, no small-office user would be disappointed with this performance beast—which looks as good on the inside as it does on the outside.

THE MICRON MILLENNIA MAX XP2 offers a speedy combination of an Athlon-1200 CPU and DDR memory.

PHOTOGRAPH: RICK RIZNER; COMPUTER SCREEN GRAPHICS: JOHN GODDARD

New on the Chart

3 MICRO EXPRESS MICROFLEX 1200B

NEW **WHAT'S HOT:** Lately AMD's 1.2-GHz Athlon seems to be the CPU of choice for power systems. Thanks to the speedy processor and a generous 256MB of PC133 (SDRAM) memory, this MicroFlex earned a score of 184 on PC WorldBench 2000—the highest we've seen for a system running Windows 98.
WHAT'S NOT: Though the 17-inch Tatung C7BZR monitor displayed rich colors in our tests, text blurred slightly at 1024 by 768 resolution and became difficult to ▶

read at the maximum resolution of 1280 by 1024. The neat and spacious interior has three open bays and four open PCI slots for expansion—but one slot next to the video card in the AGP slot is too close for comfort: If two cards were to touch, the computer could be damaged. We recommend that you not use this PCI slot.

WHAT ELSE: To access the interior of this gray-and-beige midsize tower, simply take off the top panel (after removing a thumbscrew) and pop off the side. Documentation includes a quick-setup guide, thorough component manuals, and a spiral-bound system manual with many illustrations and a detailed glossary and Internet section. Typing on the curvy Microsoft Natural Keyboard was smooth, comfortable, and quiet. The company accepts orders for this model only by phone, so you'll have to call up and request it specifically by name to get the $1099 price.

BEST USE: Bang-for-the-buck bells ring with this inexpensive, powerful PC, but the monitor was somewhat disappointing.

5 NUTREND ATHLON ULTRA 2

NEW **WHAT'S HOT:** On our text and image tests, the 19-inch ADI MicroScan E66 monitor delivered rich colors and sharp type that stayed readable even at the maximum resolution of 1600 by 1200. A 12X/10X/32X CD-RW drive delivers speedy backups, and the Ultra 2 offers multiple connectivity options: It ships with both a modem and a network adapter. A large binder holds all of the documentation and software, including Corel's WordPerfect Office 2000. The system manual contains detailed upgrading and troubleshooting directions; documentation is included for most components.

WHAT'S NOT: The system's rear ports are labeled with hard-to-read icons, and the CD-RW and floppy drives don't match Nu-Trend's basic beige case.

WHAT ELSE: Powered by a fast 1.2-GHz Athlon engine, this Ultra 2 chalked up a score of 169 on PC WorldBench 2000, about average for similarly configured systems running Windows Millennium Edition. Removing the sturdy side panel required taking out two screws. Offering a pair of open PCI slots and three open bays, the somewhat cluttered interior provides adequate expansion room. With the large monitor, a 16X DVD-ROM drive, four USB ports, and crisp and booming sound, courtesy of the Cambridge SoundWorks FPS2000 Digital five-speaker set, this system could easily double as a presentation machine.

BEST USE: Though an average performer, the Ultra 2 offers a variety of features to appeal to small- or home-office users.

POLYWELL'S 880 K7-1200 had the highest PC WorldBench score we've seen under Windows 2000, but the price is steep.

Also of Note

IBM'S $1899 NETVISTA A40 scored only 171 on our PC WorldBench 2000 tests, 11 points below the average for 1-GHz PIII systems running Windows 2000. This poor performance keeps it off the chart.

All-in-one systems typically don't fare well on our PC WorldBench 2000 tests, and NEC's latest $2699 PowerMate 2000 is no exception: This PIII-800 machine running Windows 98 earned a PC WorldBench 2000 score of 139—9 points below the average for similarly configured systems. The PC (which uses laptop components) does fit into a very small space, but its high price and lackluster performance keep it from making the chart. ▶

PHOTOGRAPH ABOVE: RICK RIZNER; ILLUSTRATION BELOW: PETER HOEY

New Buses: Just the Ticket to Help Move Your Data Faster

TECH TREND FOR SOME FOLKS, bus speed is simple—keep it above 50 mph, or the thing blows up. But for the technology-minded, bus speed is a little more complex. Very simply, a bus is the connection between the different components of a PC, such as memory and the processor.

The clock speed of a bus, expressed in millions of cycles per second (or megahertz) determines how quickly the bus sends data between the components; the faster the bus speed, the faster data flows. The bus you probably hear about most often is the frontside bus, an internal bus that connects the CPU to the memory (the backside bus connects the CPU to the Level 2 cache). The latest version of AMD's Athlon supports a 266-MHz FSB to match the speed of 266-MHz double-data-rate memory, while Intel's Pentium 4 supports a 400-MHz FSB to communicate with fast Rambus memory. However, the FSB will run at these faster speeds only if all the other components can: Put a new Athlon into a system that supports an FSB speed of just 133 MHz, and the FSB will run at the slower speed.

The FSB is just one of the many components that contribute to a PC's speed—a faster FSB alone cannot guarantee better performance. Despite having a much faster FSB than older Pentium III systems, Pentium 4 and Rambus models have yet to show much of a speed increase in our PC WorldBench 2000 tests. But in general, increases in FSB speeds mean that FSBs create less of a bottleneck in the overall performance of a system.

Although bus speeds aren't as glamorous as CPU ratings, by taking a thorough look at your prospective new computer's specs, you can make sure that the motherboard will let you get the most out of those other high-end, high-profile components.

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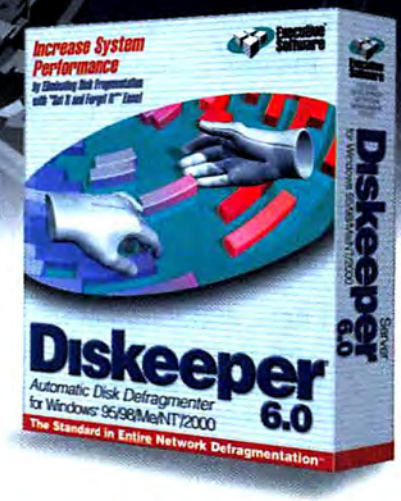

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PC WORLD

TOP 10 VALUE PCs

	VALUE SYSTEM	Month tested	★ Overall rating	Street price (3/16/01)	PC WorldBench 2000 performance score[1] Faster ▶	Base configuration
1	**Dell Dimension 4100** 800/388-8542 www.dell.com	May 01	88	Average: $1699	Outstanding 198	**Very good:** Pentium III-1000, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 19-inch monitor, Windows 2000
2	**Dell OptiPlex GX150** 800/388-8542 www.dell.com	NEW	86	Average: $1459	Outstanding 190	**Very good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 2000
3	**Tangent Valera** 800/342-9388 www.tangent.com	May 01	86	Average: $1595	Outstanding 216	**Very good:** Athlon-1200, 256MB of SDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 2000
4	**Sys Performance 1000T** 800/613-9963 www.sys.com	Nov 00	85	Average: $1465	Outstanding 197	**Outstanding:** Athlon-1000, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows 2000
5	**Gateway E-3400 XL Deluxe** 800/846-2000 www.gateway.com	Mar 01	83	Expensive: $1747	Outstanding 190	**Very good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 40GB hard drive, 17-inch monitor, Windows 2000
6	**ABS Conquest GL** 800/876-8088 www.abspc.com	Apr 01	83	Inexpensive: $1299	Very good 160	**Outstanding:** Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows Millennium Edition
7	**NuTrend Athlon Mega 2** 888/482-6678 www.nutrend.com	Apr 01	82	Inexpensive: $1219	Good 154	**Outstanding:** Athlon-950, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows Me
8	**Sys TaskMaster 850D** 800/613-9963 www.sys.com	May 01	82	Inexpensive: $1226	Very good 175	**Very good:** Duron-850, 128MB of SDRAM, 64KB L2 cache, 30GB hard drive, 19-inch monitor, Windows 2000
9	**Gateway E-1600 XL** 800/846-2000 www.gateway.com	NEW	82	Inexpensive: $1298	Very good 179	**Very good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 2000
10	**ABS Conquest SB** 800/876-8088 www.abspc.com	Mar 01	82	Inexpensive: $1299	Very good 176	**Very good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 2000
	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 159.

[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).

DELL'S MULTIFACETED NEW OptiPlex GX150, bearing tool-less components and comprehensive management features, debuts this month at number two on our value chart. Even with all its high-end options, this corporate machine comes in at an affordable $1459. Farther down the chart, another inexpensive managed PC, Gateway's E-1600 XL, captures the ninth spot, thanks to its Very Good performance and its solid corporate features.

1 DELL DIMENSION 4100

WHAT'S HOT: The latest update of Dell's Dimension 4100 sped to a score of 198 on our PC WorldBench 2000 tests, an impressive 20 points above the average mark for PIII-1000 systems carrying 128MB of RAM and running Windows 2000. In fact, this Dell's performance score rivals the average mark achieved by far more expensive 1.5-GHz P4 systems. The excellent 19-inch Dell M991 monitor produced vibrant colors in our test images and crisp text that began to blur only at the unit's maximum resolution of 1600 by 1200—higher than most users will need to go.

WHAT'S NOT: Though you can take off the side panel of this tall, thin, beige midsize tower by removing a single thumbscrew, reattaching the panel is more difficult. Dell earned a score of Good in our technical support ratings, but we have been receiving an increasing number of complaints from readers about Dell's technical support. We will be watching the quality of the company's service closely over the next several months.

WHAT ELSE: A speedy 12X/8X/32X CD-RW drive makes for accelerated data backups, and the software bundle includes Microsoft's Office 2000 Small Business Edition suite. Five open PCI slots and four open drive bays offer plentiful expansion opportunities for both extra devices and additional storage.

The system manual contains lots of detailed troubleshooting information, and a quick-setup poster and color-coded, icon-labeled rear ports aid assembly. Typing on the included Dell QuietKey keyboard was smooth, although the clackiness of the keys belies its name.

BEST USE: Priced at a reasonable $1699, the Dimension 4100 runs circles around comparable PCs. Small to medium-size businesses will appreciate its performance and Dell's strong record for reliability.

Extra features	Design and expandability [1]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Good: ATI Radeon graphics card (32MB DDR SDDRAM), 12X/8X/32X CD-RW drive, network adapter, Microsoft Office 2000 Small Business Edition	**Good:** replacing cover takes some work; midsize tower; 4 open drive bays, 5 open slots	Outstanding	Good/ Good	24/7, toll-free	3/1
Good: Dell NVidia TNT2 Pro graphics card (16MB SGRAM), 8X/4X/32X CD-RW drive, network adapter, LegacySelect, Open Manager software	**Satisfactory:** easy-to-open case; desktop; 0 open drive bays, 2 open slots	Outstanding	Good/ Outstanding	24/7, toll-free	3/3
Good: EVGA NVidia GeForce2 MX graphics card (32MB SDRAM), 12X-40X CD-ROM drive, network adapter, Corel WordPerfect Office 2000	**Good:** PCI support bar blocks drive bays; midsize tower; 4 open drive bays, 4 open slots	[1]	Fair [3]/ Outstanding	24/7, toll-free	3/3
Good: Matrox Millennium G450 Dual Head graphics card (32MB SGRAM), 16X DVD-ROM drive, network adapter	**Very good:** cluttered but roomy case; midsize tower; 5 open drive bays, 5 open slots	[1]	Good [3]/ Good	24/7, [4] toll-free	Varies [5]/5
Very good: ATI Rage Fury Pro graphics card (16MB SDRAM), 12X/8X/32X CD-RW drive, Zip 250 drive, network adapter, Intel LANDesk Client Manager, Microsoft Office 2000 SBE	**Satisfactory:** tool-less hard drive removal; desktop; 0 open drive bays, 3 open slots	Good	Fair/ Outstanding	24/7, toll-free	3/3
Very good: NVidia TNT2 M64 graphics card (32MB SDRAM), 16X DVD-ROM drive, V.90 modem, network adapter, Corel WordPerfect Office 2000	**Very good:** spacious interior; midsize tower; 4 open drive bays, 2 open slots	[1]	Fair [3]/ Fair	9/5, toll-free	3/lifetime
Very good: Leadtek WinFast GeForce2 MX graphics card (32MB SDRAM), 16X DVD-ROM drive, V.90 modem, network adapter, Corel WordPerfect Office 2000	**Very good:** roomy but messy interior; minitower; 4 open drive bays, 2 open slots	[1]	Fair [3]/ Good	9/5, toll-free	3/lifetime
Good: Gigabyte GA-GF1280T graphics card (32MB SDRAM), 22X-48X CD-ROM drive, network adapter	**Good:** small but neat interior; minitower; 2 open drive bays, 2 open slots	[1]	Good [3]/ Good	24/7, [4] toll-free	Varies [5]/5
Satisfactory: integrated Intel 810 graphics (UMA), 20X-48X CD-ROM drive, network adapter, LANDesk Client Manager	**Satisfactory:** neat but tiny interior; compact; 1 open drive bay, 2 open slots	Good	Fair/ Outstanding	24/7, toll-free	3/3
Good: Matrox Millennium G400 graphics card (32MB SDRAM), 32X-52X CD-ROM drive, V.90 modem, network adapter, Microsoft Works 2000	**Good:** neat, spacious interior; midsize tower; 4 open drive bays, 2 open slots	[1]	Fair [3]/ Fair	9/5, toll-free	3/lifetime
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent		

[1] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

[4] Support hours drop to 9 hours Monday–Friday after one year.

[5] Six years on CPU and main RAM, three years on other parts.

2 DELL OPTIPLEX GX150

WHAT'S HOT: Performing maintenance on Dell's stylish new OptiPlex GX150 is easy: You can take NEW the whole system apart without tools. Pressing a button on either side of the curvy, gray-and-black desktop case releases the lid, which swings up to reveal a small but well-arranged interior. You can remove or add most of the interior components, from the cards and drives to the power supply and motherboard, simply by finding and flipping the right green switch or lever. The GX150 is no slouch at the races either: It earned a score of 190 on our PC WorldBench 2000 tests, 11 points above the average for similar systems with 933-MHz Pentium III CPUs running Windows 2000.

WHAT'S NOT: The GX150 lacks a reset button, and the system's rear wall—which supports the PCI slot cage—is a little flimsy. Documentation for this system consists of a monitor manual, an OS manual, and a system guide with only basic setup information.

WHAT ELSE: This system is filled with a number of corporate extras: remote Wake-on-LAN, Dell's Open Manage software, and advanced security features including a twin-loop case lock, a cable-lock slot, and chassis intrusion detection. In addition, the GX150 gives administrators remote control over user access to various ports and drives. All the components adopt the case's gray-and-black color scheme, including the mouse, the keyboard, the wine-glass–shaped Harman/Kardon 19.5 speakers, and the 17-inch Dell E771p monitor. The monitor rendered our test images with vibrant colors, and text was clear and legible at 1024 by 768 pixels, although it blurred a bit at the maximum resolution of 1280 by 1024. A basic 8X/4X/32X CD-RW drive provides data backup, and two of the sys- ▶

DELL OPTIPLEX GX150: An attractive new case hides some features that systems administrators will love, such as easy-to-remove components and the ability to turn off ports.

PHOTOGRAPH: RICK RIZNER; COMPUTER SCREEN GRAPHICS: JOHN GODDARD

tem's four USB slots are easily accessible on the front of the case. Dell earned a score of Good for its technical support in our most recent reader survey, but we've been receiving a lot of complaints from readers recently about Dell's tech support.

BEST USE: This inexpensive and feature-rich system should please everyone in the company—from system administrators to cost accountants to end users.

New on the Chart

9 GATEWAY E-1600 XL

NEW **WHAT'S HOT:** This inexpensive compact system, which can stand up like a minitower in its included base, offers plenty of remote administration capabilities through the bundled LANDesk Client Manager. Though only one internal bay is open for expansion, you can switch drives simply by sliding out the hard drive—no tools required. The basic beige system sports a headphone jack on the case front for private listening.

WHAT'S NOT: No reset button is provided, and our review system shipped with only a 20X–48X CD-ROM drive. You can specify a 12X/8X/32X CD-RW drive, but it costs $129 extra. The Intel 810e chip set provides the graphics but shares main memory to do so, an arrangement that can cause performance bottlenecks in graphics-intensive applications. The 17-inch Gateway EV700 monitor produced vibrant colors in our image tests, but the text blurred slightly at 1024 by 768 resolution and was difficult to read at 1280 by 1024.

WHAT ELSE: With a 933-MHz Pentium III processor, this Gateway achieved a score of 179 on our PC WorldBench 2000 tests, about average for systems of this configuration running Windows 2000. Accessing the system interior entails removing the entire sturdy case, which pops off smoothly but must be lined up precisely for replacement. The neat but tiny interior has just one open bay, although two low-profile PCI slots are available for future expansion. System documentation consists of a single skimpy overall guide, though detailed system documentation is included on a CD-ROM. The sturdy Gateway keyboard allows smooth and nearly silent typing. Gateway systems earned a Good score for reliability in our reader survey, but we rated the company's support quality as only Fair.

BEST USE: A stalwart performer with attractive administration features, the Gateway E-1600 XL qualifies as a legitimate bargain for its $1298 price.

GATEWAY E-1600 XL: This manageable corporate PC has limited expansion options but a good price.

Also of Note

EVEN USING the latest 900-MHz Duron chip, the Polywell Poly 900KLX couldn't muster enough oomph to jump onto our chart. Its 17-inch Optiquest Q71 monitor delivered vibrant colors but displayed blurry text at 1024 by 786 resolution and higher. The unit is housed in Polywell's older-style case, a clunky-looking gray tower. Impressive documentation ships in a sturdy box, and Lotus SmartSuite Millennium Edition comes with this PC. The small motherboard has three open bays and two open PCI slots for expansion. ▶

PHOTOGRAPH ABOVE: RICK RIZNER; ILLUSTRATION BELOW: PETER HOEY

Lockdown PC: New Tools Put Administrators in Control of PC Peripherals

TECH TREND MANAGING A NETWORKED computing environment is all about control, whether you're troubleshooting problems, updating software, providing tools that your users need, or removing things that they don't. Our new number two value pick, Dell's OptiPlex GX150, includes LegacySelect features, which provide an easy way to control which drives and ports are enabled.

