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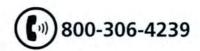VG175** offers clearer, crisper and more
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78

92

COVER *Illustration by Diego Aguirre*

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HARDWARE MP3 PLAYERS
HOW-TO Find out how an MP3 player generates music from collections of computer-encoded zeros and ones.
www.pcworld.com/how_it_works/mp3

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TOP 10 SCANNERS
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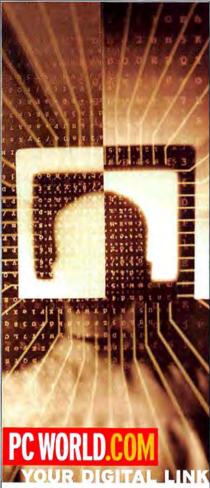
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PC WORLD

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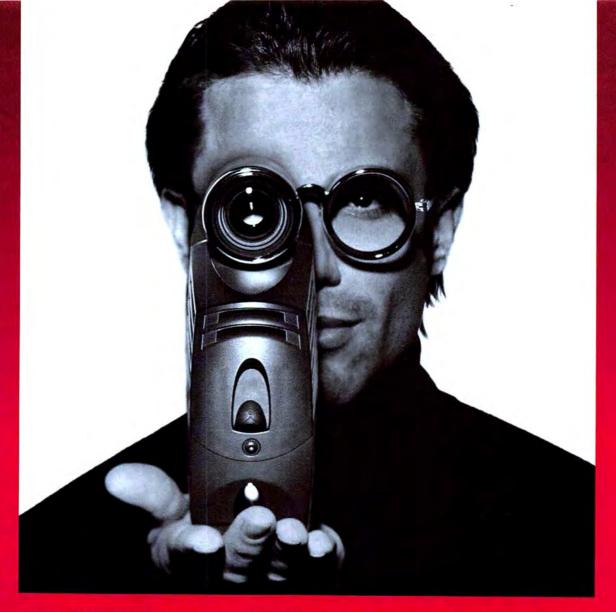
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Making Technology More Friendly

EVERY NOW AND THEN, something happens to remind you of the gap between technology hype and fact. Here's an example. Not long ago, my wife and I were shopping at a big computer superstore that pretty much functions as a cathedral to modern information technology. I was suffering from PDA withdrawal—the powerless feeling you get when the little pocket-size gizmo that holds most of your schedules, contacts, reminders, and finances dies a few weeks after its warranty expires. If you don't carry a PDA, that may sound silly. But when you're accustomed to popping up addresses, phone numbers, and the like at the touch of a stylus, then going without—even for a day or two—is a hassle.

HEADED FOR A LETDOWN

NEVERTHELESS, IT WAS surprising when my wife turned up with a brand-new, shrink-wrapped PDA in her shopping cart. She wasn't buying it for me, however; she knew I had a new one coming in the mail. She was getting it for herself—which was especially surprising to me, since my wife is as much a technophobe as I am a technophile.
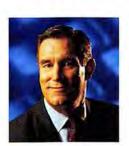
"Why are you buying that?" I asked.

"Because I hate typing information into the computer," she said. "With this, I can just write it by hand—like using a pen and paper."

If only that were true. My wife expected that the PDA would accommodate the way she likes to write, not vice versa. Unfortunately, most PDAs require you to learn the machine's style of script. If she'd bought it, she would have been disappointed. The moment was a sobering reminder that such devices will never achieve universal popularity until they get a lot friendlier.

That's why it's a pleasure to report on an advance in technological friendliness. The honors go to a program called Transcriber that comes bundled with new Casio and Compaq versions of the Pocket PC. As Carla Thornton notes in "Palm vs. Pocket PC" (page 92), Transcriber does a better job of recognizing both cursive and printed handwriting than the native writing-recognition software included with Palms or Pocket PCs. Moreover, it lets you write on any part of the screen—not just a

> It's sobering to remember how **maddeningly unfriendly** these devices can sometimes be.

small input area. As a result, Pocket PCs dominated our ranking of best PDAs for note taking, although Palm OS devices were judged better at handling e-mail and expenses.

Transcriber is not the only advance we chronicle this month. Beginning on page 129, Staff Editor Lisa Cekan compares four small, portable photo printers that produce snapshot-quality prints from digital cameras—often without the involvement of a PC. Three of the devices use dye-sublimation print engines that yield better, longer-lasting images than ink jets produce. They range in price from roughly $100 to $450, yet the most expensive is not the best and the least expensive isn't the worst—making Cekan's review well worth reading.

FRIENDLY PCs, FRIENDLIER WEB

FOR PEOPLE who want their current machines to become friendlier, Contributing Editors Steve Bass and Kirk Steers offer a dynamite collection of hardware, software, and Web tips in our cover story "Ultimate PC Troubleshooting Guide" (page 78). Web addicts will also want to check out Yael Li-Ron's compendium of add-ons and plug-ins for your browser (page 117).

For a glimpse of truly futuristic technology, though, turn to Michael Gowan's "Future Web" (page 105). Gowan examines five trends that will render the Net friendlier in years to come. Consider the effect of broadband on Internet behavior. People with always-on high-speed connections tap the Web 20 or 30 times a day on average, versus 2 or 3 times for those with dial-ups, according to Jeffrey Cole, director of the Center for Communication Policy at the University of California, Los Angeles. Cole sees "access devices starting to be a kind of kitchen appliance that people walk past to check e-mail on their way to the television." And I say, that time can't come soon enough.

COMING UP IN MAY

WHO'S AFRAID of the Big Bad Web? Maybe *you* should be. Our special issue looks at five significant Internet dangers:

• **Internet Privacy Update:** The latest threats to your privacy, plus advice on how to shield yourself from would-be intruders.

• **Security Tool Kit:** Protect your PC from viruses and other perils.

• **How to Spot a Web Scam:** Even savvy users can fall for a clever swindle. We bring you up to speed on the traps to look out for.

• **Smoking Out Hackers:** We tour this year's hackers convention.

• **Are Your Kids Headed for Trouble on the Net?** We expose hazards awaiting your children and list tips to help you protect them.