"Customers have been telling us they have a desire for a simpler computing environment," says Harvey Rosenblum, Dell's director of strategic planning. Dell claims that the new features of the GX150 let administrators "attune the technology for end users or workgroups."

Simply put, an administrator can control access to ports and drives in the GX150 remotely. If users don't need a serial port, it can be turned off, but if they do need it, an administrator can turn it back on quickly and easily. Floppy and CD-RW drives can be turned off as well, to keep data from being copied and removed from the office. And since these changes are made at BIOS level, the operating system doesn't detect disabled ports and devices. To the user, they simply don't exist.

"These features can be attractive to a certain class of customer," says Mark Margevivius, an analyst with the Gartner Group. "It's another feature set for hardware, another tool that an IT manager can use."

OptiPlex LegacySelect settings can be altered through the BIOS or remotely through management software, Rosenblum says. "Or if the customer prefers, we'll do it for them," he adds. On request, Dell can preset new PCs to a specific configuration before shipping them.

Though most users won't want these tools, they can be extremely useful to an administrator managing a network that contains secure data or that may be publicly accessible, because they can keep people from copying data. With theft of corporate data increasing, administrators will welcome the extra help in preventing improper use of company computing resources or unauthorized copying of data.

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

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PC WORLD

TOP 15 NOTEBOOK PCs

	POWER NOTEBOOK: $2700 AND OVER	Month tested	★ Overall rating	Street price (3/16/01)	PC WorldBench 2000 performance score[1] Faster ▶	Base configuration
1	**IBM ThinkPad A21p** 888/746-7426 www.ibm.com/thinkpad	Feb 01	89	Average: $3390	Outstanding 182	**Very good:** Pentium III-850/700, 15-inch active screen, trackpoint, 256MB of SDRAM, 32GB hard drive, Windows 2000
2	**Dell Latitude C800** 800/388-8542 www.dell.com	NEW	87	Average: $3543	Good 166	**Very good:** Pentium III-850/700, 15-inch active screen, touchpad, eraserhead, 128MB of SDRAM, 32GB hard drive, Windows 2000
3	**Acer TravelMate 739TLV** 800/733-2237 www.acer.com/aac	Apr 01	86	Inexpensive: $2999	Good 157	**Good:** Pentium III-850/700, 15-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 2000
4	**Micron TransPort GX+** 800/642-7667 www.micronpc.com	Apr 01	84	Inexpensive: $2968	Satisfactory 154	**Good:** Pentium III-800/650, 15-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 2000
5	**NEC Versa SXi** 888/632-8701 www.neccomp.com	NEW	83	Expensive: $3899	Good 168	**Satisfactory:** Pentium III-850/700, 14.1-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 2000
	MIDRANGE NOTEBOOK: $2000 TO $2699	Percent of overall rating ▶		Price: 14 percent	Performance: 20 percent	Base configuration: 5 percent
1	**Dell Latitude C600** 800/388-8542 www.dell.com	NEW	88	Expensive: $2546	Very good 164	**Good:** Pentium III-750/600, 14.1-inch active screen, touchpad, eraserhead, 128MB of SDRAM, 10GB hard drive, Windows 2000
2	**Gateway Solo 5300XL** 800/846-2000 www.gateway.com	Jan 01	87	Average: $2279	Very good 155	**Very good:** Pentium III-750/600, 14.1-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 2000
3	**Fujitsu PC E-6571** 877/372-3473 www.fujitsupc.com	Apr 01	87	Inexpensive: $2099	Very good 157	**Good:** Pentium III-750/600, 14.1-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 2000
4	**HP Omnibook XE3** 800/752-0900 www.hp.com/notebooks	NEW	87	Inexpensive: $2099	Very good 157	**Very good:** Pentium III-800/650, 14.1-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 2000
5	**Compaq Presario 1700T-850** 800/345-1518 www.compaq.com	Feb 01	84	Average: $2297	Outstanding 145	**Very good:** Pentium III-850/700, 14.1-inch active screen, touchpad, 128MB of SDRAM, 32GB hard drive, Windows Me
	BUDGET NOTEBOOK: UNDER $2000	Percent of overall rating ▶		Price: 17 percent	Performance: 17 percent	Base configuration: 5 percent
1	**Dell Inspiron 4000** 800/388-8542 www.dell.com	Mar 01	91	Average: $1723	Good 131	**Very good:** Pentium III-800/650, 14.1-inch active screen, touchpad, eraserhead, 128MB of SDRAM, 10GB hard drive, Windows Me
2	**Gateway Solo 5300** 800/846-2000 www.gateway.com	Feb 01	89	Average: $1684	Very good 147	**Very good:** Pentium III-650/500, 14.1-inch active screen, touchpad, 128MB of SDRAM, 10GB hard drive, Windows 2000
3	**Dell Inspiron 2500** 800/388-8542 www.dell.com	NEW	87	Very inexpensive: $1200	Satisfactory 105	**Good:** Celeron-700, 14.1-inch active screen, touchpad, 64MB of SDRAM, 5GB hard drive, Windows Me
4	**WinBook Si 800 CD** 800/965-9349 www.winbook.com	Apr 01	86	Inexpensive: $1299	Good 128	**Satisfactory:** Pentium III-800, 12.1-inch active screen, touchpad, 64MB of SDRAM, 6GB hard drive, Windows Me
5	**Toshiba Satellite 2805-S202** 800/867-4422 www.csd.toshiba.com	May 01	84	Average: $1799	Very good 135	**Very good:** Pentium III-700/550, 14.1-inch active screen, eraserhead, 128MB of SDRAM, 10GB hard drive, Windows Me
	Best Buy	Percent of overall rating ▶		Price: 20 percent	Performance: 14 percent	Base configuration: 5 percent

[1] Performance word scores reflect comparisons of PCs in the same price category running the same operating system. For more details, see "Your Guide to the Top 100" on page 159.

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

[3] Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.

WIRELESS-READY LAPTOPS could soon join cell phones and PDAs as must-have gadgets for the on-the-go set. Many laptop vendors are including antennas and wireless network interface cards based on the increasingly popular 802.11b standard. With more businesses, hotels, and airports adding wireless broadband access points, it's easier than ever to use your wireless-ready notebook to surf the Web or check your e-mail during a layover or between meetings.

Two of the five new laptops on the chart this month arrived wireless-ready, with an antenna and a mini-PCI wireless LAN card built in: The $2546 Dell Latitude C600, our new midrange Best Buy, is a slim corporate notebook with dual pointing devices. Its heavier and more expensive sibling, the $3543 Latitude C800, treats multimedia pros to a high-resolution screen and a fast IEEE 1394 port.

PHOTOGRAPH: RICK RIZNER

Extra features [2]	Design and ease of use	Battery life (hours:min)	Travel weight (pounds) [3]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Very good: multipurpose bay, 8X DVD-ROM drive, built-in modem, Lotus SmartSuite	**Excellent:** decked-out system includes video-in, 1600 by 1200 screen, huge hard drive	**Good/** 3:45	**Heavy/** 8.3	**Good**	**Good/ Fair**	**24/7, toll-free**	**3/3**
Outstanding: multipurpose bay, 8X DVD-ROM, 8X/4X/24X CD-RW drives, PC Card modem and network interface	**Very good:** beefy big-screen desktop replacement comes with built-in wireless networking	**Good/** 3:00	**Very heavy/** 9.4	**Good**	**Good/ Good**	**24/7, toll-free**	**3/3**
Very good: multipurpose bay, 8X DVD-ROM drive, built-in modem and network interface, Microsoft Works 2000	**Very good:** bulky all-in-one; fingerprint reader helps foil data thieves	**Very good/** 4:23	**Heavy/** 8.1	**Good**	**Good [4]/ Fair**	**24/7, toll-free**	**1/1**
Very good: multipurpose bay, 8X DVD-ROM drive, built-in modem and network interface, Office 2000 SBE	**Excellent:** modular bay holds any of five different devices; parts clearly labeled	**Satisfactory/** 2:45	**Heavy/** 8.2	**Fair**	**Fair/ Fair**	**24/7, toll-free**	**3/3**
Very good: multipurpose bay, 6X/4X/24X CD-RW drive, built-in modem and network interface	**Very good:** cleverly hidden removable hard drive; weak sound	**Good/** 3:13	**Average/** 7.8	**Good**	**Good [4]/ Outstanding**	**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		
Good: multipurpose bay, 10X-24X CD-ROM drive, PC Card network interface	**Excellent:** wireless-ready, dual pointing devices, accommodates raft of extra-cost add-ins	**Good/** 3:45	**Average/** 7.8	**Good**	**Good/ Good**	**24/7, toll-free**	**3/3**
Good: multipurpose bay, 10X-24X CD-ROM drive, built-in modem and network interface	**Very good:** easy to upgrade, but keyboard could be steadier; few internal add-ins are available	**Good/** 3:10	**Average/** 7.1	**Fair**	**Fair/ Good**	**24/7, toll-free**	**3/3**
Good: multipurpose bay, 8X DVD-ROM drive, built-in modem	**Very good:** infrared for wireless mouse; shortcut buttons double as password security system	**Satisfactory/** 2:47	**Average/** 7.3	**Fair**	**Poor/ Fair**	**24/7, toll-free**	**1/1**
Good: 8X DVD-ROM drive, built-in modem and network interface	**Average:** industrial-looking; includes keyboard with handy cursor lock, lots of shortcuts	**Good/** 3:33	**Heavy/** 8.2	**Good**	**Fair [4]/ Fair**	**24/7, toll call**	**1/1**
Good: multipurpose bay, 8X DVD-ROM drive, built-in modem and network interface, Microsoft Word 2000	**Very good:** slim and light with lots of shortcut buttons, distinctive case, and huge hard drive	**Satisfactory/** 2:25	**Average/** 7.4	**Fair**	**Fair/ Fair**	**24/7, toll-free**	**1/1**
Extra features: 5 percent	Design and ease of use: 10 percent	Battery life: 8 percent	Weight: 8 percent	Reliability: 20 percent	Support and warranty: 10 percent		
Good: multipurpose bay, 10X-24X CD-ROM drive, built-in modem, Microsoft Office 2000 SBE	**Very good:** accommodates many add-ins; dual pointing devices, optional color palm rests	**Good/** 3:40	**Heavy/** 8.1	**Good**	**Good/ Good**	**24/7, toll-free**	**1/1**
Good: multipurpose bay, 10X-24X CD-ROM drive, built-in modem and network interface	**Very good:** removable hard drive, handsome black-and-silver case, but wobbly keys	**Good/** 3:07	**Average/** 7.1	**Fair**	**Fair/ Fair**	**24/7, toll-free**	**1/1**
Satisfactory: multipurpose bay, 10X-24X CD-ROM drive, built-in modem, Microsoft Works 2001	**Average:** colorful palm rests can be swapped out; dual-purpose buttons inconvenient to use	**Poor/** 1:29	**Average/** 7.7	**Good**	**Good/ Good**	**24/7, toll-free**	**1/1**
Satisfactory: 12X-24X CD-ROM drive, built-in modem	**Average:** boxy, black all-in-one has Web- and mail-launch buttons but uses desktop CPU	**Satisfactory/** 2:48	**Average/** 7.7	**Fair**	**Good [4]/ Fair**	**13/6, toll-free**	**1/1**
Good: 8X DVD-ROM drive, built-in modem and network interface, Lotus SmartSuite	**Average:** no docking connection; conveniently located CD player buttons, good stereo sound	**Satisfactory/** 2:59	**Heavy/** 8.5	**Fair**	**Fair/ Good**	**24/7, toll-free**	**1/1**
Extra features: 5 percent	Design and ease of use: 10 percent	Battery life: 8 percent	Weight: 8 percent	Reliability: 20 percent	Support and warranty: 10 percent		

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

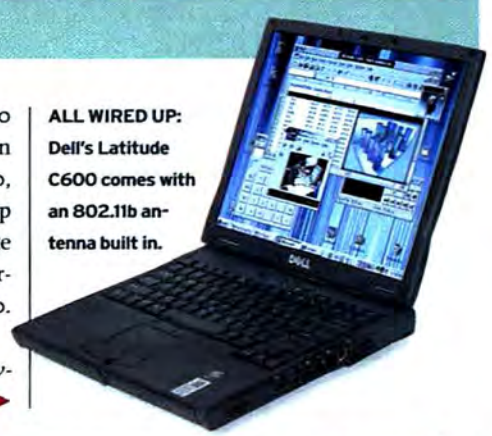
As for other new notebooks, HP's Omnibook XE3, fourth on the midrange list, is a solid business notebook that also delivers decent sound. With a bargain price for a 14.1-inch screen, the $1200 Dell Inspiron 2500 earns third place on our budget chart. HP's Omnibook 6000, the first gigahertz chip–equipped laptop we've tested for the Top 15, didn't make the list: It costs $4099 and doesn't perform much faster than a Pentium III-850.

Contributing Editor Carla Thornton covers notebooks for PC World.

FULL REVIEWS ONLINE

online

FOR DETAILED write-ups of all the new notebooks that we tested this month, visit PCWorld.com (www.pcworld.com/t15notebooks).



ALL WIRED UP: Dell's Latitude C600 comes with an 802.11b antenna built in.

COMPUTER SCREEN GRAPHICS: JOHN GODDARD

PC WORLD

TOP 15 HOME PCs

	POWER SYSTEM: $2000 AND OVER	Month tested	★ Overall rating	Street price (3/9/01)	PC WorldBench 2000 performance score [1] Faster ▶	Base configuration [2]
1	Dell Dimension 8100 800/388-8542 www.dell.com	Mar 01	90	Average: $2938	Good 157	**Good:** Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 40GB hard drive, midsize tower, 19-inch monitor, Windows Millennium
2	Gateway Select 1200 800/846-2000 www.gateway.com	Mar 01	85	Inexpensive: $2229	Very good 169	**Very good:** Athlon-1200, 128MB of SDRAM, 256KB L2 cache, 60GB hard drive, midsize tower, 19-inch monitor, Windows Me
3	Gateway Performance 1500 800/846-2000 www.gateway.com	Apr 01	83	Expensive: $3163	Good 161	**Very good:** Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 60GB hard drive, midsize tower, 19-inch monitor, Windows Me
4	IBM NetVista A60i 888/746-7426 www.ibm.com/netvista	Apr 01	81	Expensive: $3099	Good 155	**Satisfactory:** Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 75GB hard drive, midsize tower, 17-inch monitor, Windows Me
5	Compaq Presario 7000 800/345-1518 www.compaq.com	Apr 01	79	Very expensive: $3480	Good 157	**Very good:** Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 75GB hard drive, midsize tower, 19-inch monitor, Windows Me
	MIDRANGE SYSTEM: $1200 TO $1999	Percent of overall rating ▶		Price: 10 percent	Performance: 20 percent	Base configuration: 10 percent
1	Dell Dimension 4100/1GHz 800/388-8542 www.dell.com	May 01	94	Average: $1738	Very good 159	**Good:** Pentium III-1000, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, midsize tower, 19-inch monitor, Windows Me
2	Tiny Computers T-Bird 1000 888/818-8469 www.tinydirect.com	Feb 01	89	Inexpensive: $1429	Very good 160	**Very good:** Athlon-1000, 128MB of SDRAM, 256KB L2 cache, 40GB hard drive, minitower, 19-inch monitor, Windows Me
3	ABS Multimedia System 2 800/876-8088 www.abspc.com	Apr 01	85	Inexpensive: $1329	Very good 161	**Good:** Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, midsize tower, 19-inch monitor, Windows Me
4	IBM NetVista A40i 888/746-7426 www.ibm.com/netvista	Apr 01	84	Expensive: $1848	Very good 160	**Satisfactory:** Athlon-1000, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, minitower, 17-inch monitor, Windows Me
5	HP Pavilion 7875 800/752-0900 www.hp-at-home.com	NEW	83	Expensive: $1998	Outstanding 166	**Good:** Athlon-1300, 128MB of SDRAM, 256KB L2 cache, 80GB hard drive, minitower, 17-inch monitor, Windows Me
	BUDGET SYSTEM: UNDER $1200	Percent of overall rating ▶		Price: 15 percent	Performance: 15 percent	Base configuration: 10 percent
1	NuTrend Athlon Force 2 888/482-6678 www.nutrend.com	Feb 01	78	Average: $1039	Outstanding 161	**Very good:** Athlon-900, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, midsize tower, 17-inch monitor, Windows Me
2	Polywell Poly KLX-850D 800/999-1278 www.polywell.com	NEW	77	Expensive: $1099	Good 141	**Very good:** Duron-850, 128MB of SDRAM, 64KB L2 cache, 30GB hard drive, midsize tower, 17-inch monitor, Windows Me
3	ABS Performance 3 800/876-8088 www.abspc.com	Jan 01	76	Expensive: $1129	Very good 153	**Very good:** Pentium III-866, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, midsize tower, 17-inch monitor, Windows Me
4	Gateway Performance 1000 800/846-2000 www.gateway.com	NEW	75	Expensive: $1099	Very good 154	**Very good:** Pentium III-1000, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, midsize tower, 17-inch monitor, Windows Me
5	Kaypro 4110 888/352-9776 www.kaypro.com	Mar 01	70	Expensive: $1074	Good 145	**Very good:** Pentium III-800EB, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, minitower, 17-inch monitor, Windows Me
	Best Buy	Percent of overall rating ▶		Price: 20 percent	Performance: 10 percent	Base configuration: 10 percent

[1] Performance word scores reflect comparisons of PCs in the same price category running the same operating system. For more details, see "Your Guide to the Top 100" on page 159.

[2] Vertical cases are towers (over 20 inches), midsize towers (15.5 to 20 inches), or minitowers (under 15.5 inches). Horizontal cases are desktops (5 inches or taller) or compacts (under 5 inches).

THE TUG-OF-WAR between AMD's Athlons and Intel's Pentiums continues this month. On the power side of the chart, the lineup remains unchanged, as the 1.2-GHz Athlon system again offers better performance for the price than the 1.5-GHz Pentium 4 competition. In our midrange and budget sections, AMD- and Intel-powered PCs turn in competitive prices and performance.

HP's $1998 Pavilion 7875 enters the midrange section this month in fifth place, with the first 1.3-GHz Athlon we've tested. The Pavilion 7875 outperformed all the other midrange competitors—and all but one power PC, for that matter—on PC WorldBench 2000, and it demonstrated fast, smooth graphics performance on our 3D games.

Most of the action, though, takes place among sub-$1200 systems. NuTrend's Athlon Force 2 takes over as the new bud-

PHOTOGRAPH: RICK RIZNER

Extra features [1]	Setup/ ease of use	Graphics	Reliability/ support	Comments
Very good: NVidia GeForce2 Ultra graphics board (64MB DDR SDRAM), 12X DVD-ROM drive, 12X/8X/32X CD-RW drive, network adapter	Outstanding/ Good	Very good	Outstanding/ Outstanding	**PRO:** Loaded with extra features; price drops by $211. **CON:** Disappointing PC WorldBench 2000 performance, given the expensive P4 processor.
Good: NVidia GeForce2 Ultra graphics board (64MB DDR SDRAM), 16X DVD-ROM drive	Good/ Good	Good	Fair/ Fair	**PRO:** Low price, easy-to-access drive bays, and excellent frame rates combine to make this PC a good deal. **CON:** No CD-RW drive or network card.
Very good: NVidia GeForce2 Ultra graphics board (64MB DDR SDRAM), 16X DVD-ROM drive, 12X/8X/32X CD-RW drive, network adapter	Outstanding/ Satisfactory	Good	Fair/ Fair	**PRO:** $250 price drop, good graphics plus TV-tuner card, three IEEE 1394 ports, lots of storage. **CON:** Performance below that of Athlon-1200 PCs.
Very good: ATI All-in-Wonder Radeon graphics board (32MB DDR SDRAM), 16X DVD-ROM drive, 8X/4X/32X CD-RW drive, network adapter	Good/ Satisfactory	Good	Good/ Fair	**PRO:** Enormous hard drive; superb graphics card displays high frame rates. **CON:** Small monitor, considering the price; slow for a P4-1500.
Very good: 3D Blaster Annihilator2 Ultra graphics board (64MB DDR SDRAM), 8X/4X/32X CD-RW drive, 2X/8X DVD-RAM drive, network adapter	Good/ Good	Very good	Poor/ Fair	**PRO:** Top-notch PC packages high-quality sound, graphics, and optical storage options. **CON:** Still expensive, despite a $145 price drop.
Extra features: 10 percent	Setup/ease of use: 5 percent	Graphics: 15 percent	R & S: 30 percent	
Good: ATI Radeon graphics board (32MB DDR SDRAM), combo 8X/4X/32X CD-RW/8X DVD-ROM drive	Outstanding/ Good	Good	Outstanding/ Outstanding	**PRO:** Tops performance of some 1.5-GHz PCs. **CON:** Combo DVD/CD-RW drive saves space but is the only drive available for backups and CD writing/reading.
Very good: NVidia GeForce2 MX graphics board (32MB SDRAM), 8X DVD-ROM drive, 8X/4X/32X CD-RW drive, scanner, printer	Satisfactory/ Good	Good	[4]/Good [5]	**PRO:** Fast family PC with extras gets $120 cheaper. **CON:** Dark DVD movie playback; limited expansion room; comes with low-end printer and scanner.
Satisfactory: Leadtek WinFast GeForce2 MX graphics board (32MB SDRAM), 16X DVD-ROM drive	Good/ Satisfactory	Good	[4]/Fair [5]	**PRO:** 19-inch monitor displays sharp text; nice-sounding speakers. **CON:** 3D games looked banded, and menu screens on DVD playback appeared blurry.
Good: NVidia GeForce2 GTS graphics board (32MB SGRAM), 8X/4X/32X CD-RW drive	Outstanding/ Satisfactory	Good	Good/ Fair	**PRO:** Sturdy multimedia keyboard with seven Internet buttons. **CON:** Free tech support limited to three years.
Good: NVidia GeForce2 MX graphics board (32MB SGRAM), 16X DVD-ROM drive, 8X/4X/32X CD-RW drive, network adapter	Satisfactory/ Good	Very good	Fair/ Fair	**PRO:** Graphite-colored PC offers great performance on business applications and graphics. **CON:** Speakers don't deliver very good sound.
Extra features: 10 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 30 percent	
Good: NVidia TNT2 M64 graphics board (32MB SDRAM), 12X DVD-ROM drive, network adapter	Satisfactory/ Satisfactory	Satisfactory	[4]/Fair [5]	**PRO:** PC's speed redefines budget performance; handsome multimedia keyboard. **CON:** Lackluster frame rates in our gaming tests.
Satisfactory: Leadtek WinFast GeForce2 MX graphics board (32MB SDRAM), 12X DVD-ROM drive, network adapter	Outstanding/ Satisfactory	Good	[4]/Fair [5]	**PRO:** Good frame rates on 3D games; sharp DVD playback. **CON:** Warm color tones translated poorly on Optiquest Q71 monitor, and text lacked crisp edges.
Good: Leadtek WinFast GeForce2 MX graphics board (32MB SGRAM), 10X DVD-ROM drive, 8X/4X/32X CD-RW drive	Satisfactory/ Good	Good	[4]/Fair [5]	**PRO:** Fast budget PC includes both DVD and CD-RW drives. **CON:** Text display lacks sharpness; mediocre frame rates in 3D games tests.
Satisfactory: integrated Intel 815 graphics with UMA, 22X-48X CD-ROM drive, network adapter	Satisfactory/ Good	Limited	Fair/ Fair	**PRO:** Competitive performance for a 1-GHz PC; packs a network card. **CON:** Documentation unusually slim; poor graphics performance.
Good: NVidia Vanta graphics board (16MB SDRAM), 22X-52X CD-ROM drive	Satisfactory/ Satisfactory	Satisfactory	[4]/Good [5]	**PRO:** Good PC WorldBench performance. **CON:** Poor gaming frame rates due to low-end graphics card; Daewoo monitor displays fuzzy text and faded colors.
Extra features: 10 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 30 percent	

[1] Unless otherwise noted, all home PCs come with a V.90 modem.

[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.

COMPUTER SCREEN GRAPHICS: JOHN GODDARD

get Best Buy, as Dell's Dimension L866r retires from the market. Farther down the chart, new entries from Polywell and Gateway represent different approaches to creating a budget system. For users who want a PC with strong gaming features, Polywell's Poly KLX-850D carries a GeForce2 MX graphics card and a DVD-ROM drive; for people interested in a machine to handle standard office functions, Gateway's Performance 1000 runs business applications better. ▶

FULL REVIEWS ONLINE

online

FOR WRITE-UPS on all the new systems we reviewed this month, visit PCWorld.com (www.pcworld.com/reviews/topcharts).

UP-FRONT ACCESS: HP's Pavilion 7875 has IEEE-1394, USB, and serial ports.

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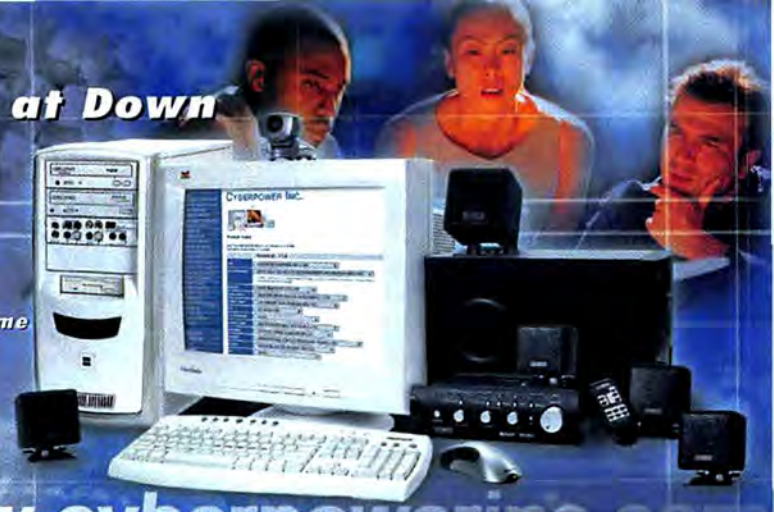

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- ATI Radeon VE 32MB DDR w/Dual Monitor Output AGP Video Card
- 16X DVD-ROM
- CREATIVE LAB SOUND BLASTER LIVE VALUE
- ALTEC LANSING ACS 54 Subwoofer System
- 19" VIEWSONIC E790 .22MM SVGA Monitor
- ZOOM 56K V.90 Fax Modem
- Mitsumi 1.44 MB Floppy Drive
- PS2 Win98 Multimedia Keyboard
- PS2 Internet Mouse w/ Wheel
- ATX Medium Tower Case w/ 300 Watt UL
- Microsoft Windows Millennium or 98 2nd Edition
- COREL WORDPERFECT OFFICE 2000
- Free One Year On Site Service

AMD ATHLON 1.4GHZ	$ 1399	PL601
AMD ATHLON 1.33GHZ	$ 1359	PL602
AMD ATHLON 1.2GHZ	$ 1329	PL603
AMD ATHLON 1.13GHZ	$ 1305	PL604
AMD ATHLON 1.0GHZ	$ 1289	PL605
AMD ATHLON 900	$ 1269	PL606

AMD BEST BUY

- VIA KT-133A 266MHZ FSB 4X AGP MAIN BOARD
- 128 MB PC133 SDRAM
- 40 GB Ultra DMA 100 Hard Drive
- NVIDIA TNT2 M64 32MB 3D AGP Video Card
- 52X CD-ROM
- AC97 3D Wavetable Sound Card
- 120-Watt Power Stereo Speakers
- ZOOM PCI 56K V.90 Fax Modem w/ Voice
- Mitsumi 1.44 MB Floppy Drive
- 108 KEY Win98 Keyboard & Internet Mouse
- Medium Tower Case w/ 250 Watt UL
- Microsoftsoft Windows Millennium or 98 2nd Edition
- Corel Wordperfect Office 2000
- 17" .27MM SVGA Color Monitor +$165
- One Year On Site Service +$29

AMD ATHLON 1.4GHZ	$ 735	PE601
AMD ATHLON 1.33GHZ	$ 689	PE602
AMD ATHLON 1.2GHZ	$ 665	PE603
AMD ATHLON 1.13GHZ	$ 639	PE604
AMD ATHLON 1.0GHZ	**$ 619**	PE605
AMD ATHLON 850	$ 599	PE606
AMD DURON 850	$ 549	PE607
AMD DURON 800	$ 529	PE608

ATHLON LIGHTNING DVD

- VIA KT-133A 266MHZ FSB 4X AGP MAIN BOARD
- 256 MB PC133 SDRAM
- 40 GB Ultra DMA 100 RPM Hard Drive
- NVIDIA GeFORCE-2 MX 32MB 4X AGP Video Card
- 12X DVD-ROM
- 8X4X32 CDRW Drive
- AC97 3D Wavetable Sound Card
- 450 WATT Subwoofer Speaker System
- 19" .26MM SVGA Color Monitor
- ZOOM 56K V.90 Fax Modem w/ Voice
- Mitsumi 1.44 MB Floppy Drive
- PS2 Win98 Keyboard & Internet Mouse
- ATX Medium Tower Case w/ 300 Watt UL
- Microsoftsoft Windows Millennium or 98 2nd Edition
- Corel Wordperfect Office 2000
- One Year On Site Service +$29

AMD ATHLON 1.4GHZ	$ 1149	PH601
AMD ATHLON 1.33 GHZ	$ 1109	PH602
AMD ATHLON 1.2 GHZ	$ 1079	PH603
AMD ATHLON 1.13 GHZ	$ 1055	PH604
AMD ATHLON 1.0 GHZ	$ 1039	PH605
AMD ATHLON 900	$ 1015	PH606
AMD DURON 850	$ 965	PH607
AMD DURON 800	$ 945	PH608

ATHLON BEST BUY

- VIA KT-133A 266MHZ FSB 4X AGP MAIN BOARD
- 128 MB PC133 SDRAM
- 40 GB Ultra DMA 100 Hard Drive
- NVIDIA GeFORCE-2 MX 32MB 4X AGP Video Card
- 12X DVD-ROM
- AC97 3D Wavetable Sound Card
- 240-Watt Power Stereo Speakers System
- ZOOM 56K V.90 Fax Modem w/ Voice
- Mitsumi 1.44 MB Floppy Drive
- PS2 Win98 Keyboard & Internet Mouse
- ATX Medium Tower Case w/ 250 Watt UL
- Microsoftsoft Windows Millennium or 98 2nd Edition
- Corel Wordperfect Office 2000
- 19" .26MM SVGA Color Monitor +$235
- One Year On Site Service +$29

AMD ATHLON 1.4GHZ	$ 799	PJ601
AMD ATHLON 1.33GHZ	$ 755	PJ602
AMD ATHLON 1.2GHZ	$ 729	PJ603
AMD ATHLON 1.13GHZ	$ 699	PJ604
AMD ATHLON 1.0GHZ	$ 685	PJ605
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AMD ATHLON 1.2GHZ	$ 999	PA603
AMD ATHLON 1.13GHZ	$ 978	PA604
AMD ATHLON 1.0GHZ	$ 949	PA605
AMD ATHLON 900	$ 945	PA606
AMD DURON 850	$ 889	PA607
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TOP 10 MONITORS

	21-INCH/22-INCH MONITOR	Month tested	Street price (3/19/01)	Overall rating	Quality of text/ graphics	Comments
1	Samsung SyncMaster 1200NF 800/726-7864 www.samsungmonitor.com	NEW	$824	83	Very good/ Excellent	**FEATURES:** 19.9-inch viewable area, .24mm stripe pitch tube, up to 177-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Conveys subtleties in color images and renders very legible text, even at small font sizes. The smart-looking case includes a rear-mounted USB hub.
2	ViewSonic P225F 800/888-8583 www.viewsonic.com	NEW	$865	83	Very good/ Excellent	**FEATURES:** 20-inch viewable area, .24mm stripe pitch Diamondtron NF tube, up to 115-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Displays beautiful, realistic color, including flesh tones; strong contrast yields very legible text. Dull beige case will not dress up your desktop.
3	Mitsubishi Diamond Pro 2060u 888/632-6487 www.necmitsubishi.com	NEW	$999	82	Excellent/ Excellent	**FEATURES:** 20.3-inch viewable area, .24mm stripe pitch Diamondtron NF tube, up to 110-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Took top honors in most of our tests, handling both text and graphics with aplomb—but high price keeps it from earning a Best Buy. Includes USB hub and dual video inputs.
4	Cornerstone Technology C1025 800/562-2552 www.monitorsdirect.com	June 00	$595	82	Very good/ Good	**FEATURES:** 19.7-inch viewable area, .26mm dot pitch tube,[3] up to 88-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour weekday toll-free support. **SUMMARY:** New models bump this one from the top spot it held in October, but low price and crisp spreadsheet text make it a good buy. It also significantly outscored its new sibling, the C1030.
5	CTX PR1400F 800/266-1491 www.ctxintl.com	Oct 00	$799	82	Very good/ Very good	**FEATURES:** 19.9-inch viewable area, .24mm–.25mm stripe pitch FD Trinitron tube,[4] up to 115-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Displays crisp, legible text and provides logically laid out on-screen controls. Limited tech support hours are a minus, especially for home users.
6	NEC MultiSync FE1250+ 888/632-6487 www.necmitsubishi.com	NEW	$875	80	Good/ Very good	**FEATURES:** 20-inch viewable area, .24mm stripe pitch Diamondtron NF tube, up to 101-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Good all-around monitor is competitively priced, though text legibility in our tests could have been better. Features clean-looking case and intuitive controls.
7	Optiquest Q115 800/888-8583 www.viewsonic.com/optiquest	June 00	$619	77	Good/ Satisfactory	**FEATURES:** 19.7-inch viewable area, .26mm dot pitch tube,[3] up to 88-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** $126 price drop gives this monitor appeal for cost-conscious home and home-office users who want a big screen for displaying text, but the higher-ranked Cornerstone C1025 is a better deal.
8	Sony CPD-G520 800/352-7669 www.sony.com/displays	NEW	$999	75	Good/ Good	**FEATURES:** 20-inch viewable area, .24mm stripe pitch FD Trinitron tube, up to 122-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Graphics have rich colors but appear slightly dark. Handsome slate-and-gray case features dual inputs that let you share the monitor between two PCs.
9	Hitachi CM813 Plus 800/441-4832 www.hitachidisplays.com	Oct 00	$869	72	Good/ Satisfactory	**FEATURES:** 20-inch viewable area, .26mm dot pitch tube,[3] up to 105-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, 5-year warranty, 11.5-hour weekday toll-free support. **SUMMARY:** $71 price drop and generous warranty help this monitor onto our chart, but graphics are slightly dark, text quality could be better, and tech support hours are limited.
10	Eizo Nanao FlexScan T962 800/800-5202 www.eizo.com	NEW	$1339	69	Satisfactory/ Good	**FEATURES:** 20-inch viewable area, .24mm stripe pitch tube, up to 121-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 8-hour weekday toll-free support. **SUMMARY:** Poor contrast and slight grayish pallor make text difficult to read. Graphics performance is serviceable, but you can get better quality for much less. Includes USB hub.

Best Buy For reviews of the monitors on this chart, visit www.pcworld.com/t10monitors.

TEST PC WORLD CENTER **HOW WE TEST** Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on text and graphics quality (25 percent each), price (25 percent), features and ease of use (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by PC World Test Center. All rights reserved. [1] Maximum refresh rate at 1280 by 1024 resolution (the tested resolution for this size monitor). [2] Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play. [3] Diagonal dot pitch. [4] Uses an aperture grille in which parallel wires near the sides of the screen are strung farther apart than those at the middle.