Kevin McKean is editorial director of PC World. ∎

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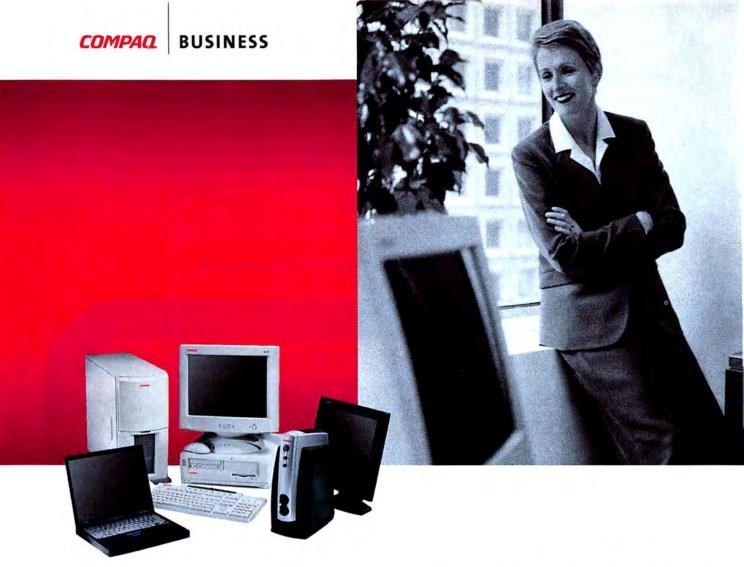
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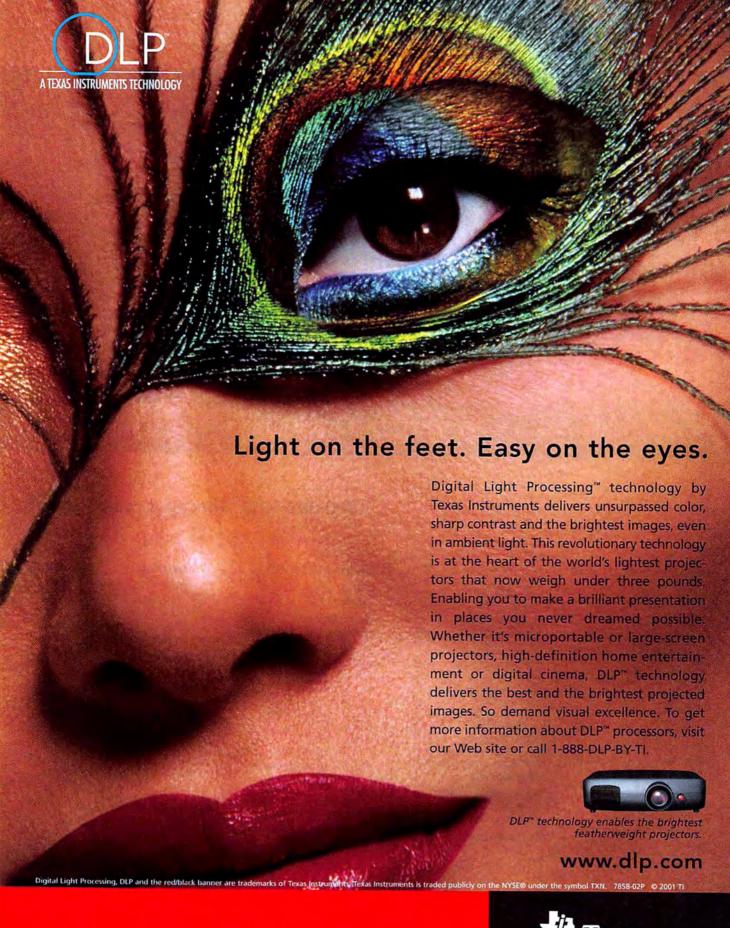
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YOUR TAKE ON: Future interactivity ◆ Online job hunting ◆ Windows Me

UNFAIR TO WINDOWS ME

I THINK YOU unfairly slammed Windows Millennium Edition in your article "Life With Me: First 100 Days" [*Top of the News*, February]. It's important to consider the real reason why Windows Me and Windows 2000 have compatibility problems with certain hardware. In the past, Microsoft had a "support everything" attitude (and still does, for the most part), but now it is moving away from that because too many software and hardware vendors do a sloppy job of creating drivers or programs for Microsoft's products.

I wonder how many people in your survey took the time to do an appropriate inventory of their computer's hardware and software, and then check that inventory against Microsoft's Hardware Compatibility List (www.microsoft.com/hcl) or their vendors' latest drivers before upgrading? How many people simply saw the $49 price tag of the upgrade, slid the CD into their drive, and clicked OK?

Glitches are bound to happen occasionally. However, it sounds to me as if many of those who had trouble upgrading could have saved themselves a lot of headaches by taking a few minutes to do some homework first.

James Summerlin, via the Internet

MICROSOFT HOIST WITH ITS OWN AD?

THE ADVERTISEMENT for Windows 2000 Professional on pages 4 and 5 of the February *PC World* should be an embarrassment to Microsoft. The picture shows the blue-screen "fatal exception" message with which we are all too familiar. There is an implied admission that this is a problem contained in Windows 95/98. The text explains that if the owners of Windows 95 and 98—customers of Microsoft—now buy its newest and best, we will be done with these faults of previous editions of Windows. Right! I trust them!

It seems to me that if Microsoft cared, it would offer a free correction to the program we paid for originally. Would Bill Gates buy a car with a faulty braking system and accept the suggestion that he buy a newer model to correct that problem, or

Life With Me: First 100 Days

would he expect the manufacturer to correct the brake problem on his car?

Edward Gross, Cedarhurst, New York

ONLINE RÉSUMÉS

YOUR ARTICLE "Find the Right Job Online" [February] is outdated on one point: the advice to "keep your résumé concise (a single printed page is best)." This comes from the days when hard-copy résumés were snail-mailed to headhunters and extra pages cluttered their desks. As a technical recruiter, I know most résumés on the Web are read only on screen, making the "single printed page" dictum irrelevant. And in today's IT job market, job seekers gather so many skills and change jobs so often, it is nearly impossible to put it all on one page. A candidate who does so may well leave out the key phrases a recruiter is looking for.

Maurice Belanger, Fort Lauderdale, Florida

ASPs, THE WAVE OF THE FUTURE

IN THE STORY ON application service providers ["So Long, Shrink-Wrap?" February], your writers may have missed the key opportunities offered by ASPs.

The software packages reviewed were designed to run on stand-alone PCs; delivering them in an ASP model requires using a fix such as Windows Terminal Server, adding complexity to the effort.

The real opportunity for the ASP approach is to exploit client/network software (such as Microsoft Exchange) that is typically beyond a smaller company's resources (as it would need to employ skilled engineers). An ASP using a ▶

CROSS FIRE

Thumbs Down on Dell's Support

I RECENTLY BOUGHT a Dell PC because of its strong reputation for customer service and technical support. But I've had to call four times, waiting over 45 minutes on each call. The last time, the wait was over an hour, so I finally gave up. Dell's Resolution Advisor software supposedly enables contact with support via e-mail or even chat with reps. It didn't work.

When I finally spoke with a technician about my monitor's digital display problems, he tried to convince me I should settle for the analog display instead because, he said, Dell doesn't really support digital even though it sells it.

I rate Dell's as the *worst* technical support in my 15 years' experience with PCs.

Jeff Bayless, Chicago

Thumbs Up on Its Service

A WOMAN IN February's *Consumer Watch* complained about Dell's customer service when she wanted to return a new PC. As a Dell customer, my experience has been totally different from hers.

When I had to return my subwoofer for replacement, not only did Dell send a new one the next day, but the company also included a prepaid shipping document, so I did not have to pay anything for shipping. And when I had to return an NIC card to Dell, I received a replacement by overnight delivery, again with return shipping. (With another vendor, by contrast, I had to pay for return shipping when I wanted a replacement monitor.) In my experience, Dell offers superior customer service.

Mathew Daniel, Bellerose, New York

one-to-many delivery model, however, can spread the cost not just of human resources but also of other service-oriented infrastructure, such as 24/7 security. Economies of scale can enable ASPs to deliver "big boys' toys" to any firm.

Jeff Maynard, Chairman
ASP Industry Consortium Europe
Bracknell, England

INTERACTIVITY, ANYONE?

YOUR ARTICLE on interactive TV [*Top of the News*, January] says we can soon surf the Web, e-mail, and watch *Lost in Space* whenever we want. What next? Perhaps there will be ways for reality TV show contestants to see you in your living room through the video cam, as you watch them. I can see it now: Brad Pitt is on *Hollywood Squares*; he ponders a question, looks on the video cam, sees me eating popcorn on the living room couch, and asks me for the answer...