SINCE OCTOBER, when we last reviewed 21- and 22-inch monitors, vendors have discontinued several models, including the Best Buy Compaq P1100; they've also introduced worthy replacements. Mitsubishi's Diamond Pro 2060u performs best, but Samsung's SyncMaster 1200NF and ViewSonic's P225F nearly match its quality at lower prices. Among new monitors, only Cornerstone's C1030 missed the chart. Next month: 17-inchers. ▶

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PC WORLD

TOP 10 GRAPHICS BOARDS

	AGP BOARD	Month tested	Street price (4/1/01)	Overall rating	Image quality	Overall speed	Features	Comments
1	ATI All-in-Wonder Radeon 905/882-2600 www.ati.com	Feb 01	$299	96	Very good	Good	Excellent	**FEATURES:** 4X AGP, ATI Radeon chip, 32MB of DDR SDRAM, 350-MHz RAMDAC; DVI-out, TV tuner, hardware DVD support, graphics editing software. **SUMMARY:** This card retains first place, thanks to DirectX 8 support and ATI's video features and bundled software. A great card for the video editing enthusiast.
2	CardExpert GeForce2 MX 800/539-2273 www.gainward.com	Feb 01	$119	93	Very good	Good	Very good	**FEATURES:** 4X AGP, NVidia GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; S-Video-out, composite-out; DVD, overclocking, and color-calibration software. **SUMMARY:** This budget MX delivered respectable performance and includes a nice helping of extras for a low-cost board.
3	Hercules 3D Prophet II MX 877/484-5536 www.hercules.com	Mar 01	$99	92	Excellent	Good	Good	**FEATURES:** 4X AGP, NVidia GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; color-calibration software, five game demos. **SUMMARY:** Lacks features and software bundles of the top cards. A $51 price drop, combined with the board's outstanding image quality and good overall speed, helps it move up to third place.
4	Asus V7100 Deluxe Combo 510/739-3777 www.asus.com	May 01	$159	92	Good	Good	Excellent	**FEATURES:** 4X AGP, NVidia GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC, 3D glasses, AV adapter, S-Video-in and -out, TV tuner, coaxial output; DVD, image-editing, and color-calibration software, and game. **SUMMARY:** Board rivals our top card's features and costs less. Dim lighting in two test games.
5	ATI Radeon 64MB DDR 905/882-2600 www.ati.com	Apr 01	$229	92	Very good	Very good	Very good	**FEATURES:** 4X AGP, ATI Radeon chip, 64MB of DDR SDRAM, 350-MHz RAMDAC, hardware DVD support, S-Video out, composite-in, composite-out, graphics editing software. **SUMMARY:** ATI card receives high honors due to partial DirectX 8 support, solid performance at high resolutions, and 64MB of fast DDR SDRAM.
6	ELSA Gladiac MX 800/272-3572 www.elsa.com	Apr 01	$139	86	Very good	Good	Satisfactory	**FEATURES:** 4X AGP, NVidia GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; DVD software. **SUMMARY:** ELSA Gladiac MX turned in stellar speed scores for an MX board, but image quality lacked polish in two of our games. Buyers can add up to three games at discount prices from the Shopelsa.com site.
7	MSI MS-StarForce 818 GeForce2 MX 626/965-1680 www.msicomputer.com	NEW	$99	86	Very good	Good	Good	**FEATURES:** 4X AGP, NVidia GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; S-Video out, DVD, and overclocking, desktop, and color-calibration utility. **SUMMARY:** This inexpensive newcomer's speed and image-quality scores nearly matched those of the other MX-based boards cards on the chart.
8	Matrox Millennium G450 800/361-1408 www.matrox.com	Mar 01	$135	86	Very good	Good	Excellent	**FEATURES:** 4X AGP, Matrox G450 chip, 32MB of DDR SDRAM, 360-MHz RAMDAC; dual-display support. **SUMMARY:** While the Matrox didn't exactly excel in 3D performance, it had terrific image quality in our tests. And it is the only card on our Top 10 chart to offer dual-display support.
9	ELSA Gladiac GeForce2 GTS 800/272-3572 www.elsa.com	Feb 01	$229	86	Satisfactory	Very good	Good	**FEATURES:** 4X AGP, NVidia GeForce2 GTS chip, 32MB of DDR SGRAM, 350-MHz RAMDAC; TV-out, no bundled applications. **SUMMARY:** Image quality pales in comparison with that provided by NVidia GeForce2 Ultra and Pro boards. No bundled games, but you can pick up three from Shopelsa.com for just $20.
10	Hercules 3D Prophet II Ultra 877/484-5536 www.hercules.com	Mar 01	$499	85	Very good	Excellent	Very good	**FEATURES:** 4X AGP, NVidia GeForce2 Ultra chip, 64MB of DDR SDRAM, 350-MHz RAMDAC, DVI-out, S-Video-out, composite out; utilities; DVD and color-calibration software. **SUMMARY:** This powerful GeForce2 Ultra-based card delivers the fastest performance on the chart, but it's also the most expensive.

Best Buy

For reviews of new graphics boards that we tested this month, visit www.pcworld.com/t10graphics.

TEST PC WORLD CENTER **HOW WE TEST** We test graphics boards under Windows Me. Our performance scores are based on tests that we evaluate on frame rate (50 percent) and image quality (50 percent). We use GT Interactive's Unreal Tournament, Id Software's Quake III Arena, Interplay's MDK2 Demo, Infogrames' Test Drive 6, and the Caligari TrueSpace 4.2 Benchmark for both performance and image-quality testing. We test graphics boards in a Dell Dimension 4100 Series with a PIII-933 CPU and 128MB of PC133 SDRAM. To test each board, we use drivers supplied by the vendor. Overall rating is based on performance (42.5 percent), features (27.5 percent), price (20 percent), and support policies (10 percent).

WE TESTED THREE new cards this month—Matrox's Millennium G450 ETV, ATI's Radeon VE, and MSI's MS-StarForce 818 GeForce2 MX—but only the $99 StarForce landed on the chart. Hercules' quick but pricey 3D Prophet II Ultra may climb out of its tenth-place cellar spot in coming months: Prices should drop on NVidia GeForce2 Ultra cards, as the next generation of models with the GeForce3 chip starts to appear. ▶

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TOP 10 CD-RW DRIVES

	CD-RW DRIVE	Street price (3/15/01)	Overall rating	Performance/ support policies	CD-R write speed for 430MB/CD-RW write speed for 100MB (min:sec)	Comments
1	Creative Labs CD-RW Blaster 12-10-32 800/998-1000 www.creative.com	$150	86	Very good/ Very good	5:23/1:50	**FEATURES:** 12X/10X/32X,[1] IDE, internal, 2MB buffer, buffer underrun compensation technology, Ahead Nero Burning ROM 4.0 and Prassi AbCD, one-year warranty, toll support for 14 hours weekdays and Saturdays and 8 hours Sundays. **SUMMARY:** $100 price drop makes this drive a steal. Newer packagings have revised hardware and software.
2	TDK 16/10/40 VeloCD ReWriter (NEW) 800/835-8273 www.tdk.com/multimedia	$250	86	Excellent/ Very good	4:21/1:53	**FEATURES:** 16X/10X/40X,[1] IDE, internal, 2MB buffer, buffer underrun compensation technology, Ahead Nero Burning ROM 5.0 and InCD, one-year warranty, toll-free support for 11.5 hours weekdays and 10 hours Saturday. **SUMMARY:** This speedy 16X drive features great performance. A handy video walks novices through the installation process.
3	Plextor PlexWriter 12/10/32A 800/886-3935 www.plextor.com	$220	85	Excellent/ Very good	5:14/1:32	**FEATURES:** 12X/10X/32X,[1] IDE, internal, 2MB buffer, buffer underrun compensation technology, Adaptec Easy CD Creator 4.02 and DirectCD 3.01, one-year warranty, toll-free support for 11 hours weekdays. **SUMMARY:** April's number one stays high on the chart thanks to its CD-RW and CD-ROM performance—even though faster drives cost little more.
4	LG Electronics CED-8120B (NEW) 800/243-0000 www.lgeus.com	$160	85	Very good/ Very good	5:12/1:51	**FEATURES:** 12X/8X/32X,[1] IDE, internal, 8MB buffer, Adaptec Easy CD Creator 4.02 and DirectCD 3.01, one-year warranty, toll-free support for 12 hours weekdays. **SUMMARY:** Bolstered by excellent read performance and good write performance, this drive features a large buffer and a sturdy tray mechanism.
5	Acer 1832A 10/8/32 (NEW) 888/723-2238 www.acercm.com	$159	84	Very good/ Excellent	6:04/1:44	**FEATURES:** 10X/8X/32X,[1] IDE, internal, 4MB buffer, Adaptec Easy CD Creator 4.02e and DirectCD 3.01, one-year warranty, 24-hour/7-day toll-free support. **SUMMARY:** This is the only drive on the chart to feature round-the-clock technical support, and its CD-RW performance is competitive with that of other 8X-rated drives.
6	Hewlett-Packard CD-Writer 9510i 800/752-0900 www.hpcdwriter.com	$199	84	Excellent/ Satisfactory	4:56/1:46	**FEATURES:** 12X/8X/32X,[1] IDE, internal, 4MB buffer, HP MyCD and Adaptec DirectCD 3.01c, one-year warranty, toll support for 12 hours weekdays. **SUMMARY:** Drive offers strong overall performance, and such niceties as one-step software installation. The extensive software bundle includes HP Simple Backup and HP CD Labeler.
7	Plextor PlexWriter 16/10/40A (NEW) 800/886-3935 www.plextor.com	$247	83	Excellent/ Very good	3:57/1:37	**FEATURES:** 16X/10X/40X,[1] IDE, internal, 2MB buffer, buffer underrun compensation technology, Adaptec Easy CD Creator 4.02e and DirectCD 3.01, one-year warranty, toll-free support for 11 hours weekdays. **SUMMARY:** Superb CD-R performance and drivers for easily extracting CD audio tracks make this an excellent pick.
8	Pacific Digital PDC 8832ei (NEW) 888/333-6732 www.1pdc.com	$139	82	Very good/ Good	7:16/1:57	**FEATURES:** 8X/8X/32X,[1] IDE, internal, 2MB buffer, NTI CD-Maker 2000 and NTI FileCD, one-year warranty, toll-free support for 12 hours weekdays and 5 hours Saturday. **SUMMARY:** This is a strong performer for its speed class. But for a little more money you can buy a faster drive that ups the CD-R speed to 12X.
9	TDK 12/10/32 VeloCD ReWriter 800/835-8273 www.tdk.com/multimedia	$230	82	Very good/ Very good	5:25/2:00	**FEATURES:** 12X/10X/32X,[1] IDE, internal, 2MB buffer, buffer underrun compensation technology, Ahead Nero Burning ROM 5.0 and InCD, one-year warranty, toll-free support for 11.5 hours weekdays and 10 hours Saturdays. **SUMMARY:** Solid CD-R write performance keeps this drive on our chart, despite sluggish CD-RW performance.
10	Sony Spressa Professional CRX140E/CH2 800/352-7669 www.storagebysony.com/spressa	$149	82	Very good/ Very good	7:04/3:24	**FEATURES:** 8X/4X/32X,[1] IDE, internal, 4MB buffer, Sony CD Extreme 1.1 and Prassi AbCD 1.3, one-year warranty, toll-free support for 12 hours weekdays and Saturday. **SUMMARY:** Long a mainstay on our chart, this remains the fastest 8X/4X/32X drive we've tested; however, newer, speedier drives leave it in the dust.

Best Buy

For capsule reviews of this month's new CD-RW drives, visit www.pcworld.com/reviews/cdrw.

TEST PC WORLD CENTER **HOW WE TEST** We test CD-RW drives on a Micron Millennia Celeron-400 system with 64MB of RAM, a 13GB hard drive, and Windows 98. To gauge CD-ROM read performance, we use Testa Labs' CD Tach 98 version 2.0 and install Microsoft's Office 2000 suite in its default configuration. To determine CD-R write performance, we burn 430MB of data to CD-R from an image file and on the fly. To test CD-R read performance, we copy the same 430MB of data to the hard drive. We evaluate digital audio extraction speed by extracting a 250MB track from an audio CD and saving it to the hard drive. To measure CD-RW packet-writing performance, we copy 100MB of files to a CD-RW disc twice. Overall ratings are based on performance (40 percent), price (20 percent), features (20 percent), tech support policies (10 percent), and ease of installation (10 percent). [1] Speeds for CD media: CD-R write/CD-RW write/CD-ROM read; 1X = 150 KBps with CD media, 1.38 MBps with DVD media.

THIS MONTH'S RESHUFFLED chart entries reflect the double whammy of falling prices and the arrival of five new CD-RW drives—including drives with 16X CD-R write speeds from Plextor and TDK. The latter, TDK's $250 16/10/40 VeloCD ReWriter, debuts at number two; but thanks to a $100 price cut, the Creative Labs CD-RW Blaster 12-10-32 jumps seven notches to edge past it and capture first place. ▶

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TOP 10 DIGITAL CAMERAS

	CAMERA: $500 AND OVER	Street price (3/15/01)	Overall rating	Image quality	Ease of use	Battery life/ shots	Comments
1	Nikon Coolpix 880 800/645-6689 www.nikonusa.com	$689	87	Very good	Adequate	Very good/ 227	**FEATURES:** 3.34-megapixel resolution, 8MB CompactFlash media, 38-95mm focal range;[1] serial, USB, and video output; 11.2 ounces. **SUMMARY:** Small and light; many exposure and control options, but extensive menus can be confusing; good choice for a serious digital photographer who travels frequently.
2	Olympus Camedia C-3040 Zoom (NEW) 888/553-4448 www.olympusamerica.com	$999	84	Very good	Good	Good/ 147	**FEATURES:** 3.34-megapixel resolution, 16MB SmartMedia card, 35-105mm focal range;[1] serial, USB, and video output; 13.7 ounces. **SUMMARY:** Boxy but stylish camera produces great shots; loads of control options, but too many are buried in menu system; new, fast f1.8 zoom lens; supports USB Storage Class standard.
3	Olympus Camedia C-2040 Zoom (NEW) 888/553-4448 www.olympusamerica.com	$599	83	Good	Good	Good/ 147	**FEATURES:** 2.11-megapixel resolution, 8MB SmartMedia card, 40-120mm focal range;[1] USB and video output; 13.7 ounces. **SUMMARY:** A close cousin to the C-3040, this camera offers lower maximum resolution but nearly equal image quality. It's solidly designed, but won't capture audio when recording QuickTime videos.
4	Sony Cyber-shot DSC-P1 800/222-7669 www.sony.com/di	$799	83	Good	Excellent	Adequate/ 115	**FEATURES:** 3.34-megapixel resolution, 8MB Memory Stick media, 39-117mm focal range;[1] USB and video output; 8.8 ounces. **SUMMARY:** Pocket-size, innovative design; easy-to-use controls and menus; creates MPEG movie clips; optional underwater case good down to 100 feet; ideal for trendy snapshooters.
5	Olympus Camedia E-10 (NEW) 888/553-4448 www.olympusamerica.com	$1999	83	Good	Very good	Limited/ 69	**FEATURES:** 4-megapixel resolution, 32MB SmartMedia card, 35-140mm focal range;[1] USB and video output; 40.2 ounces. **SUMMARY:** Ultrahigh resolution, through-the-lens viewing, and a huge number of controls; also accepts CompactFlash media. However, it's relatively heavy and pricey.
6	Kodak DC4800 800/235-6325 www.kodak.com/go/dc4800	$599	83	Very good	Adequate	Good/ 171	**FEATURES:** 3.1-megapixel resolution, 16MB CompactFlash media, 28-84mm focal range;[1] USB and video output; 11.4 ounces. **SUMMARY:** Superlative images and versatile exposure settings, with both aperture- and shutter-priority modes. But no manual focus, audio recording, or video recording.
7	HP PhotoSmart 912 800/752-0900 www.photosmart.com	$799	82	Good	Very good	Good/ 155	**FEATURES:** 2.24-megapixel resolution, 16MB CompactFlash media, 34-107mm focal range;[1] USB, IRDA, and video output; 21.6 ounces. **SUMMARY:** This model offers an SLR-like case, extensive and intuitive controls, and solid images. It should interest anyone transitioning from a through-the-lens 35mm camera.
8	Nikon Coolpix 990 800/645-6689 www.nikonusa.com	$899	82	Good	Very good	Good/ 157	**FEATURES:** 3.34-megapixel resolution, 16MB CompactFlash media, 38-115mm focal range;[1] serial, USB, and video output; 16.1 ounces. **SUMMARY:** Has a long list of features for the photo enthusiast, with a wide array of exposure and focus settings; a swivel lens and optional wide-angle and teleconverter lenses add to its flexibility.
9	Sony Mavica MVC-CD1000 800/222-7669 www.sony.com/di	$1299	81	Good	Good	Good/ 170	**FEATURES:** 2.1-megapixel resolution, 156MB CD-R media, 39-390mm focal range;[1] USB and video output; 36 ounces. **SUMMARY:** This model broke new ground with its built-in CD-R that stores huge numbers of images on 3-inch discs. At over 2 pounds, it's heavy and bulky, and saving images to disc is slow.
10	Canon PowerShot G1 800/652-2666 www.usa.canon.com	$899	79	Adequate	Good	Very good/ 195	**FEATURES:** 3.34-megapixel resolution, 16MB CompactFlash media, 34-102mm focal range;[1] serial, USB, and video output; 17 ounces. **SUMMARY:** Innovative LCD screen on the back of the camera swings open and twists on its hinges; however, image quality was judged only adequate, and some controls are difficult to use.

Best Buy For expanded reviews of this month's digital cameras, visit www.pcworld.com/t10cameras.