Sharon Diane Roberts
Port Orange, Florida

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

CORRECTIONS AND CLARIFICATIONS

MARCH'S "FISCAL FITNESS" should have stated that our reviews of this year's tax-preparation software appear in February's *Top of the News* (online at www.pcworld.com/news/feb2001/taxes).

In February's "Windows Your Way," three errors were introduced during the editorial process. A tip on page 101, "System Health, Speed," inadvertently combined two separate and incompatible functions in Windows Me. Disabling System Restore erases all of your system's existing restore points and makes it impossible to create a new restore point until the feature is enabled. And in the tip "An Easier Way to Print a Directory Listing" (page 109A), the characters to be typed are: command /c dir>prn. In the same tip, pressing <Windows>-R (on a Windows keyboard) is an alternative to clicking Start•Run.

In February's "3D Graphics Grand Prix," the chart should not have indicated that the Creative Labs 3D Blaster Annihilator 2 has S-Video-out.

PC World regrets the errors.
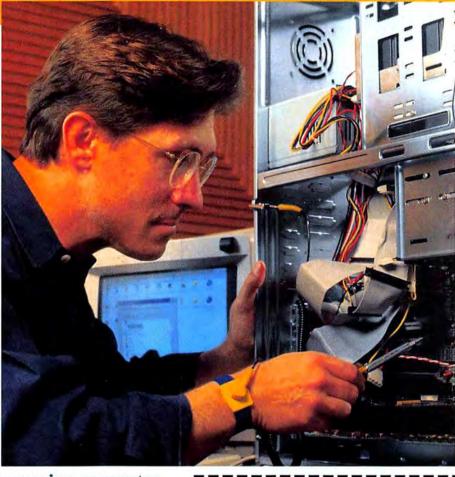
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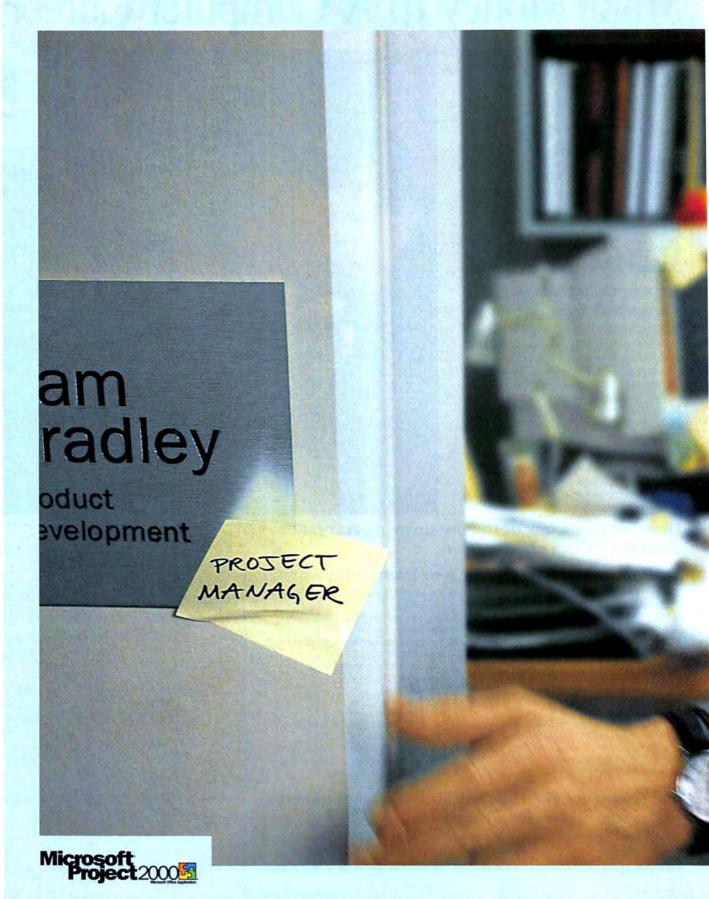
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Avoid the DSL Runaround

There's nothing high-speed about many DSL installations.

ILLUSTRATION: RICK SEALOCK

SURF THE WEB up to 50 times faster! Always-on connection! Affordable monthly rates! Talk and go online simultaneously on the same phone line! The promises made by DSL providers sound irresistible to Internet users who still plod along at 56 kbps. The problem is, those promises are often a long time in coming.

Just ask Brad Grimes, a former *PC World* executive editor. When Grimes was setting up his new office as vice president of an editorial consulting firm in Brookline, Massachusetts, he knew that broadband Internet access was essential—and he chose his existing ISP, Earth-

Link, to provide the service. "I'd heard some bad things about Verizon's [the local phone company's] DSL service, and I'd had good luck with EarthLink as an ISP," says Grimes, "so it seemed like the way to go."

That simple decision set off a comedy of errors that won't seem funny to anyone who's suffered through a similar experience. I've received dozens of letters from disgruntled would-be DSL users, whose complaints range from installation delays to incompetent technicians to abysmal customer support. If there's a theme, it's the lack of communication among the various players on the DSL team. To see just how bad the repercussions of miscommunication can be, read the rest of Grimes' story. But don't abandon hope—I'll follow up with some tips on how to avoid DSL disaster.

THE CALM BEFORE THE STORM

THINGS STARTED OUT smoothly for Grimes. He received e-mail confirmation from both EarthLink and Covad (the DSL service provider contracted by EarthLink), and Verizon installed the new phone line to his office on schedule. The next step was for Covad to install the DSL modem and software. Thus began Grimes' personal descent into DSL hell.

Twice, Covad representatives failed to show for scheduled appointments. The first time the hapless technician was fruitlessly searching the streets for Grimes' address—unfortunately he was searching on Staten Island, New York, a good 250 miles and three states away.

Grimes thought he'd clarified matters, but incredibly the same mistake happened again—another Covad tech combed the streets of New York for Grimes' Massachusetts address. The two missed appointments delayed the installation by nearly two months.

And things didn't improve much after Covad did show up. The technician couldn't establish a working DSL connection. Finally, Grimes himself completed the installation.

But the DSL demons weren't done yet. Their next curse hit the modem supplied with the EarthLink service. "It just died, right in the middle of an EBay transaction," Grimes laments. Exasperated, Grimes demanded a new modem. EarthLink's response? You'll have to take it up with the modem manufacturer.

"I told [EarthLink] that that wasn't acceptable, and if they wouldn't fix the problem I'd cancel my DSL service contract," Grimes recalls. ▶

"After all, when the modem in my Dell PC goes south, Dell doesn't tell me to call the modem manufacturer." EarthLink eventually called Covad, which replaced the modem. Nearly six months after Grimes first ordered DSL, he's finally satisfied with the service.

Are problems like this unique to Earth-Link and Covad? Hardly. The letters I receive and the posts at Web sites such as www.dslreports.com that rate broadband service reveal plenty of similar gripes about every DSL provider under the sun. EarthLink declined to comment specifically on Grimes' case. But a company spokesperson says the firm is working to improve the installation process. Earth-Link also claims to have one of the highest customer satisfaction rates among broadband service providers, though that may be sort of like being the hippest kid at the *Star Trek* convention.

Grimes attributes the problems to all the different companies involved. "If I'd ordered from Verizon, I'd have had one company to deal with," he says. "When I got EarthLink, I ended up with EarthLink, Covad, and Verizon. It makes no sense."

Besides, the best customer support in the world won't do you much good unless your service provider is at the top of the DSL food chain—the position typically held by the local phone companies, which own the physical lines for DSL access. In fact, many consumers complain that local phone companies drag their feet when asked to install the wiring for ISPs and other DSL providers, especially if the local phone company itself offers DSL service.

GO TO THE SOURCE?

IT'S NO SURPRISE then that dedicated DSL companies such as Rhythms, Covad, and Northpoint have disappointed their investors recently. "The downfall of the DSL resellers," says Michael Goodman, senior analyst at the Yankee Group, "is that they're automatically at a competitive disadvantage since they're buying the service from the regional phone companies and attempting to resell what those companies already provide."

So should you go directly to the phone company for a DSL connection? It may depend on where you live. Our files are fat with complaints about the Baby Bells, too. In fact, Verizon DSL customers upset ▶

WHEN I WAS trying to purchase an airline ticket for my daughter at Priceline.com, I goofed and entered the wrong travel dates. So I clicked the Back button to change the information. I corrected the dates and proceeded to the next screen, but then I got an error message indicating that the company had already accepted my previous, wrong request. I immediately e-mailed Priceline asking that they disregard the offer because I had incorrectly input the itinerary. The next day I received a response from the company saying, "Congratulations you've got tickets." I called Priceline, and a representative told me that there was nothing the company could do once an offer is made and accepted by Priceline. I also called the credit card and airline companies, but neither could do anything. I'm out over $400 for a ticket I can't use. Can you help?

Phil Mygatt
Fort Worth, Texas

On Your Side responds: It's appalling to be charged for tickets without having the opportunity to finalize the transaction. So we contacted Priceline.com on Mygatt's behalf. Though the company no longer has a record of what happened, spokesman Brian Ek says, "[Priceline] has issued Mygatt a refund and apologizes for any inconvenience." If someone makes an offer for an airline ticket today with the wrong dates, "simply contact [Priceline's] customer service department to resubmit the offer with the correct information," adds Ek. Before providing your credit card information, carefully read the fine print. And before clicking the Next button, proof your entries to ensure that you have provided the correct information.

—Grace Aquino

Gotten a raw deal? Or a great one? E-mail the details to onyourside@ pcworld.com. We'll follow up on and publish items of the broadest interest.

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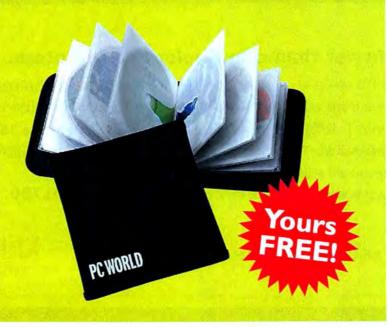
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about installation delays recently filed a class action lawsuit against the company. In most cases, if you obtain service from your phone provider, only one company will be involved—but that's no advantage if the company is incompetent or negligent. It makes sense to check the ratings of your local phone company's service at www.dslreports.com. The site provides lists of service providers, extensive ratings and user reviews (updated daily), discussion forums and chat rooms, broadband industry news reports, and tools and tips for technically savvy users.

CABLE AN OBVIOUS CHOICE?

A LUCKY FEW have a choice between DSL and cable for broadband service (at press time, cable Internet access was available to 46 percent of U.S. homes, compared to DSL's 34 percent). The tales of DSL installation nightmares may make cable seem like the obvious choice. Among 500 broadband users we surveyed by e-mail for our January story "Warp-Speed Web Access" (www.pcworld.com/jan2001/warp), 91 percent of cable users reported having their service up and running within three weeks of ordering it, compared to just 61 percent of DSL users. And fewer separate players are involved in most cable installations. But some cable users report frequent fluctuations in their connection speed. Nearly 19 percent of cable users told us they perceive a significant slowdown in their connection at least once a day. Only 10 percent of DSL users reported the same thing.

The good news is that most experts are optimistic about DSL. Says Joe Laszlo, broadband analyst at Jupiter Research, "The big shift in the next year will be toward plug-and-play; self-installation will become the standard. In turn, consumers will eventually see the lines of technology blur: Broadband will become less a matter of deciding between DSL, cable, and satellite, and more a matter of deciding which ISP best meets your needs."

That sounds easier than explaining how to get to Brookline from Staten Island.

Anne Kandra is a PC World contributing editor. ■

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a sentence with
"If only I could…"

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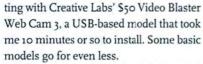
Reach Out and See Someone

LET'S FACE IT: So far, the 21st century bears depressingly little resemblance to the cartoony utopia prophesied by *The Jetsons*. Personal spacecraft and cybernetic servants are nowhere in sight. So I look for glimmers of Jetsonian living where I can. And that's how I got interested in

gabbing with far-flung friends and co-workers via Web-based video chat—just like the first family of the future did.

Geeky types have been propping cute little Webcams atop their monitors and making Internet video calls for years. But only recently has the medium inched toward truly affordable point-and-click simplicity. Today, cost is no longer much of a stumbling block: You can get a Webcam for about the price of a decent mouse. I did my chatting with Creative Labs' $50 Video Blaster Web Cam 3, a USB-based model that took me 10 minutes or so to install. Some basic models go for even less.

What's more, a new wave of free services eliminates the hassle of earlier, quirkier videoconferencing applications such as Microsoft's NetMeeting. Eyeball Chat LE (www.eyeball.com) and See-Saw.com, the two contenders that I tried, use proprietary compression techniques to improve image and sound quality, which I figured would benefit further from my cable modem's plentiful bandwidth.

When my PC was ready to go, though, I found that those of my distant friends often weren't. Microphone trouble was a recurring hobgoblin—even folks who had working Webcams didn't always have mikes hooked to their PCs, or had them improperly installed. (At one point, a colleague could hear me but I couldn't hear him; he cleverly improvised by scrawling notes and holding them up to the camera.) Others needed to download the latest version of Microsoft's DirectX.

New on the Net...

Alternative Radio: My column on Internet radio (www.pcworld.com/feb2001/savvy) prompted e-mail from audio aficionados all over, many of whom raved about stations and services that I didn't mention. Among the readers' recommendations: Launchcast at www.launch.com, Live365.com, and Shoutcast (www.shoutcast.com). I particularly like Incanta (www.incanta.com). The service requires a broadband connection but delivers highly listenable—and customizable—personal radio stations... **No Go:** Web sites are dropping like flies these days. But few of the departed are as well-known as Disney's Go.com, which, as Infoseek, was one of the Net's first search engines. What's a Go fan to do? Disney says that it will move some features to its other sites, such as ESPN.com, and that e-mail accounts will remain accessible. However, users with personal home pages at Go.com should download their data and find a new home for it, Disney advises.

Once everything's working, just how satisfying is video chat? It was a blast to view distant chums I don't often see in person, even if they looked a tad fuzzy. And audio quality was better than I'd anticipated—good enough to carry on a real conversation.

But George and Jane Jetson would undoubtedly sneer at video chat circa 2001. Both Eyeball and SeeSaw showed incoming images in partial-screen windows that at their best were herky-jerky. Picture quality often became blurry, blocky, or dim. (Hint: Tell your video pals to crank up the lighting near their PCs.) My buddy Kip, who spent a couple of hours videoconferencing with me one evening, compared it to watching a satellite feed from a Soviet space capsule. I can't disagree with that assessment. ▶

GIMME FIVE

Uncle Sam's Top Sites

E PLURIBUS WEB! The U.S. government offers Web sites on everything from taxes to the exploits of the National Zoo's newest inhabitants. You pay for them, so why not use them?