HOW WE TEST Each camera's overall rating is based on price (30 percent), picture quality (20 percent), ease of use (15 percent), features (15 percent), battery life (10 percent), and support (10 percent). For all ratings, higher is better. To gauge picture quality, we take a series of shots, with and without flash, at 640 by 480 resolution and at the camera's highest resolution. We take pictures of a complex still life and of a mannequin to see how well each camera captures image details and subtle colorings such as skin tones. A panel of judges reviews the on-screen and printed photos and assigns image-quality scores; we then average those scores. Camera weights include batteries. Data based on tests designed and conducted by the PC World Test Center. All rights reserved. [1] 35mm film equivalent.

NEW MODELS FROM Olympus this month highlight our expanded chart of cameras $500 and over. Earning a Best Buy, the Camedia C-3040 Zoom is an update of the C-3030, with a faster lens and easier USB connections. For the serious photographer, Olympus's big, heavy, and powerful E-10 offers precise, through-the-lens viewing and fast action when you're changing exposure settings. Next month: digital cameras under $500. ■

HERE'S HOW

WINDOWS TIPS SCOTT DUNN

What's on the Menu? You Decide

ONE OF THE USEFUL new features in Windows Millennium Edition and 2000 is the ability to put the Control Panel on the Start menu. But why stop there? Windows Me and 2000 let you convert many different folders into cascading menus that provide quick access to their contents. Here's what you can do.

Expand the Control Panel: To have the Control Panel appear as a cascading menu off the Start•Settings menu, choose *Start•Settings•Taskbar and Start Menu*, or right-click an empty area of the taskbar and select *Properties*. Click the *Advanced* tab, make sure that *Expand Control Panel* is selected in the list of check boxes at the bottom, and click *OK* (see **FIGURE 1**).

Customize Your Control Panel Menu: Expanding the Control Panel is a good idea if you frequently open many different Control Panel utilities with your mouse; if you change only a few Control Panel settings or prefer to access the applets from the keyboard, you can make your own Control Panel menu: Right-click the *Start* button and click *Open*. Then right-click in the Start Menu folder and choose *New•Folder*. Type a new name beginning with a letter not already used as a Start menu shortcut key (see below), and press **<Enter>**. Open the new folder and then open the Control Panel window. While holding down **<Ctrl>**, select only the Control Panel icons you use most, right-click them, drag the group to your new folder, and choose *Create Shortcut(s) Here*.

If two or more items in your new folder begin with the same letter, you may have to hit the same shortcut key repeatedly to get to the folder you want to open, because each item's initial letter becomes its shortcut key by default. You can avoid the extra keystrokes by beginning each item name with a unique character. For example, if you move Add/Remove Programs to a folder named Gizmos that already has items named Add New Hardware and Action Items, you must press **<Ctrl>-<Esc>GAAA<Enter>** to open the Add/Remove Programs applet. But if you rename Add/Remove Programs as Install and Remove Programs, you can open it simply by pressing **<Ctrl>-<Esc>GI**. For even faster access, see "Add Custom Accelerator Keys to Your Start Menu," page 182.

FIGURE 1: MAKE INSTANT MENUS from often-used system folders by checking these boxes.

ILLUSTRATION: CHRIS PYLE

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online NAPSTER MAY SOON be history, but there are other ways to share tunes. Visit www.pcworld.com/features/napster.

Don't Expand Scheduled Tasks: If you made a custom Control Panel menu as described above and included the Scheduled Tasks icon from the normal Control Panel, your cascading menu will have another cascading menu called Scheduled Tasks. If you'd rather open the Scheduled Tasks folder as a window, delete the Scheduled Tasks icon you dragged from the Control Panel and open the *Start•Programs•Accessories•System Tools* menu. Right-click and drag the Scheduled Tasks icon from there into your own menu (or the folder window for that menu). When you release the mouse button, choose *Copy Here* or *Create Shortcut(s) Here*. Unlike shortcuts created from the Control Panel, which show the folder items in a cascading menu, this approach opens a window. (Alternatively, you can leave the cascading Scheduled Tasks menu in place and when you want to view it as a folder, simply open your custom Control Panel menu and double-click the *Scheduled Tasks* menu item.)

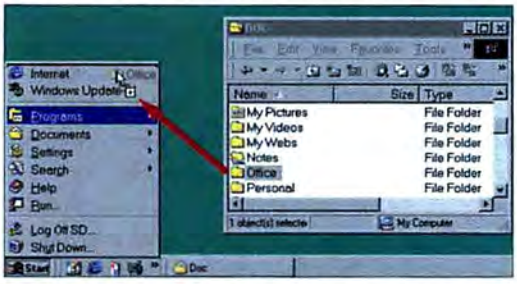


FIGURE 2: MAKE A FOLDER a menu: Right-click and drag it to the Start menu and choose *Create Shortcut(s) Here*.

Expand Dial-Up Networking or Printers: To convert your Dial-Up Networking folder and the Printers folder on your Start•Settings menu into cascading menus, choose *Start•Settings•Taskbar and Start Menu*, or right-click an empty area of the taskbar, and choose *Properties*. Click the *Advanced* tab and make sure that the options for *Expand Dial-Up Networking* (Windows Me) or *Expand Network and Dial-Up Connections* (Windows 2000) and for *Expand Printers* are selected. Then click *OK*.

Expand My Documents and My Pictures: By default, when you choose *Start•Documents*, you see shortcuts to the My Documents and My Pictures folders (Windows' built-in folders that are intended to encourage your more exemplary organizational habits). If you'd rather have each of these folders appear as cascading menus so you can open the contents of each directly from the menu, just—you guessed it—open the *Advanced* tab of the Taskbar and Start Menu Properties sheet as instructed above. Check the options for *Expand My Documents* and *Expand My Pictures* (the latter with Windows Me only), and click *OK*.

Expand Any Folder—or Don't: You can see any folder on your system as a cascading menu. Right-click and drag the folder into any menu (or its corresponding folder) within the Start menu hierarchy, and choose *Create Shortcut(s) Here* (see **FIGURE 2**). But what if you just want to open a folder from the Start menu without seeing all the contents as a cascading menu? Right-click the spot where you want your folder shortcut to appear in the menu and choose *Open*. Then right-click an empty area of the folder and choose *New•Shortcut*. In the Command Line box of the Create Shortcut Wizard, type **explorer.exe *n*:\folder name**, where *n* is the drive letter and *folder name* is the name of the folder you want access to. If you want the shortcut to open a two-paned Explorer window with the file tree pane on the left, add a comma and **/e** to the end of the command line (for example, **explorer.exe n:\folder name,/e**). Click *Next*, type a name for your shortcut, and click *Finish*.

Have It Both Ways: Dave Valiulis of Scotts Valley, California, doesn't want to have to choose between opening the Control Panel in a window and seeing it as a cascading menu. He asks why Windows can't be more like the Macintosh operating system, which allows a cascading Control Panel menu but also permits opening the Control Panel in a window by clicking the menu name. The answer: Windows does let you have it both ways, for Control Panel and all folders; but you have to double-click the menu item. You can also use the left mouse button to open it as a cascading menu and the right mouse button to open it in a window. When you right-click the menu name, you see a pop-up menu that allows you to open the folder in a single window (*Open*) or in a two-pane Explorer window (*Explore*), as in **FIGURE 3**. Note that this technique doesn't work for certain built-in menus, such as Start•Search and Start•Documents.

More Menu Modifications: While you're right-clicking menu items, don't forget that creating custom menus by adding a folder within the Start Menu folder or its subfolders gives you even more right-click options, including Delete and Rename. These options are not available for Control Panel, Printers, My Documents, or other automatic system menu items.

Note: To learn how to turn custom toolbars into cascading menus off the Windows taskbar, see the November 1999 ▶

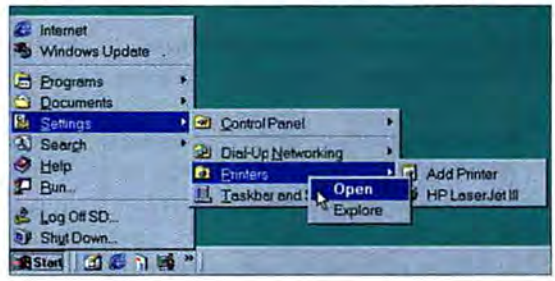


FIGURE 3: LEFT-CLICK *Control Panel* (or any folder-based menu entry) to see a menu; right-click to open it in a window.

Windows Tips at www.pcworld.com/nov99/menus. If you don't have Windows Me or Windows 2000, check out this month's "Windows Toolbox" at right.

ADD CUSTOM ACCELERATOR KEYS TO YOUR START MENU

IN WINDOWS 9*x* you can access Start menu items by pressing **<Ctrl>-<Esc>** followed by the underlined character (also called the accelerator key) of the menu item you want to open. If the item has no underlined character, its accelerator key is its first character. You hit accelerator keys until the item you want is launched. Unfortunately, if you've created two or more items that begin with the same character, or with an existing underlined character, you have to press that character repeatedly on the keyboard until the desired item is highlighted, and then press **<Enter>**. This process can really slow things down, especially if several icons start with the same character. The obvious (if unwieldy) solution is to make sure each item you add to the Start menu (or its submenus) begins with a different character. You could also add a number (such as 1, 2, or 3) and/or a character (A, B, C, and so on) to the beginning of each icon name.

Now there's a better way. Microsoft has made available in Windows Me and 2000 a useful technique that other utilities have offered for years: Just type an ampersand (**&**) before any character in a shortcut or menu name to make that character the shortcut key. For example, to add a custom Control Panel menu named Controls, you can add an ampersand before a character not used as a Start menu shortcut so that the *C* in Controls won't conflict with the underlined *c* in the Search menu. Unfortunately, this feature is not fully implemented, so adding an ampersand doesn't underline the following character, it just inserts an ampersand in the middle of the menu name—for example, **Contr&ols** (see **FIGURE 4**). The result may be unsightly, but the technique works.

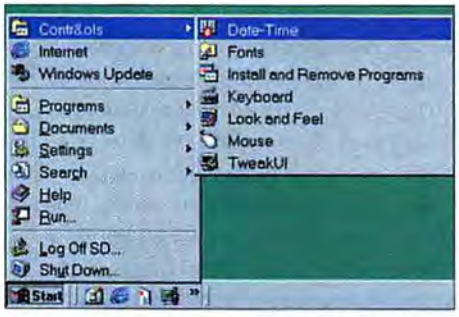


FIGURE 4: LOOK, MA, NO MOUSE: Enter the key after the ampersand to select custom Start menus.

FORCE WINDOWS TO EXIT OR REBOOT

IN JANUARY'S *Windows Tips*, I showed how to create shortcuts that automate the process of shutting down Windows or rebooting your computer (see www.pcworld.com/jan2001/automate). But a problem arises if your PC is on a network: Shutting down Windows in that situation can trigger a message box reminding you that you are connected to another computer. Windows then asks for permission to proceed. If you're using Task Scheduler to automate a shutdown or reboot, you may not be at your PC to respond, so Windows will simply sit there with the prompt displayed for all eternity—or at least until someone responds by clicking Yes or No. So much for automation.

Fortunately, as Richard Schauer of Everett, Washington, points out, you can force Windows to shut down or reboot and have it ignore all open applications, documents, and message prompts. First, if you haven't already done so, create your shutdown or reboot shortcut: Right-click the desktop or in the desired folder and choose *New•Shortcut*. Type the appropriate command line, but add 4 to the numeric parameter at the end. For example, the command line normally used for shutting down Windows is 'rundll32.exe shell32.dll,SHExitWindowsEx 1'. Add **4** to the final parameter, and now the 'force shutdown' line becomes 'rundll32.exe shell32.dll,SHExitWindowsEx 5'. To force a reboot, change the '5' to a **6** (equivalent to adding 4 to the normal reboot option of 2). To complete the shortcut, click *Next*, type a name, and click *Finish*.

Characters in this command line are case-sensitive, so watch your capitalization. Also, take care not to add a space after the comma. A typo in the January issue included a space, to the consternation of many readers. Deleting the space should solve that problem.

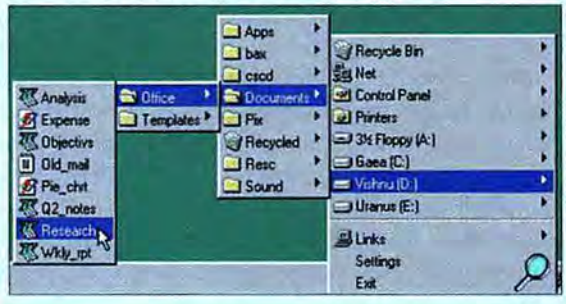
The downside: If you use this command, Windows will ignore all network connection prompts and also any prompts to save open documents. If any open documents have unsaved changes when you force a shutdown, those changes will be lost for good. So use this technique only when you're certain you won't lose data.

Find files in this article at www.pcworld.com/downloads, and find more tips at www.pcworld.com/heres_how. We pay $50 for published tips and questions. Scott Dunn is a contributing editor for PC World. ■

WINDOWS TOOLBOX

I've Got the World on a Menu

IF YOU'RE HAPPY WITH Windows 95 or 98 using Internet Explorer 4 or earlier, so be it. But you're missing the nifty ability to access your drives, folders, and other objects from a single cascading menu (see the November 1999 *Windows Tips* column at www.pcworld.com/nov99/menus). To the rescue comes TrayExplorer, a $10 shareware utility that adds an icon to your taskbar tray (the area near the clock) with a cascading menu for accessing disk drives, Network Neighborhood, the Recycle Bin, Control Panel, Printers, and other folders (you can remove any cascading-menu item that you don't need). The program also features a customizable menu with your favorite links to folders, applications, Web sites, and documents. TrayExplorer is available from PCWorld.com's Downloads as TrayExpl.zip.



Look into the southern sky. What do you see?

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File-Management Puzzle: To Delete or Not to Delete?

I NEED TO make room on my hard drive. What files can I safely delete?
Name withheld by request

I CAN'T TELL you exactly what files you can safely delete—it's a matter of judgment. But I can give you some general guidelines and advice.

When in doubt, move or compress the file rather than delete it. If you move files you think you don't need to a CD-RW disc or other removable media, or compress them in a .zip file, you'll soon know whether you were wrong about their expendability. If you haven't opened them after two months, delete them.

FIGURE 1 lists files that you can probably delete safely, along with the folder you'll find them in. **Note:** In many cases, the files named are safe to delete *only* if they reside in the specified folders.

Start your search for deletable files in Windows Explorer. Right-click one of the folders listed in Figure 1's 'Location' column, and select *Find* (or *Search* in Windows Me/2000). In the Find (or Search Results) dialog box's Named field, enter the text that Figure 1's 'File type' column lists for that folder. If the 'Include subfolders' column in Figure 1 says 'Yes', confirm that the 'Include subfolders' option is selected in the Find dialog box (in Windows Me and 2000, check *Advanced Options* and make sure *Search Subfolders* is checked). Click *Find Now* (*Search Now* in Windows Me/2000).

Maximize the search window so it fills your screen. When the search is done, click the *Modified* column heading to sort the files found by date. You can delete every file that's more than two days old.

You could also use Windows' own Disk Cleanup accessory to delete unneeded files. (Select *Start•Programs•Accessories•System Tools•Disk Cleanup.*) McAfee's QuickClean, the CleanSweep utility in Norton SystemWorks, and similar programs do a more thorough job, but they require more work (and more money).

STOP BROWSER POP-UPS

HOW CAN I stop Internet Explorer from opening pop-up windows?
William Chan, Ontario

A NUMBER OF PROGRAMS will keep pop-up windows from opening. My favorite is a little freebie by Scott R. Lemmon called the Proxomitron (see **FIGURE 2**). This handy utility can also be set to banish banners, counters, music, and other unwanted Web elements. Download the Proxomitron from PCWorld.com's Downloads; Lemmon's own Web site is at spywaresucks.org/prox.

Proxomitron requires that you change your proxy settings. In Internet Explorer 5, select *Tools•Internet Options* and click the *Connections* tab. If you're using a modem, select your preferred dial-up setting and click *Settings*. If you have a cable or DSL connection to the Internet, click *LAN Settings*. Either way, check *Use a proxy server*. Enter **localhost** in the Address field, and **8080** in the Port field. Click *OK* until you're back in your browser.

FIGURE 2: TIRED OF POP-UP ADS? The Proxomitron will banish them for good.

FILE TYPE	Location	Include subfolders	Comments
*.---	C:	Yes	Backup files created by Windows.
.	C:\Windows\temp	No	You can remove any file within this folder that is more than a day old.
*.bak	C:	Yes	Backup files from various applications.
*.bmp	C:\Windows	No	Wallpaper files. Don't delete the ones you use.
*.chk	C:	No	Files created by ScanDisk and its predecessor, Chkdsk.
*.log	C:	Yes	Log files created by various programs.
*.old	C:	Yes	Old versions of files that have been replaced by newer versions.
*.prv	C:	No	Log files created by past Windows boot-ups.
*.tmp	C:	Yes	Temporary files from various applications.
*.wbk	C:\My Documents	Yes	Word backup files.
~$*.doc	C:	Yes	Temporary Word files; not needed after the document is created.

FIGURE 1: RUNNING LOW ON HARD DRIVE SPACE? Here are some files you can consider deleting.

Surge Protectors and Storms

A STORM IS BREWING. To protect your PC, is it better to leave your surge protector on or to turn it off (and pull the plug)? It doesn't matter. In fact, surge-protector vendor American Power Conversion has an equipment protection policy that spells out when you can be reimbursed for surge-damaged equipment. Having the surge protector on is not one of the conditions. Of course, no surge protector is perfect. A direct lightning hit, for example, can get through the best protector whether it's on or off.

Find files from this article at www.pcworld.com/downloads. Send questions to answer@pcworld.com. We pay $50 for published items. You'll find Contributing Editor Lincoln Spector's humorous writing at www.thelinkinspector.com. ■

ILLUSTRATION: JEFFREY PELO

ALL PC USERS!!

THIS IS AN URGENT MESSAGE

You are and will continue to be vulnerable and at the mercy of any virus or malicious acts of a hacker as long as you continue to rely and depend on software as your line of defense. There is only one way to truly protect your PC, Hardware!

HDD SHERIFF This leading computer protection and recovery hardware system is saving millions of computers in homes, schools, libraries, colleges, universities and companies around the world.