1. FirstGov: This inviting portal to governmental resources all over the Web beats the older FedWorld. www.firstgov.gov

2. Consumer.gov: Smart tips on everything from auto safety to healthful eating, including lots of advice for Web surfers.

3. The National Zoo's PandaCam: See streaming video of furry superstars Mei Xiang and Tian Tian. pandas.si.edu/pandacam

4. NASA.gov: News flashes from the final frontier, including shuttle Webcasts and Hubble photos.

5. IRS.gov: Download forms, get info on filing online, or just peruse the sobering but informative tax FAQ.

One other major caveat: Like many a nascent technology before it, video chat is something of a red-light district. Whenever I peeked into SeeSaw's chat rooms—which let you converse with up to 149 other cam users, with two video windows on view at a time—no more than a handful of souls occupied its all-ages areas. In contrast, hundreds huddled in the "Go-Go Nightclub," a section whose name didn't begin to convey its tawdry nature. At least you get warning messages when you try to enter that section, and parents can password-protect it to prevent kids from wandering into trouble. And you can create a private chat room that's open only to you and your comrades, so there's no chance of unsavory types barging in.

SeeSaw was being used by just a few thousand beta testers when I visited; the people who run it say that all-ages activity should pick up once the service goes public, which should have occurred by the time you read this. At press time, Eyeball

Chat LE lacked SeeSaw's seamy atmosphere, in part because it offered only one-to-one video calls, not open chat rooms. But Eyeball.com plans to introduce multiple-party chat as part of a fee-based service soon. Here's hoping it doesn't morph into a high-tech peep show.

MORE CAM TRICKS

MEANWHILE, the Net offers other, more-wholesome ways to amuse yourself—and others—at no charge with a Webcam. MyVideoShare (www.myvideoshare.com), for instance, lets you record video clips and send them to your friends and family members by e-mail. Since the clips are delivered as streaming video, there are no bandwidth-clogging file attachments to tick off your recipients. Just be sure they have Windows Media Player installed—it's required for playback.

I also found myself weirdly transfixed by EarthCamTV (tv.earthcam.com), a service that lets Webcam owners set up live video feeds that anyone who has a Web browser can view. As with SeeSaw, some of what you'll find at EarthCam is pretty sleazy. Other broadcasts are just plain boring—I saw an awful lot of empty desk chairs, dog beds, and bassinets. Nevertheless, I was intrigued enough to set up a live cam in my office. I'm now the proprietor of the extremely G-rated Channel 26890 (aka Harry@PCWorld) on Earth-CamTV. Drop by sometime, and you might catch me at my keyboard.

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

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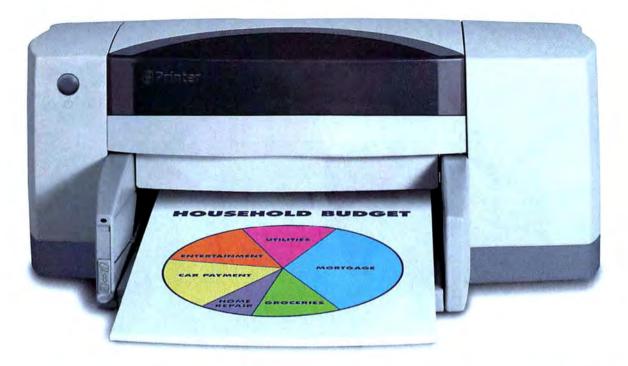
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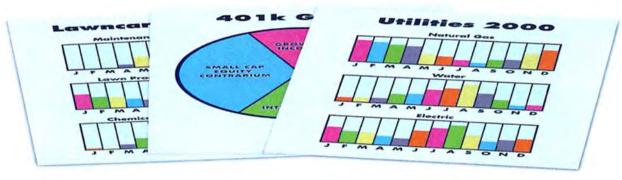
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The E-Mail Rules: Manage the Medium

LIKE GETTING E-MAIL? Cool, I'll forward you some of mine. Be careful what you ask for, though. I send roughly 22,000 e-mail messages a year and receive more than twice that amount. How do I know? Eudora, my e-mail client of choice, tracks all my e-mail use, reporting, for example, that about 3500 of the messages I received last year had attachments, of which I read only about 60 percent.

I have e-mail secrets: tips to make it easier to read, and pointers for handling attachments. They're yours—and if you e-mail me, please promise to use them.

E-MAIL THAT'S READ ALL OVER

UNLESS YOU'RE vacationing on a desert island, your time is tight. So is mine. If you send me a long message and I don't know you, I probably won't read it—especially if it has an attachment. Lengthy messages from friends I read when I have the time. (Okay, so I scan them. Sue me.)

My point? If you want *your* messages read, consider your recipient. That's what these rules are all about.

Think short: Limit the message to three paragraphs, tops, each with no more than four sentences. If you *must* include more, introduce points with short previews—for instance, "Deadline? Did I miss it?"

Stay plain, Jane: Avoid the fancy formatting, flowery backgrounds, and gaudy colors that new versions of e-mail software allow. Many people still use e-mail programs that support plain text only. Also, what's cool on your monitor may look like hell on mine. And geez! That extra coding increases download time when my notebook's using a 56-kbps dial-up account.

One person, please: If you're sending an e-mail to a large group of people, hide the recipient list to keep the file size down. It's all right to use your e-mail app's carbon copy (cc) feature if you need to let every-

> **Don't attach** anything to an e-mail...or **get permission first**, if the **file's large.**

one know who else is getting the message, but otherwise use the blind copy (bcc) feature. Address the message to yourself (or leave the "To:" field blank, if your software allows it) and bcc everyone else. In Outlook Express, select *View* and check *All Headers*. In Outlook, choose *View* and check *Bcc Field*. In Netscape 6, click the *To* field and scroll to *Bcc*. Eudora's the easiest—just fill in the "bcc" field.

Clean it up: Forwarded messages are usually overloaded with annoying angle brackets (>), extra spaces and carriage returns, and uneven word wrapping. That's one reason why I don't read them, and you shouldn't be surprised if the messages you forward aren't read either.

You can scour the e-mail you forward to get rid of the gobbledygook. All it takes is a quick cut and paste into The ECleaner freeware utility that's available at PCWorld.com's Downloads. The ECleaner can be accessed from Outlook 2000's Toolbar; I keep it on my Windows 98 Quick Launch Toolbar. Unfortunately, The ECleaner doesn't remove the e-mail

headers in the original message, so you need to delete them manually before forwarding. (AOL users have to work harder. AOL doesn't show you the forwarded message's sloppy formatting, so copy the message into a text editor, clean it up, and paste it into a new AOL e-mail.)

RISKY ATTACHMENTS

EVERY E-MAIL I send or receive that has a file attachment carries built-in risks. Viruses and Trojan horses are the most obvious, but file size is another. I found this out after I accidentally tied up an editor's $2-per-minute dial-up account—for 40 minutes—with a huge attachment. (Not smart.) Unless you know the person, don't attach anything—images, programs, or Internet movies—to an e-mail. If you must, and if the file's larger than 100KB, be sure you get the recipient's permission first.

You can save *yourself* grief by setting your e-mail program not to accept attachments over a specific size. And always play it safe—before opening a file, save it to a convenient folder and scan it for viruses. There's no space to do so here, but I'll provide step-by-step details for these filtering and scanning procedures in my online *Home Office* newsletter. Subscribe at www.pcworld.com/bass_letter.

BINHEXED? THANKS, NO.

OCCASIONALLY I RECEIVE e-mail with an attachment that looks like it's been sprinkled with sawdust, but it has probably only been UUencoded, MIME'd, or (cover your ears) BinHexed, rendering it seemingly indecipherable. OnTrack's free PowerDesk Windows Explorer replacement can make those messages intelligible. Find it at PCWorld.com's Downloads.

Don't touch that dial! In June I'll tell you all about filters that manage your incoming e-mail and eradicate spam.

You'll find files mentioned in this article at www.pcworld.com/ downloads. PC World Contributing Editor Steve Bass runs the Pasadena IBM Users Group. He can be reached at steve_bass@pcworld.com. ∎

Tax traumas ◆ PowerPoint 2000 hole ◆ **Netscape 6 problems** ◆ Melissa's revenge

Don't Let Bugs Scramble Your Taxes

BENJAMIN FRANKLIN WROTE that nothing is certain in life except death and taxes. If he were around today, Old Ben might add buggy tax software to that list. The companies behind the two leading tax preparation packages—Intuit, which puts out TurboTax, and Block Financial, publisher of Kiplinger TaxCut—recently posted lists of bugs that you'll want to squash before you file your federal tax forms.

If you use TurboTax, the program may overstate your income, incorrectly depreciate the sale of a business vehicle, or simply make printing errors. Kiplinger TaxCut miscalculates such figures as earned income credits, the child tax credit, and job-related moving expenses.

Both Intuit and Block Financial diligently post fixes and workarounds as soon as they're discovered. Before you whisk off your return to Uncle Sam, get the lowdown on the types of filing situations affected—and the updates themselves—by visiting the Web site of the company whose tax software you use. A word of warning: Other glitches might surface before the April deadline, so make sure you visit the site again just before you file.

TurboTax users can get full details about the calculation snarls at intuit.com/support/turbotax/updates/ty2000/ttax_updates_alerts00.html. To use the live update feature when TurboTax is

running, select *Online•One-click Updates*. TaxCut users can get their alerts by surfing over to taxcut.com/updates/oofedwinup.html#calc_alerts. To update the program while you're connected to the Web, open TaxCut and choose *Tools• Update TaxCut*.

POWERPOINT 2000 ATTACK

MICROSOFT RECENTLY DISCOVERED a security hole in Power-Point 2000 that could let a malicious hacker do anything to your PC that you can do. This one won't bite you, though, unless you open an infected PowerPoint 2000 presentation sent to you via e-mail or stored on an evil hacker's Web site.

A booby-trapped PowerPoint slide show overfills a part of the app called a "file buffer," which resembles the waiting list at a popular restaurant. If the restaurant's manager invited everyone to grab a table at once, a sneaky criminal could slip in with the rest of the horde and rob the place blind. The PowerPoint hole could allow a hacker to do the digital equivalent to your PC's files.

When PowerPoint loads the infected presentation, two things could happen. The simpler and more likely outcome is that the program would just crash. But the second possibility is nasty: With some carefully crafted code, the bad guy could take over your PC and run roughshod over your valuable files. For the fix, go to microsoft.com/technet/security/bulletin/MS01-002.asp.

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

Meet Melissa, the Sequel

IT'S JUST LIKE the follow-up to a bad horror flick: Melissa is back. The new version, named W97M.Melissa.W, carries out its attack just as its 1999 ancestor did. In its new mutation, however, it arrives as a Mac Word 9 file attachment to an e-mail. The message's subject line begins "Important Message from..." and the text states "Here is that document you asked for...Don't show anyone else ;-)." If you click on the attachment, the virus will take over all Windows versions of Outlook (though not Outlook Express), infect other files, and e-mail copies of itself to the first 50 entries in your address book.

If your PC has any version of Norton AntiVirus installed, definition files dated January 18, 2001, and later will detect and disinfect the new Melissa. Find the details at service1.symantec.com/sarc/sarc.nsf/html/W97M.Melissa.W.html. If you use McAfee's VirusScan/Net-Shield, any DAT file dated January 24, 2001, or later should cover you. Update your DAT file by visiting www.mcafee-at-home.com/naicommon/download/updates.asp.

TOP OF THE NEWS

Wireless Home Network Wars

Wireless networking systems are cheaper, easier to set up, and more plentiful than ever. But before you buy, you'll have to choose between two battling standards.

◆ By Becky Waring

YOU'VE GOT a few computers. You've got broadband Internet access. Now you want to pull everything together with a wireless network so you can share the wealth of bandwidth (not to mention printers and files) without having to run cables all over the place.

Your timing is perfect. Once scarce, extremely expensive, and tough to configure, home wireless networking products are more plentiful, affordable, and consumer-friendly than ever. With one of these setups, your small business or home can have a wireless network up and running in an hour or less. It won't be dirt cheap:

Expect to pay $480 to $750 for the equipment to link two PCs to each other and the Internet. But it's a lot easier than tearing up walls to string ethernet cable; and for notebook users, having the freedom to move around in a home or small office can be worth a lot.

Before you invest in a wireless network, however, you'll

have to choose between two competing standards—Home-RF and 802.11b—a potentially serious complication.

Up until now, HomeRF has been more popular—largely because 802.11b (also known as Wi-Fi) did not become widely available outside the enterprise market until late last year. Wi-Fi is rapidly catching up, however, and it dominates the latest round of products (see "Wireless Gateway Gold Rush," page 44). Still, the battle is far from over, and you should investigate carefully before you choose.

Why the deluge of new Wi-Fi offerings? Probably the biggest reason is their 11-mbps speed, roughly equal to that of older, wired 10-mbps ethernet networks. In contrast, Home-RF currently runs at just 1.6 mbps, though the FCC has approved a next-generation HomeRF protocol that will support speeds of up to 10 mbps. Chips supporting this faster HomeRF are due later this year and should attract more vendors to the standard. Right now, however, Intel and Proxim are the only suppliers of complete HomeRF systems.

Other advantages of Wi-Fi include a far greater range—typically 300 to 500 feet indoors versus 150 to 300 feet for HomeRF—and a planned upgrade path to 54 mbps (although you'll likely need new hardware when that version

PHOTOGRAPH: KEVIN CANDLAND; ICONS: JEFFREY PELO

DISPATCH

arrives). Finally, Wi-Fi enjoys widespread use outside the home. Since numerous enterprises have 802.11b wireless networks, their employees already have Wi-Fi PC Cards for their notebooks. Several companies are beginning to offer subscription-based 802.11b Internet access in public spaces such as airports and hotel lobbies. Starbucks has said it will launch 802.11b access in its cafés this spring.

Security may be an issue for users of these public Wi-Fi networks, however, because none of the networks yet incorporate the standard's Wireless Equivalent Privacy (WEP)

encryption algorithm. If your data is sensitive, you should take additional precautions—such as using a virtual private network (VPN) or encrypting sensitive e-mail—when using a public 802.11b network.

And enabling WEP may not allay all concerns. A group of Berkeley researchers recently identified weaknesses in the protocol that hackers could exploit. The Blowfish encryption used by HomeRF has known vulnerabilities, too; so again, extra precautions are wise unless you feel certain that no hacker can get within range of the network's signal.