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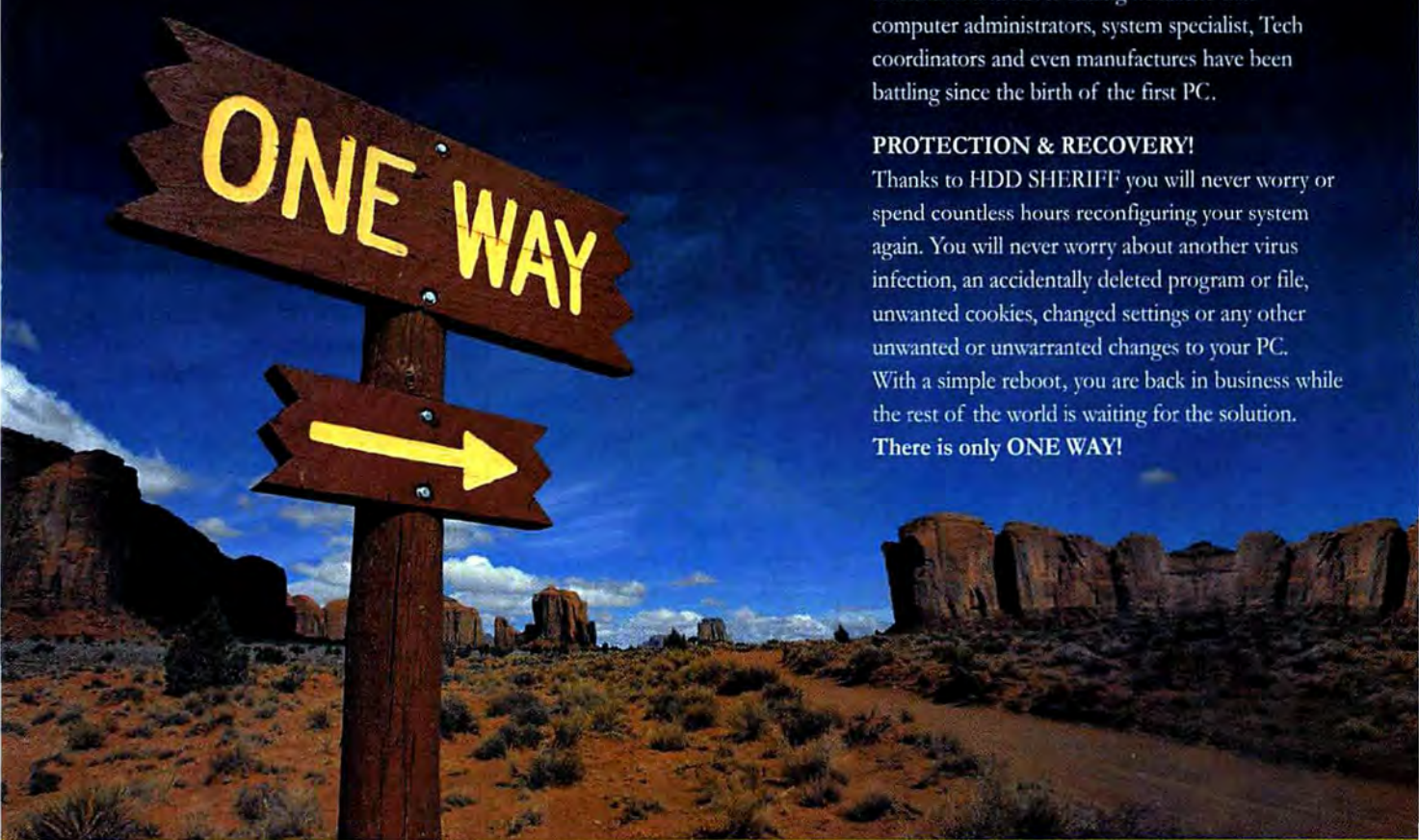
PROTECTION & RECOVERY!

Thanks to HDD SHERIFF you will never worry or spend countless hours reconfiguring your system again. You will never worry about another virus infection, an accidentally deleted program or file, unwanted cookies, changed settings or any other unwanted or unwarranted changes to your PC. With a simple reboot, you are back in business while the rest of the world is waiting for the solution.

There is only ONE WAY!



DATA SHERIFF™ *"I will protect all your vital information."*

DATA SHERIFF is here to take away all your fears and let you rest at ease. With a UI interface structured in an easy to operate format your data will never be lost again. This fast and easy backup and recovery program allows you to backup and manage specific data by date and time and much more. Storing all files in a compressed dated format you can easily preview and quickly recover any file you wish. You can store up to 100 different copies of the same data to any mapped location.

NET SHERIFF™ *"I will manage your network."*

NET SHERIFF is the latest in network management software. Providing a comfor-table and easy solution for managing your network. Once installed you will have cont-rol of the network right at your fingertips. Use the system power on/off function to boot and shut down your client computers. You can file broadcast, image copy, even control the security mode of HDD Sheriff across the network, all from the server. It is time to get the management tool that gives you piece of mind.

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Fry's ELECTRONICS
OfficeMax

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JAPAN	TOEI Electric / www02.so-net.ne.jp/~toei/index.html
GERMANY	SCHWARZ Computer System / www.hdd-sheriff.de
CANADA	INTERWARE SYSTEMS / www.interwaresystems.com
BRAZIL	Dolphins International / e-mail: dolphins@pobox.com
AUSTRALIA	BIT Distribution Pty. Ltd / www.bitcon.com.au
UK	Celluna / www.celluna.com
FRANCE	MSI / www.msi-sa.fr

AUSTRIA	EDV Werkstatt GmbH / www.edvw.com
SWITZERLAND	MasterEye Ltd. / www.mastereye.com
TURKEY	NET Bilgi / e-mail:netbilgi@superonline.com
ISRAEL	Radix Technologies Ltd. /e-mail:dov@radix.co.il
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Mend Your E-Mail's Broken Links

IT SEEMS SO SIMPLE. You stumble upon an amazing Web site, and you want to forward the address to a few of your friends by e-mail. You select the URL in your browser's Address field, press <Ctrl>-C to copy it, switch to your e-mail program, and press <Ctrl>-V to paste the URL into your message. Then you hit the Send button, and boom! The URL is on its way.

But sometimes, your link goes boom—as I found out firsthand recently when I tried to post a message containing a fairly long URL to a mailing list of friends. Most recipients found the URL highlighted as a link in their e-mail program, but the link did not take them to the site. Several people tried copying the URL from the message and then pasting it into a browser Address window, but they still went nowhere. It turns out that the address I used was good, but the way I sent it wasn't.

The lingua franca of the Internet—ASCII text—doesn't like long URLs. Most e-mail programs break a message's text (whether typed in or copied and pasted) into lines of 70 to 80 characters, inserting a carriage return at the end of each line. Your e-mail program usually highlights the URLs in your incoming mail as hyperlinks automatically. Unfortunately, it probably won't highlight anything after the carriage return that it inserted at the end of the first line containing the URL. Clicking the resulting URL fragment usually generates an error message. Copying the entire URL and pasting it into your browser's address window can cause the paste operation to skip everything after the invisible carriage return. True, you could try cutting and pasting individual pieces of the URL before and after the carriage return, but you may find it easier to type the URL directly into the browser address window.

I could have prevented line-wrap from breaking my link by posting the message in HTML format. **FIGURE 1** shows two long URLs within an e-mail message: one broken, and one that works. Some mailing-list subscribers oppose receiving messages in any format other than plain text, however, so posting an HTML message may draw more complaints than posting a broken URL.

A friend who is up on Internet rules and regulations argues that the best way to avoid line breaks in an e-mailed URL is to add **<URL:** to the beginning of the Web address and **>** to the end. Other Internet resources report that enclosing the URL between right and left angle brackets prevents the dreaded line wrap, but when I tried this I got a broken link whether I sent the URL alone (http://www.url.com), enclosed in brackets (<http://www.url.com>), or with the official URL container (<URL:http://www.url.com>). I finally managed to send the link using Qualcomm's Eudora 5.0.2 e-mail software. No matter how I formatted the URL in Eudora, or which e-mail program I received the message with, the URL came through 100 percent functional. Nothing fancy is going on—the program simply identifies URLs and doesn't insert carriage returns in them. Think how the collective level of human e-mail suffering would fall if only the other guys would add such a feature to their programs.

Banish AOL's Pop-Up Ads

IF YOU'RE BUGGED BY the many ad windows that appear when you use America Online 6, reader Jacob Dawson of St. Marys, Georgia, offers relief. Click the *Settings* icon in the toolbar and select *Preferences*. Select the *Marketing* link, and click *Continue* on the button labeled *POP-UP* to open the Pop-up Preference screen. Select *No, I do not want to receive special AOL members-only pop-up offers*, and click *OK* twice. You can also opt out of e-mail ads, telemarketing, and snail mail from AOL and its partners.

KEEP YOUR LINKS IN LINE

NETSCAPE'S MESSENGER requires you to take one small step to prevent long URLs from cracking up. Prepare your new message in the normal way, but then choose *View* and uncheck *Wrap Long Lines* before clicking the *Send* button. Neither Outlook nor Outlook Express provides such an option. If you don't want to switch to Eudora or Messenger (or send messages in HTML format and brave the wrath of text-only purists), send people the site's shorter main URL, followed by the steps required to reach the page you're ▶

FIGURE 1: BROKEN LINKS IN E-MAIL (top) can be avoided by using an e-mail program that keeps your long URLs intact.

ILLUSTRATIONS: CHRIS PYLE (LEFT); JEFFREY PELO (RIGHT)

WHACK!

[This is the sound of your hand hitting your head after you find out you could have designed your web pages faster, easier and cheaper if you had gone to **ulead.com** first]

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directing them to. Better yet, offer the exact commands you used to find the page through a particular search engine.

CAREFUL–DON'T CLICK THAT AD!

WHEN BROWSING the Web I often encounter frames, windows, dialog boxes, and even such page elements as Close, OK, and Cancel buttons that appear to be a legitimate part of the Web site. When I click on any of them, however, the entire frame that holds them turns out to be a link to another site. Trying to 'close' the object sends me to another Web site, which may automatically do something I don't want, such as present me with an unrequested download or subscription.

The next time you see one of these faux elements on your screen, move the mouse over it, but don't click. If the pointer changes to a pointing hand everywhere inside its boundaries, the element is actually a link. To avoid unwanted responses, just ignore it.

Mike Guerard, Wenonah, New Jersey

GOOD TIP. There's nothing wrong with ads—you can ignore them, and they help pay for the free content you enjoy. But banner ads that try to trick you into visiting an advertiser's Web site by masquerading as part of the host site are even more obnoxious than suppertime telemarketers.

Another way to avoid camouflaged ads is to check your browser's status bar as you hover the cursor over suspect content (**FIGURE 2** shows an example on *PC World*'s site—here, of course, the ad is obviously an ad). Each hyperlink on a Web page is a URL—a Web address. When you place the cursor over any link, including a banner ad, the embedded link shows up in your browser's status bar. By examining the domain name at the beginning of the URL (usually the part directly following 'http://'), you can often distinguish the ads from the site's content because their addresses contain the word 'ad' or 'ads', or the name of a prominent online advertising company, such as DoubleClick.

A BROWSER SECURITY CHECK

NO TWO PEOPLE use their browser in quite the same way, yet nearly everyone seems satisfied with the default security settings on their browser. Part of the reason could be how well the browser makers hide these security settings.

So, how's your browser set, security-wise? To view Internet Explorer 5's settings, first choose *Tools•Internet Options* and then click the *Security* tab. Make sure that 'Internet' is the Web content zone selected. Click *Default Level* to reset your browser to its default setting of Medium; this disables ActiveX controls that are unsigned or not marked as safe, but allows all cookies (prompting you only before accepting third-party cookies stored locally). Active scripting and scripting of Java applets are also enabled by default.

To change the default setting, click *Custom Level* under Internet Options' Security tab and then choose one of the other three presets (High, Medium-low, or Low), or change individual settings manually.

In Netscape *4.x*, select *Edit•Preferences* and then click *Advanced*. The default setting enables Java and JavaScript, and accepts all cookies, but you can choose to block all cookies, to allow only those that are sent back to the originating server, or to receive a warning before the browser accepts a cookie. Netscape 6 adds the ability to view your stored cookies, remove them individually or all at once, and permanently block all cookies that have been removed.

In Opera, click *File•Preferences* and highlight *Security*. You can view your personal certificates and certificate authorities, and select and configure security protocols.

FIGURE 2: SPOT THE AD: Check the browser status bar (bottom) as you hover the cursor over suspect content to reveal its link.

DOWNLOAD OF THE MONTH

MP3 CD Catalog: Once More With Feeling

IN THE JULY 2000 *Internet Tips* column (www.pcworld.com/heres_how/july2000/tips), I wrote about CDScan, a nifty utility that catalogs MP3s stored on multiple CD-R and CD-RW discs. Alas, CDScan isn't being updated. Of the numerous alternatives, Wizetech Software's $30 Advanced MP3 Catalog Pro has won my heart. The 744KB program is available at PCWorld.com's Downloads and at the vendor's site at www.wizetech.com. The program isn't free (the demo version catalogs only three discs), but it's worth the investment if your MP3 archives are massive.

Besides grabbing each song file's ID3 data, Advanced MP3 Catalog Pro lets you assign music categories to the tunes in your database and search by song, album, or artist within a category. You can also use it to print reports about your collection; sort reports by artist name, album title, or other ID3 tag; and export reports to Word, Excel, or Access. Best of all, the program can be used to print CD covers that list the contents of each disc.

online *You'll find the file mentioned in this article at www.pcworld.com/downloads. Send questions and tips to nettips@spanbauer.com. We pay $50 for published items. Scott Spanbauer is a contributing editor for* PC World. ■

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Avoid buffer underruns ◆ Cure real-mode driver blues ◆ **Fast Windows answers**

Remove Your (CD) Writer's Block

CD-R AND CD-RW DRIVES are fussy eaters. They require an uninterrupted stream of data from the source CD-ROM or hard drive to the recipient blank CD. If your PC can't meet your drive's demanding dietary requirements, you've got trouble. Even a brief pause in the flow of data can result in a dreaded 'buffer underrun error', ruining your recording session and—if you're burning a CD-R—wasting a good disc.

To correct this problem, just reduce the recording speed—from 8X to 4X, for example. Of course, slower speeds mean longer recording times (see **FIGURE 1**). So before you acquiesce to this option, see whether some simple adjustments might speed your PC's data transfer and maximize your CD-R or CD-RW drive's performance. **Note:** The following tips refer exclusively to internal IDE drives, and not to USB or parallel-port external drives.

Take a load off: Do everything you can to reduce the computing load on your system's CPU while you're burning a disc. This means doing more than merely closing all currently open apps on your PC. You should also disable real-time virus protection, screen savers, telephony programs, and any other software running in the background that might interrupt the flow of data. Check your System Tray (usually found in the lower-right corner of your screen) for icons representing your running programs. If you're on a network, log off for the duration, or at least disable File and Print Sharing under Network Properties so no one can bog down your hard drive by sharing your files while you try to burn a CD. Right-click *Network Neighborhood* on the desktop (*My Network Places* in Windows Me), select *Properties*, click the *File and Print Sharing* button under Configuration, and be sure that the *I want to be able to give others access to my files* option is not checked. Here's one final trick: Choose *Start•Programs•Accessories•System Tools•System Information*, and then select *System Configuration Utility* under the Tools menu. Click the *Startup* tab. You'll see a list of programs that your system starts automatically whenever you boot Windows. Make sure that there aren't any duplicate start-up instructions, which can make your system unstable.

Use your hard drive: When you copy a CD or CD-ROM from another drive, make sure your CD-R software is set to use your hard drive as a faster cache for the data being streamed to your CD-RW drive. Direct transfers from, say, a CD-ROM drive to a CD-RW drive are more susceptible to buffer underrun errors, and you need a very fast source drive to maintain a reliable data stream. Your CD-R software should use the hard drive by default. And if you use an ATAPI (IDE) CD-RW drive, make sure it's on a different IDE channel than the hard drive. Most current PCs come with two IDE channels—primary and secondary—built into the motherboard. Each channel supports two IDE devices on a single cable: a master and a slave. Hard drives should always be on the primary channel, and ATAPI devices (if any) should be on the secondary channel.

Use direct memory access: Most CD-RW drives support direct memory access, a feature that nearly always improves writing performance significantly. If you use Windows 98 or Me, you can enable or disable DMA for your drive: Select *Start•Settings•Control Panel*, double-click the *System* icon, click the *Device Manager* tab, select the CD-RW drive under *CD-ROM*, click *Properties*, click the *Settings* tab, and check the DMA box (see **FIGURE 2**).

On some PCs, using DMA can cause problems. If you have trouble burning CDs and DMA is enabled, try disabling it.

Maximize your cache: Make sure your CD-ROM's cache settings are maximized. Right-click the *My Computer* icon and select *Properties*. Choose *File System* under the Performance tab, and select *CD-ROM*. Under *Settings*, slide the *Supplemental* ▶

Book of PC Revelations

IF YOU'RE LOOKING for fast answers to your hardware and Windows questions, your best resource may be right under your nose. If you use Windows 95 or Windows 98, a great reference lies just a few mouse clicks and button pushes away. You'll find an online (and searchable) copy of Microsoft's telephone book–size *Windows Resource Kit* located on your Windows CD. On the Windows 98 CD, the resource kit resides in the tools\reskit\setup folder; on the Windows 95 CD check in the admin\reskit folder.

Time to Burn

CD-R OR CD-RW DRIVE SPEED [1]	Theoretical time to burn 650MB [2]
2X	36 minutes
4X	18 minutes
8X	10 minutes
12X	6 minutes

[1] 1X = 150KB per second.

[2] The time required to write headers and tables of contents will extend these figures.

FIGURE 1: HERE ARE THE TRANSFER times for CD-R and CD-RW drives with specific 'X' ratings.