The principal advantages of

HomeRF start with price. For example, a Proxim Symphony-HRF gateway—the centerpiece of a wireless home network—costs $199, which is $100 to $200 less than most Wi-Fi gateways. The differential is less for the PC adapters: HomeRF network cards range from $100 to $135, whereas Wi-Fi cards for home use run between $100 and $175.

On the technological side, one of HomeRF's advantages is built-in support for voice communications (so you can get decent voice quality if you want to use your network to manage phone calls as well as data). Another plus is the ▶

Product Pipeline

▶ **Low-Power Chip Battle:** Intel looks to trump Transmeta's Crusoe chip with a pair of CPUs it claims run faster and use less power. Designed for notebook PCs that need all the power they can get, the 500-MHz Ultra Low Voltage Mobile Pentium III with Speed-Step consumes a mere 1 watt at full power and less than 0.5 watt in its 300-MHz battery-optimized mode. The 500-MHz Celeron lacks SpeedStep but uses less than 1 watt as well. IBM has begun to ship the first notebooks with the new Ultra Low Voltage Mobile PIII—a ThinkPad I-Series 1124—in Japan.

▶ **Palm Updates Desktop:** The Palm Desktop software you use to organize and edit your Palm information just got a face-lift. Available as a free download (www.palm.com/software/desktop), Palm Desktop version 4.0 for Windows adds a more flexible user interface; customizable calendar views to show a day within the month, multiple months at once, and even the full year; timesaving features; improved security; and the ability to send business cards or appointments as Vcard and Vcal attachments to e-mail. You can also select a desktop theme to suit your aesthetic sensibilities or schedule an alarm to keep you awake in front of your office computer. ▶

A GAGGLE OF GATEWAYS: Latest wireless networking products from (top right, clockwise) 2Wire, Buffalo Technology, D-Link, Home Wireless Networks, Proxim, MaxGate, and 3Com.

wideband frequency-hopping transmission that HomeRF radios use; this is inherently less susceptible than Wi-Fi's spread-spectrum technology to interference from microwave ovens and from devices that communicate via Bluetooth. Wi-Fi's proponents respond that this advantage—which they view as marginal—will be wiped out when HomeRF's 10-mbps version kicks in.

MEDIA FRIENDLY

PERHAPS EVEN more important, HomeRF can give priority to streaming media packets, so it offers better support for multimedia applications such as viewing video over the Internet. That advantage may be temporary, however: A company called ShareWave has developed an extension of the Wi-Fi standard called Whitecap (and used in the Panasonic Concourse Gateway, listed in the chart below) that optimizes streaming media; and work has already begun on the next generation of 802.11b to improve voice and multimedia support. That coming version, 802.11e, is expected to address the current weakness in WEP security, too.

But just like its wired home-networking counterparts, HomePNA and HomePlug (see "Wired Alternatives: Home-PNA, HomePlug," page 45), HomeRF is expected to appear in an array of non-PC home entertainment devices. For example, Simple-Devices is committed to using HomeRF for its coming series of wireless consumer products, including a Net-connected alarm clock that will deliver personalized content each morning and an audio player that will use content stored elsewhere on your PC.

Whichever type of network you opt for, you'll need a gateway or access point—a hub that converts wired network traffic into radio-frequency data packets and directs the data streams to devices with

> For **sharing** broadband access, HomeRF's **1.6-mbps** speed is **adequate**; most **broadband hookups** don't exceed that bandwidth.

wireless receivers. Early access points did just that, and nothing more. You needed additional boxes for your cable or DSL modem, an ethernet hub, an Internet router that let all computers on the network share a single connection, and in some cases a firewall to protect against intruders. Putting it all together was a challenging task even for experts.

That's changed. The new class of wireless residential gateways pack most of these functions into one easy-to-install box. Some units, such as those from Cayman Systems, do it all: They bundle a DSL or cable-modem wireless access point, an ethernet hub, a firewall, and an Internet router in a single box. Because different DSL providers have different modem requirements, you typically buy an all-in-one unit preconfigured by your ISP when you set up service. Most other new gateways are designed to work with the DSL or cable modem you got from your ISP. You buy these gateways off-the-shelf from conventional computer and electronics retailers and handle setup yourself.

If you decide on a wireless network, make sure you know

Wireless Gateway Gold Rush: Many Players, 802.11b Dominates

PRODUCT	Street price	Networks supported	LAN port(s)	DSL/Cable modem (WAN) port	Additional features
2Wire HomePortal 100W 877/348-6369 www.2wire.com	$399	Ethernet, HomePNA, 802.11b, USB	One 10Base-T RJ-45, one HomePNA RJ-11	10Base-T RJ-45	None
3Com Home Wireless Gateway 847/262-3700 www.3com.com	$349	Ethernet, 802.11b	Three 10/100Base-T RJ-45	10Base-T RJ-45	None
Buffalo Technology AirStation WLAR-L11-L 800/508-1110 www.buffalotech.com	$323	Ethernet, 802.11b	Four 10/100Base-T RJ-45	10/100Base-T RJ-45	None
Cayman Systems 3220-H-W 800/473-4776 www.cayman.com	$400	Ethernet, HomePNA, HomeRF or 802.11b	Four 10Base-T RJ-45, one HomePNA RJ-11	n/a [1]	None
D-Link DI-713 800/326-1688 www.dlink.com	$300	Ethernet, 802.11b	Three 10/100Base-T RJ-45	10Base-T RJ-45	Serial port
Farallon NetLine Wireless Broadband Gateway 800/613-4954 www.farallon.com	$399	Ethernet, 802.11b	One 10/100Base-T RJ-45	10Base-T RJ-45	None
Home Wireless Networks AirWay TransPort 800/949-9473 www.homewireless.com	$349	Ethernet, 802.11b	None	10Base-T RJ-45	Digital telephony [2]
Linksys EtherFast BEFW11P1 800/546-5797 www.linksys.com	$299	Ethernet, 802.11b	Two 10/100Base-T RJ-45, including one uplink port	10Base-T RJ-45	Built-in print server with parallel printer port
MaxGate UGate-3300 800/284-8985 www.maxgate.net	$299	Ethernet, 802.11b	Two 10/100Base-T RJ-45, including one uplink port	10Base-T RJ-45	Built-in print server with parallel printer port
Panasonic Concourse Networking Gateway KX-HGW200 800/272-7033 www.panasonic.com	$300	Ethernet, HomePNA, 802.11b	One 10Base-T RJ-45, one HomePNA RJ-11	10Base-T RJ-45	Support for Whitecap [3] extension to 802.11b
Proxim Symphony-HRF Cordless Gateway 800/411-8106 www.proxim.com	$199	HomeRF	None	10Base-T RJ-45	None

[1] Built-in DSL modem.   [2] Via AirWay Personal PBX system.   [3] Networking protocols to optimize presentation of streaming media.

what you're getting into financially: Besides purchasing the gateway, you'll have to buy a PC Card, a PCI card, or a USB adapter for each device on the network. If your devices and peripherals are ethernet-ready and not too far from your gateway, you may want to consider a gateway with a built-in ethernet hub. It will cost a bit more initially, but you might be able to make up the difference on the adapter side because you can pick up an ethernet card for about $30—far less than any wireless adapter costs.