ILLUSTRATIONS: CHRIS PYLE (LEFT); JEFFREY PELO (RIGHT)

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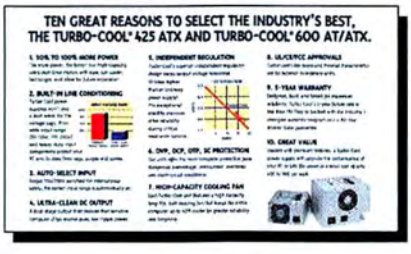

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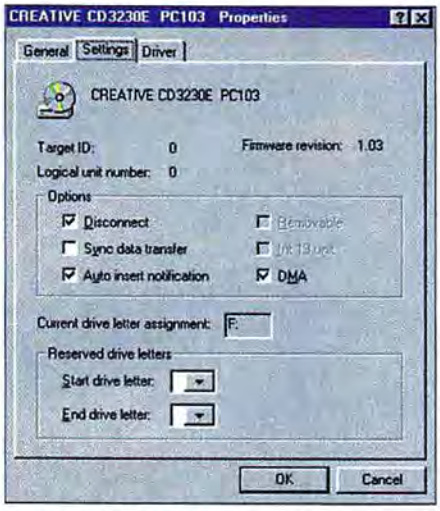

FIGURE 2: TO SPEED transfers, check the DMA box on the CD-ROM drive's Properties menu.

cache bar all the way to the right, and then select *Quad speed or higher.*

Firm up your firmware: Some CD-ROM, CD-R, and CD-RW drives come with upgradable firmware—operating instructions located on a chip in the drive, much like the chip that holds your PC's BIOS. Ask your drive vendor if a more recent firmware version is available. (A downloadable executable file is usually posted in the support section of the vendor's Web site.) The current version's number can be found on the *Settings* tab of the drive's Properties sheet under *Device Manager* (see 'Firmware revision' in Figure 2).

Spruce up your hard drive: Data moves faster off a hard drive than off a CD, but only if your drive is working at top efficiency. Run *ScanDisk* (under *Start•Programs•Accessories•System Tools*) with the box checked to fix cross-linked files and lost clusters automatically. If you choose *Thorough*, you'll also scan for disk errors. Finally, run *Disk Defragmenter* (also under System Tools) to optimize file structure.

Windows 98 users can increase the disk cache set aside for frequently used hard-disk data. Select *Start•Settings•Control Panel*, double-click the *System* icon, choose the *Performance* tab, select *File System*, click the *Hard Disk* tab, and under 'Typical role of this computer', change 'Desktop computer' to *Network server.*

Match your media to your drive: Older discs and cheap generic media may be rated to record at 8X or even 4X, but an 8X-rated CD-R disc may record reliably at 12X on your machine. It all depends on the media and the drive you use. Finding the brand or model that works best on your drive is a matter of trial and error, but you should start with the brands recommended by your drive manufacturer.

Keep it clean: Dust, grime, and grease can collect on the optics of your drive and on the surface of CDs, hindering the recording process. Kits with a special CD that cleans your CD drive cost less than $10 at most computer stores, but check with your drive maker for the approved cleaning method before you use a cleaning kit.

Clean CDs with water and a lint-free cloth. Wipe along a radius from the center of the CD outward. CD-Rs are far more delicate than conventional CDs and need more care. Avoid adhesive labels, and never write on discs with a hard-tipped pen.

If these methods don't improve your CD recorder's performance, you'll have to spend a few bucks on better hardware. But before you mortgage the ranch to get the latest and greatest, consider buying a new CD-RW drive that uses a technology designed to prevent buffer underrun errors. Check *Top 10 CD-RW Drives* (page 177) for reports and recommendations on drives. Though we haven't formally tested the efficacy of these technologies at the specific task of preventing buffer underrun errors, we've yet to see a drive that uses the new techniques ruin a disc.

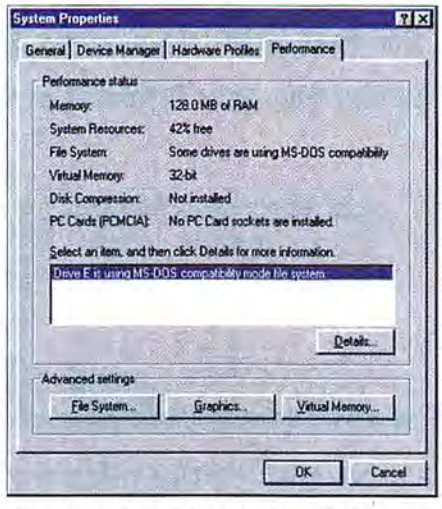

FIGURE 3: DEVICES USING real-mode drivers can slow hard-drive data transfers considerably.

GET UN-REAL (MODE)

I JUST BUILT a new PC. Hating to waste anything, I removed the hard drive from my old, reliable Pentium 90 and installed it as a second drive in my new system running Windows 98. Now the old drive moves like molasses. Transferring data from one hard drive to the other is slower than writing to a floppy disk. What can I do to speed up my older disk?

Robert Vail, Jacksonville, Florida

SOUNDS like a bad case of real-mode drivers. One of Win 95's big improvements was protected-mode operation, which allots each program its own protected segment of memory. Previously, under the real-mode operations of Windows 3.*x* and DOS, programs had to share a small, unprotected memory segment, which frequently caused conflicts and crashes.

To maintain backward compatibility with old DOS programs, Win 95 and 98 still work in real mode. If Windows does not recognize an older hard drive or can't find a protected-mode driver for it, the OS tries to use a compatible real-mode driver. Real-mode drivers use real-mode memory management, which is very slow.

To check your old drive, select *Start•Settings•Control Panel* and double-click the *System* icon. Select the *Performance* tab, and under both File System and Details look to see if you're using MS-DOS compatibility mode (see **FIGURE 3**).

Try installing protected-mode drivers, if your drive vendor has them available. You can still use the drive without protected-mode drivers, though it may be suitable only for archival storage, not for running applications or anything requiring frequent disk accesses. For most people, the storage capacity gained from slaving a vintage drive to a much newer, faster, and higher-capacity drive simply isn't worth the trouble. The wisest approach is to attach the drive temporarily to copy any data you may want and then remove the old drive from the system.

online

For more tips, see www.pcworld.com/heres_how. We welcome your tips and questions and pay $50 for published items. Kirk Steers is a PC World *contributing editor.* ■

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Install a Bigger, Faster Hard Drive

INSTALLING A NEW hard drive remains one of the most popular upgrade projects for PC users. And it's easy to see why. Today's drives are bigger than ever and bargain priced, and they offer a performance boost, as well. You'll need that extra space for the increasingly roomy OS installs and gigabyte-eating applications that are the norm these days. And don't forget graphics, audio, and video files.

If your budget is limited, you can upgrade to a 20GB drive for as little as $120; a medium-size 40GB drive will set you back $150 or thereabouts. For maximum storage space, you can invest in a 60GB or 80GB behemoth, although prices for these larger drives are in the $200-to-$300 range. If you're comfortable making the upgrade without installation software, you can save a few bucks ($10 to $30) by purchasing a bare drive.

Manufacturers offer most drives in both 5400-rpm and 7200-rpm versions. While the 5400-rpm drives are slightly less expensive than the 7200-rpm models, the latter deliver a genuine performance boost in the form of quicker access times and improved data transfers.

THE TOP DOWN

Benefits: Higher capacity, better performance
Cost: $100 (20GB) to $325 (80GB)
Expertise level: Intermediate
Time required: 1 to 2 hours
Tools required: Phillips screwdriver, needle-nose pliers, antistatic wrist strap (recommended)
Vendors: IBM (www.storage.ibm.com), Maxtor (www.maxtor.com), Quantum (www.quantum.com), Seagate (www.seagate.com), Western Digital (www.wdc.com)

If you need...
Ultra DMA/100 card: Ultra100 $40 (www.promise.com)

The newest IDE hard drives are backward-compatible with the Ultra DMA/66 interface found on most PCs made in the last few years. But most of today's drives support the Ultra DMA/100 interface (alternatively called ATA/100), which offers burst transfer speeds of up to 100MB per second. In some operations, the new interface can speed up data transfers, but the overall performance difference is not that dramatic because the bursts involve only tiny amounts of data.

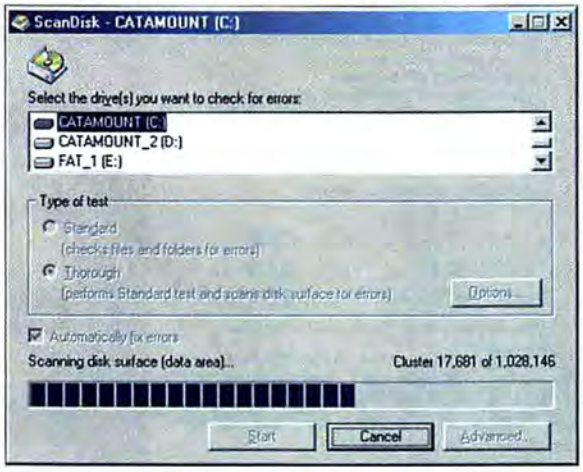
Still, if you want the best performance out of your new drive, your PC must have on-board Ultra DMA/100 support. For about $40, you can buy a card that adds Ultra DMA/100 to your PC from a company like Promise (www.promise.com). Or you can just settle for the interface that your PC uses now.

Because your new hard disk will be bigger and faster than the one your PC currently uses, plan on making the new drive your primary drive—the new home for your operating system and applications. You can attach the old drive as a secondary hard disk and use it for archives and less frequently accessed data.

All major drive makers pack software with their upgrade kits that prepares the drive for data (partitioning and formatting) and can also copy exactly what's on your current drive to the new one, helping to make the upgrade a snap.

Stan Miastkowski is a PC World *contributing editor.* ■

1 Prepare your PC's existing hard drive. To prevent future problems, make sure the current drive in your PC is trouble-free. Run ScanDisk (*Start•Programs•Accessories•System Tools•Scan Disk*) and check the *Thorough* test option. Then run Disk Defragmenter (*Start•Programs•Accessories•System Tools•Disk Defragmenter*). These tests sometimes take hours to complete if you haven't run them before, but you'll save time and headaches later in the installation process by ensuring that you will be copying error-free data.

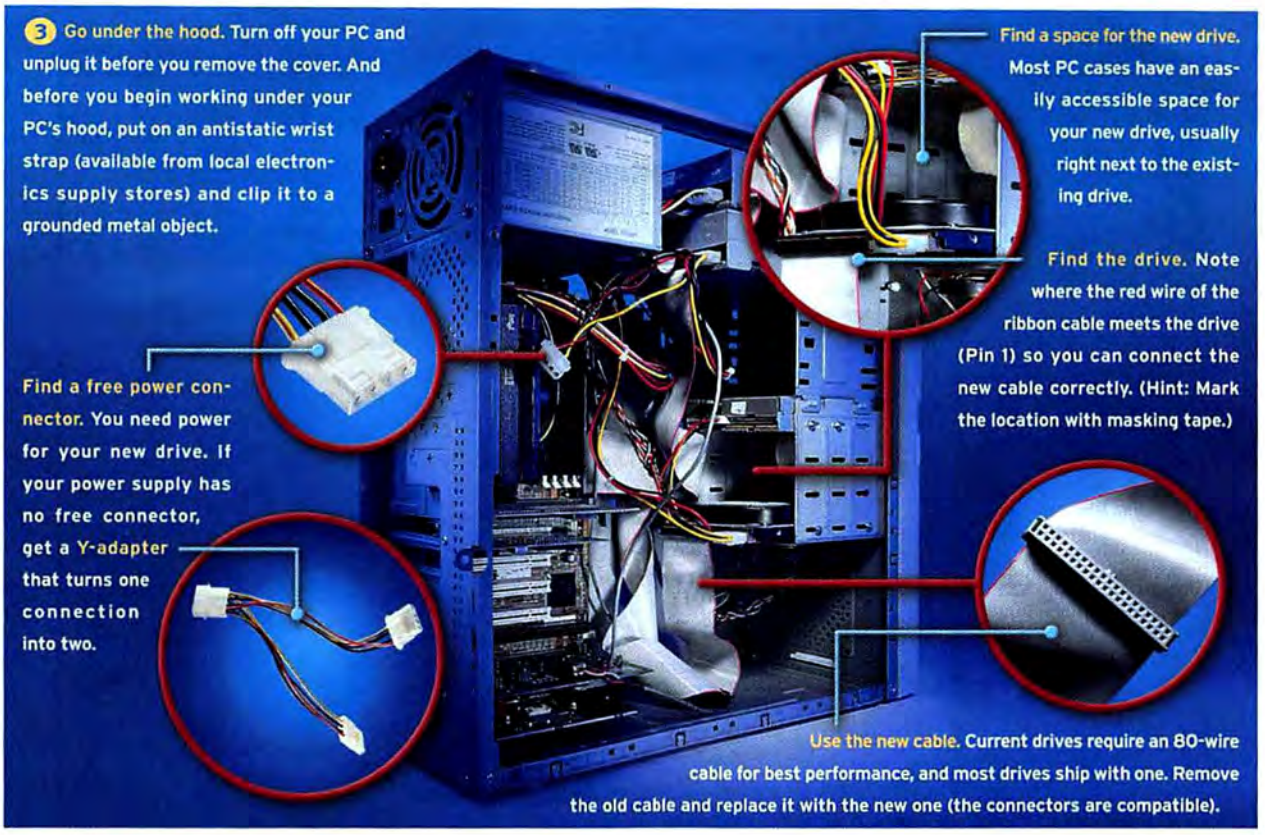


Next, make a full backup of your hard drive if you're able to, or at least back up your vital data and configuration files from your favorite programs. Don't forget files like normal.dot from Microsoft Word and Bookmarks or Favorites from your Web browser.

2 Run the new drive-installation software. Almost all hard drives ship with installation software that takes care of formatting and partitioning. Some even help you transfer data from your old disk to the new one. You must run most installation software before you physically install the new drive, but check the drive's manual or installation poster. You'll either install and run the software from within Windows, or boot from a floppy disk. Program details vary by drive manufacturer, so read the directions carefully.

PHOTOGRAPHS: MARC SIMON

3 Go under the hood. Turn off your PC and unplug it before you remove the cover. And before you begin working under your PC's hood, put on an antistatic wrist strap (available from local electronics supply stores) and clip it to a grounded metal object.



Find a space for the new drive. Most PC cases have an easily accessible space for your new drive, usually right next to the existing drive.

Find the drive. Note where the red wire of the ribbon cable meets the drive (Pin 1) so you can connect the new cable correctly. (Hint: Mark the location with masking tape.)

Find a free power connector. You need power for your new drive. If your power supply has no free connector, get a Y-adapter that turns one connection into two.

Use the new cable. Current drives require an 80-wire cable for best performance, and most drives ship with one. Remove the old cable and replace it with the new one (the connectors are compatible).

4 Set the drive jumpers. Usually, you'll install your new drive as the second drive on the primary IDE channel (the same channel where the current drive is connected). When two IDE drives are connected to a single cable, one must be designated 'Master', and the other 'Slave'.

The jumper settings are printed on the drives. If you'll be using the new disk as your PC's boot drive, set its jumper to *Master*, and change the jumper settings on your old drive to *Slave*. (Check the included installation software to make sure that it supports copying of the data over to your new hard disk.)

5 Put it all back together. Install the new drive. Attach the two connectors on the new ribbon cable to the old and new hard disks. (It doesn't matter which of the connectors goes where.) Make sure the red wire on the cables goes to Pin 1. Also make sure the other end of the cable is securely connected to the primary IDE connector on the motherboard, and that it's correctly connected so that the red wire on the cable goes to Pin 1 on the motherboard connector. (A secondary IDE connector is used for things like your CD-ROM and CD-RW drives.) Plug in the power connectors to both drives. Double-check all your connections; don't put the cover back on until you're sure that everything's working correctly.

6 Check your system's setup program and finish up. Make sure the hard drive installation utility disk is in the floppy drive; then turn your PC on. Enter your PC's setup utility (usually by pressing <Delete>, <F1>, or <F2> at start-up, although details vary by manufacturer). Then make sure drives 1 and 2 are set to *AUTO*. If they're not, your PC may not detect your new drive.

Save the setup settings, and reboot from the installation utility floppy disk. Follow the directions to set up your new drive and copy the data from the old drive to the new.

Finally, remove the floppy and reboot your PC. It should start Windows normally. When you're sure everything's working, reformat your old drive to wipe out its superfluous data and to prepare it for new files.

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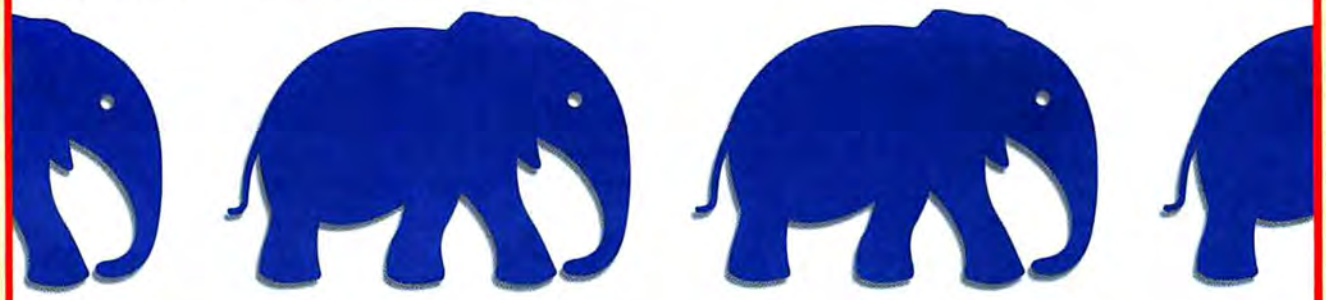

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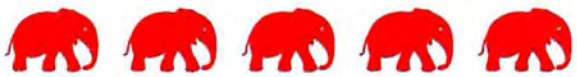

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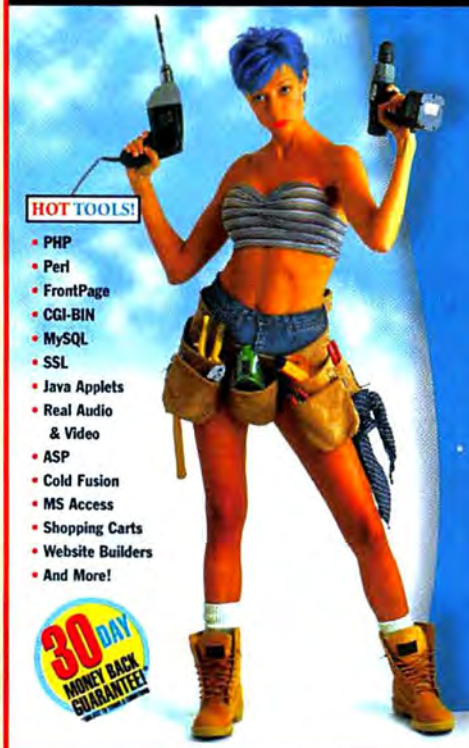

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• Ultra SCSI Custom Teflon Cable Available
• Custom Enclosures in 1 Day for Raid & Arrays

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Our 8 Bay Rack Mount Enclosure includes a 300 watt power supply. These cases are commercial quality. Optional rails are also available.

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HOT SWAP Pull Out Bays
Compatible with all 50 pin & 68 pin SCSI Buses up to Fast SCSI 2. From: $79

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Benefits:
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Features:
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- Large Ferrite Filters
- Triple Shielding (Unique Design)
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Features:
- New .8mm Ultra 160 LVD SCSI Connector
- Triple Shielding (Unique Design)
- Double Gold 20u" Plated Connectors
- Diagnostic Indicators
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Benefits:
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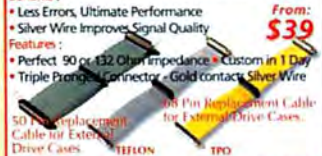

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FireWire RAID systems offer up to 480 gigabytes of storage. Using the second generation of FireWire. We are now able to get a true 40MB/s data transfer rate; 3 Times faster than the competition!

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8 Hot-Swap Bays Kit
8 - Bay Tower holds 480 Gigabytes of Hot-Swappable Drives. Bays incorporate exclusive Blue Neon Light.

240 Gigabyte $1995
4 Hot-Swap Bays Kit
4 - Bay Tower holds 240 Gigabytes of Hot-Swappable Drives. Bays incorporate exclusive Blue Neon Light.

120 Gigabyte $995
2 Hot-Swap Bays Kit
2 - Bay Tower holds 120 Gigabytes of Hot-Swappable Drives. Bays incorporate exclusive Blue Neon Light.

Blue Neon glow strip in every bay shows that drive is powered properly.

Our Hot-Swappable RAID Systems offer quick and easy bay interchangability and complete fault tolerance. Each Hot-Swap Bay includes 2 fans and our exclusive Blue Neon Light. Systems can be custom configured to your specific needs. Our RAID Systems use standard IDE ATA100 Drives offering low cost and high reliability. Each system uses Maxtor DiamondMax 60 Gigabyte 7200rpm drives with three year warranties.

Easily Transportable

FireVue™ FireWire 1394 Adapters

4-4 Pin - Connects 2 Cables
6-6 Pin - Connects 2 Cables
4-6 Pin - Converts 6p Cable
6-4 Pin - Converts 4p Cable

$19.95

These Firewire 1394 Gender Changer and Cable Extenders allow you to use your current cables to extend or change your connector ends. Combined with the added versatility that these devices offer is the ability to also monitor 1394 power. Exclusive LED circuit tells that power is being supplied to the 1394 bus.

FireVue™ Gold FireWire 1394 Cables

From: $29

RAID Cables

Diagnostic LED monitors power on the Firewire cable. Gold Connectors, Ferrite Beads, and perfect cable characteristics. Lengths up to 32', both 4 and 6 pins.

Our 32' 6 pin to 6 pin Cable is a Granite exclusive. These cables go longer because they are made better! 2 x Specification.

FireVue™ FireWire 1394 6 Port HUB

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Power Source Included

These Firewire 1394 HUB / Repeater allow you to connect up to 6 devices. They can also be wired together to offer unlimited capabilities. Power Supply guarantees proper operation of many devices at the same time and rejuvenates the lines.

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- Fast 50 & Fast Wide 68
- Status Indicators
- Gold Contacts

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- 68 Pin Drive to 50 Pin IDC (runs wide drive as narrow)
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68 Pin to 50 Pin Centronics or 50 Pin MicroD Adapters

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$955 Kit

Kit Includes:
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- One 2 Port Escalade™ PCI RAID Controller.

240 Gigabyte 4 Hot-Swap Bays

$1895 Kit

Kit Includes:
- Hot-Swap Case, 4 Bays, with 200 watt power supply.
- Four Hot-Swap Bays with fans
- Four 36" Teflon Cables
- Four Maxtor 60 Gigabyte 5400 rpm ATA 100 IDE Drives
- One 4 Port Escalade™ PCI RAID Controller.

480 Gigabyte 8 Hot-Swap Bays

$3695 Kit

Kit Includes:
- Hot-Swap Case, 8 Bays, with 300 watt power supply.
- Eight Hot-Swap Bays with fans
- Eight 36" Teflon Cables
- Eight Maxtor 60 Gigabyte 5400 rpm ATA 100 IDE Drives
- One 8 Port Escalade™ PCI RAID Controller.

All RAID Cards include support for RAID 0, 1, 10, Hot-Swap and Hot-Spare. Ultra Fast 100MB/s with low CPU overhead. These cards are unbelievably fast.

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Offered in three packages, 2 Drive, 4 Drive, and 8 Drive models, it is now easy to configure a RAID System that fits your needs. Using the exclusive TwinStor™ and DiskSwitch™ technologies, Escalade supports RAID 0, RAID 1, and RAID 10.

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IDEVue™ ATA 100 Teflon Cables

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IN THE SUPERIOR COURT OF THE STATE OF DELAWARE
IN AND FOR NEW CASTLE COUNTY

JASON RINALDI, ET AL.,
On Behalf of Themselves and All Others Similarly Situated,

Plaintiffs,

v.

IOMEGA CORPORATION,

Defendant.

Civil Action No. 98C-09-064-RRC

SUMMARY NOTICE OF PENDENCY OF CLASS ACTION AND HEARING ON PROPOSED SETTLEMENT

TO: ALL PERSONS WHO PURCHASED AN IOMEGA ZIP® DRIVE AT RETAIL OR THROUGH AN AUTHORIZED IOMEGA ORIGINAL EQUIPMENT MANUFACTURER BETWEEN JANUARY 1, 1995 AND MARCH 19, 2001.

YOU ARE HEREBY NOTIFIED that the Class Representatives and Iomega in the above-captioned Class Action lawsuit have entered into an agreement to settle this Class Action.

PLEASE BE FURTHER ADVISED that pursuant to an Order of the Delaware Superior Court, dated March 21, 2001, a hearing will be held on June 8, 2001 at 10:00 a.m. at the Delaware Superior Court, 1020 N. King Street, Wilmington, Delaware 19801 for the purpose of determining (1) whether the proposed settlement of the Class Action under the terms set out in the Stipulation of Settlement of Class Action on file with the Court, should be approved by the Court as fair, reasonable and adequate; (2) whether the Class Action should be dismissed on the merits and with prejudice as against Iomega pursuant to the terms of the Stipulation; (3) whether the Class as defined in the Stipulation of Settlement of Class Action should be permanently certified; and (4) the reasonableness of the application of the Class Counsel for an award of attorneys' fees and/or reimbursement of costs and expenses incurred in connection with the Class Action.

If you purchased an Iomega Zip® drive between January 1, 1995 and March 19, 2001 your rights, **including claims for damage to your Zip® drive and/or losses from the corruption or loss of data as a result of such damage,** may be affected by the settlement of the Class Action.

If you have not received a detailed Notice of Pendency of Class Action and Hearing on Proposed Settlement, you may obtain copies by downloading said Notice from Iomega's World Wide Web page at http://www.iomega.com. You may also receive a copy of the Notice by requesting a copy in writing to:

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PT-L501U Ultra-Portable SVGA Projector

Simple, Smart, Stylish and only 8.4 Pounds

Stylishly designed and lightweight at 8.4 pounds, the PT-L501U delivers 1100 ANSI lumens of brightness with SVGA resolution (SXGA maximum). It's equipped with an extra short-throw lens that shortens the necessary projection distance by 25%. Its one-touch Auto Setup with digital keystone correction makes it simple to use. The PT-L501U picture quality with stereo audio is exceptional and it can display HDTV images.
Suggested List Price: $3,995

PT-L511U Ultra-Portable SVGA Projector

1500 ANSI Lumens Bright, Feature-Rich Unit

The value-packed, ultra-portable PT-L511U projector provides 1500 ANSI lumens of brightness, SVGA (UXGA maximum) resolution, extra short-throw lens and highly attractive styling. The DTV-ready projector also offers two-mode lamp operation, 9X digital zoom, one-touch Auto Setup with digital keystone correction, ultra-quiet cooling fan, 10-bit digital gamma correction, card-type remote control and full 16.7 million color palette. For greater connection flexibility, two RGB input terminals are provided for connecting two computers at the same time.
Suggested List Price: $4,495

PT-L711U Ultra-Portable XGA Projector

1400 ANSI Lumens Bright, Cutting Edge Technology

The ultra-portable PT-L711U XGA projector with Micro Lens Array delivers 1400 ANSI lumens of brightness, and a 300:1 contrast ratio. Offering a refined, super sleek design and weighing only 8.4 pounds, the projector provides presenter-pleasing benefits, such as the world's shortest focal lens in an ultra-portable unit; "Auto-Everything" Setup with digital keystone adjustment; and exceptional video quality featuring a unique Digital Cinema Reality™ circuit for film-based video contents. Full-featured but small and light, it can display vibrant images in 1024 x 768 true XGA resolution and maximum SXGA (1280 x 1024) resolution. The video-enhanced projector is HDTV compatible, automatically resizing 1080i and 720p images for 16:9 wide-aspect display; 480p, 480i and 625i component video signals and S-Video can also be displayed in either 4:3 or 16:9. The unit offers broad compatibility ranging from PAL, PAL-M, PAL-N, PAL 60, SECAM, NTSC and M-NTSC.
Suggested List Price: $6,995

PT-L759U Portable XGA Projector

One-Touch Auto Setup, 2500 ANSI Lumens

The sleek PT-L759U portable XGA LCD projector with Micro Lens Array delivers exceptional brightness of 2500 ANSI lumens. The 13-pound projector displays a native resolution of 1024 x 768 XGA, with a maximum resolution of 1600 x 1200 UXGA. This unit features a high contrast ratio of more than 250:1, and a remarkably high center-to-corner uniformity ratio of 95%. The PT-L759U features one-touch Auto Setup to tune and adjust the image for optimal viewing. This projector is compatible with PC and Macintosh computers; accepts NTSC, M-NTSC, SECAM, PAL, PAL-M and PAL-N video signals and is capable of front, rear, desktop or ceiling mount projection on screens ranging in size from 20"- 300". Additional features include a digital zoom, two sets of RGB inputs, USB input, S-video compatibility, selectable 6-language on-screen menu, status code indicator, security lock system, warning indication for lamp replacement, Universal AC power supply, RS-232C computer interface, mute/freeze for video and RGB, and a detachable carrying handle.
Suggested List Price: $7,995

PT-LC50U Micro-Portable SVGA Projector

At 5.5 Pounds, You'll Want to Take It Everywhere!

At only 5.5 pounds, this ultra-sleek Panasonic projector travels wherever you do, yet it is so automatic (with one-touch Auto Setup and digital keystone correction) that the only thing you need to worry about is making sure it's plugged in. The highly-affordable PT-LC50U offers exceptional SVGA resolution (SXGA maximum) and 700 ANSI lumens of brightness. It's loaded with special benefits, including a detachable swivel stand, 5X Digital Zoom, and Manual Focus.
Suggested List Price: $2,499

PT-L701SDU XGA SD Memory Projector

World's First Memory Unit SD™

The PT-L701SDU ultra-portable XGA projector comes complete with a postage stamp-sized 16MB SD (Secure Digital) Memory Card, a PC card adapter, and software that converts BMP or TIFF images and entire Microsoft PowerPoint files into JPEG images, allowing PC-free as well as unattended, continuous-play presentations. As the world's first SD Memory model, Panasonic's PT-L701SDU offers outstanding presentation functions, including Auto Slide Show, which automatically shows the data from an SD Memory Card in succession; Capture, which captures and saves the displayed screen directly onto an SD Memory Card in JPEG file format; and Thumbnail Display, which provides an index-type display of all the images on an SD Memory Card, and lets the user change the image sequence.

The PT-L701SDU offers exceptional automatic features including one-touch Auto-Everything Setup and digital keystone correction.
Suggested List Price: $6,495

PT-L701U Ultra-Portable XGA Projector

"Auto-Everything" Setup with Digital Keystone Correction

The PT-L701U XGA is an unbeatable value, delivering 1000 ANSI lumens with a high contrast ratio of 350:1. It's integrated with the most advanced DSP technology, including the industry's first Digital Cinema Reality circuit, 10-bit Digital Gamma Correction, an Intelligent Image Resizing circuit, and a 3-D digital comb filter. At 8.4 pounds light, this projector offers user-friendly features like one-touch "Auto Everything" Setup, automatic keystone correction and auto input selection, allowing a user to automatically tune and adjust an image for optimal viewing. A newly-developed built-in gravity sensor detects the projector angle relative to the floor, then corrects for keystone distortion accordingly.
Suggested List Price: $5,995

PT-L6600 Fixed-Install SXGA/XGA Projectors

Ultra-Bright 3600 ANSI Lumens Exclusive Dual Lamp System

The PT-L6600/6500U Series of S-XGA and XGA Series projectors offer the exclusive BriteOpticTM dual lamp system that guarantees presentors that the lights will not go out during their presentation. These state-of-the-art projectors deliver the brightest, most vibrant images (up to 3,600 ANSI lumens) in its class for data and video, plus longer lamp life and multiple inputs, include DVI. Both units offer an exceptional contrast ratio (600:1 in the L6500U and 400:1 in the L6600U). With its center-mounted lens, motorized lens shift, digital keystone correction and wide selection of short, long and extra long throw lenses, the PT-L6600/6500U Series will never let you down.
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Suggested List Price: $19,995
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PT-L6500U XGA:
Suggested List Price: $12,995
PT-L6500UL XGA (without lens):
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"Read the Manual!" What Manual?

CUSTOMER SERVICE shouldn't begin when you have a problem. It should start when a product is built, so that you don't have to futz around on the Web or wait on hold to get answers. One form of that service is good product design. Another is a great manual.

A what? As hardware and software grow dizzyingly more complicated, the manual—if any—now amounts to a scrap of tissue. The online help that supposedly replaces it inevitably runs out of information just as you close in on what you need to know.

Back in 1982, my first IBM PC—with 64KB of memory, a 4.77-MHz 8088 processor, and DOS—came with loose-leaf manuals that were boxed in linen and full of useful examples. My new 1-GHz Dell Pentium III came with its own box of documentation, but no linen and not much information—even if you count a grand total of ten pages on Microsoft Office 2000 that tout new features but offer virtually no details on how they actually work.

As hardware and software grow **more complicated,** the manual–if any–now amounts to a **scrap of tissue.**

A VICIOUS CIRCLE

DOCUMENTATION IS getting worse because companies treat it the way they do customer service—as a cost center. Their miserly policies push expenses out to the users. It's a vicious circle: Companies refuse to spend a nickel more than they have to for documentation; faced with useless help, customers learn not to bother with it; and after discovering from surveys and focus groups that nobody uses the manuals, companies make them even worse.

That merry-go-round sends users to sources that actually explain things. Since Microsoft makes money selling books designed to fill the gaping holes in its abysmal manuals, it's no wonder some ugly adjectives characterize documentation circa 2001:

Unspecific. To cut costs, vendors release one-size-fits-all docs to cover 17 similar but not identical models. Before you can use the manual, you need to figure out which facts apply to the product you have—assuming the information is there at all. Want a challenge? Try to get details on the particular CD-RW or DVD drive the computer maker stuck into your machine.

Immovable. Several things are wrong with manuals meant to be read on computer screens. How do you proceed when you need information on what to do when your machine won't boot? Since my computer screen doesn't face my printer or scanner, it's not exactly easy to read online documentation while I'm fiddling with peripherals' front panels. The latest affront to common sense comes from Kyocera, which delivers the detailed manual for its nifty new Palm-based Smartphone on CD-ROM. Maybe you're supposed to bring along a laptop whenever you use the phone.

Incomplete. You need two basic pieces of information to get a home networking gateway to work: the proper settings for your broadband provider, and those for Windows networking. Unless you have experience with networks, you have little chance of getting the settings right from the meager info the ISPs and Microsoft supply. Yet not one of the gateways I've tried offers any real help in these two essential areas. Listen up, manufacturers: Decent documentation might well reduce the number of returns you get from people who simply can't figure out how to set up your product.

Unusable. Professional indexing by a human being has become a quaint concept. At best, you can expect to get full-text searching in an online document, but that's a poor substitute for a real index. More often, though, you get a travesty generated by some half-bright indexing program—or no index at all.

Unreal. How many times have you followed step-by-step directions that were flat-out wrong? If you're lucky, the Readme file or an errata sheet will point out some of the howlers. Better idea: Manufacturers should get the documentation right in the first place, particularly when it's in online form.

The need for documentation grows more acute as consumer products go digital and inherit the complexity of PCs. Much of the problem is poor design: You shouldn't have to read a manual just to dope out some simple function of a VCR or coffeemaker.

But you do. Manuals for those devices stink, too, but at least they don't come on CD-ROM—so far.

PC World *Contributing Editor Stephen Manes is a cohost of* Digital Duo, *a series appearing on public television stations nationwide. For program information, see www.digitalduo.com.* ■

PHOTOGRAPH: ERIK BUTLER

IDG INTERNATIONAL DATA GROUP

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