If you simply want to share broadband access, HomeRF's 1.6-mbps speed is adequate, since most broadband hookups don't exceed that band-width. But if you expect to transfer a lot of large files (such as music, photo, and video files) between your computers, the difference will be very noticeable. Also, since 10-mbps HomeRF products are expected later this year, investing in HomeRF right now makes little sense unless you don't need the speed.

CHECK VPN STATUS
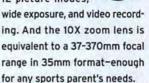
IF YOU'RE a telecommuter or have a wireless network at your office, talk to your IT department before buying. Many companies require employees to use a VPN to connect to their corporate LAN. While all of the gateways in our chart claim VPN support to some degree, that support comes in many different flavors—and you don't want to install everything only to find out later that it won't work. If you have an 802.11b wireless network at the office, your decision is simple, since you already have an adapter. Frequent travelers should go with Wi-Fi to take advantage of its growing availability in public spaces.

While residential gateways are not yet truly plug and play, reasonably savvy users should be able to install them without much pain. And once you've tasted the wireless lifestyle, you'll never want to go back.

For more, visit www.pcworld. com/news/april2001. ▶

Wired Alternatives: HomePNA, HomePlug

WIRELESS NETWORKS ARE sweet, but maybe you want something that's cheaper—and still doesn't require you to string new cables. If so, check out the "no new wires" alternatives based either on the HomePNA (www.homepna.org) standard, which uses existing telephone wires, or on Home-Plug (www.homeplug.org), which runs on existing electrical power lines.

Both approaches offer decent speed: HomePNA is rated at 10 mbps, and HomePlug at 14 mbps—both comparable to older 10-mbps ethernet and 802.11b (Wi-Fi) wireless networks. The hardware is eminently affordable, too—as little as $40 for a HomePNA PCI card, versus $100 to $175 for Wi-Fi cards. And supporters say that they handle streaming media and telephony better than wireless networks. So why do so few of the newer gateways—none in the case of HomePlug—support these standards?

There are three main reasons. First, the Home-Plug standard is late out of the gate. It has only just reached draft certification (using Intellon's PowerPacket technology), and the first products won't hit store shelves until later this year.

Second, both of these wired standards are designed for homes: You won't find them in corporations or public spaces. In contrast, some companies and a handful of airports and hotel lobbies already offer Wi-Fi access.

Finally, a wireless network offers compelling convenience, and the extra cost is hardly prohibitive. You can go anywhere in the house—or outside it—without losing your connection. Sipping an iced tea on the patio while checking your e-mail is hard to beat.

But don't count the Homies out yet. Their much lower per-node costs will attract users who'd like to add non-PC devices such as game consoles and MP3 players to a network without spending a lot of extra money. SonicBlue (a founder of the HomePlug alliance) and Dell have MP3 systems in the works that feature HomePNA connections for transferring files to and from PCs and playing them back through home stereo systems. Other HomePlug Powerline Alliance founders include giants 3Com, Cisco, Compaq, Intel, and Motorola. Most of these are founding members of the HomePNA alliance as well—evidence that vendors are hedging their bets until a clear winner emerges.

Quake on the Run: NVidia Brings Gamer-Style GeForce Graphics to Notebooks

SOMETIMES you just gotta play. But try a round of Quake III on a laptop. It's a lousy, herky-jerky experience because even the best systems lack the graphics oomph to run such a demanding 3D title.

NVidia's new GeForce2 Go mobile graphics controller changes all that. Great notebook graphics? We've heard that before. But our skepticism faded after just a few minutes with a $2749 preproduction Toshiba Satellite 2805-S402, the first to use the GeForce2 Go (units from Dell and others are in the wings). Its fluid visuals backed terrific test scores. And it handles work presentations well, too.

The new mobile chip set is the first to have what NVidia calls a graphics processing unit. The GPU enables some of the more sophisticated graphics functions—such as transform and lighting—that are found in recent desktops, and it renders smoke, fog, and textures more realistically.

The GeForce2 Go's GPU processes 286 million pixels per second. That's not much compared to the 1 billion pixels per second managed by NVidia's GeForce2 Ultra desktop chip set, but the company claims it's enough to render 3D graphics up to ten times

Toshiba Satellite 2805-S402
Street price: $2749; 800/457-7777; www.csd.toshiba.com

faster than average mobile graphics chip sets can.

To match the fancy graphics, Toshiba's 2805 has a fast Pentium III-850 CPU, 128MB of SDRAM, 16MB of SGRAM for graphics, a 20GB hard drive, a 15-inch active-matrix

TOSHIBA'S Satellite 2805-S402 with NVidia's new GeForce2 Go.

LCD, a combo 6X DVD/4X CD-RW/24X CD-ROM drive, sound with subwoofer, a built-in 56-kbps modem, and ethernet. Add a SmartMedia slot and an IEEE 1394 port, and you have a serious 8.7-pound (loaded for travel) notebook.

LOOKING GOOD

IN INFORMAL tests using the graphics-rich UnReal Tournament, the 2805 rendered great detail and texturing, as well as fluid video—easily the best we've seen on a laptop. DVD movies were equally stunning.

The 2805 also garnered a top-notch PC WorldBench 2000 score of 146. As we expected, the unit shone in our

graphics tests, with averages well above 60 frames per second on a series of 3D applications and demanding games like MDK2, at a low 640 by 480 resolution with 16-bit color (65,536 colors). At its native 1024 by 768 resolution, it managed a satisfactory average of more than 30 fps.

The 2805 performed well above most laptops, but it did not match desktops with top graphics. And at 32-bit color (16.7 million colors), the 2805's frame rates slowed noticeably. Most users should be well satisfied with its capabilities, however.

GAMERS DELIGHT

NVIDIA'S competition isn't standing still. ATI, the current mobile graphics market leader, has launched its Mobility Radeon, which it claims combines advanced power management with many of the 3D texture and rendering features of its Radeon desktop counterpart. Expect systems equipped with it by autumn of 2001.

Serious gamers who've been waiting for a worthy notebook, as well as home and small-business users interested in a solid desktop replacement with the mojo to run an occasional game or DVD, should be well served by the new chip sets. The 2805 offers a visually stunning example of the platform's power and potential.

—*Tom Mainelli*

For more, visit www.pcworld. com/news/april2001. ▶

Clipboards That Compute:
For People Who'd Rather Write Than Type

FIRST LOOK

CAPTAIN Janeway of *Star Trek: Voyager* had one. So did *Deep Space Nine*'s Captain Sisko. They called these electronic clipboards PADDs—Personal Access Display Devices. But we call them tablet PCs or Web tablets, and you'll see more of them very soon.

Tablet computers are not new, but until now the format was confined to specialized industries. That is changing. Tablets for consumers—both PCs and Internet appliances—are due out soon from upstart vendors such as Aqcess Technologies and from big players like Siemens.

What's so cool about these devices? You can write on them without ever having to sit down. What's not so cool? Price and weight. Internet appliances start at $450; PC tablets, at about $1300. And both remain much heavier than your average clipboard.

I looked at one new tablet, the $1799 Qbe Vivo from Aqcess Technologies. The immediate successor to a bulky, 6-pound device now known as the Qbe Original, the new Vivo has slimmed down to 4 pounds by offloading the old model's built-in Smart Card reader and CD-ROM drive. But it still sports Windows Me and Windows 2000 support; a stylus and 10.4-inch touch

**Aqcess Technologies
Qbe Vivo**

Street price: $1799; 888/818-0055; www.qbenet.com

screen that can display content in landscape or portrait mode; and capable handwriting recognition software.

WELL CONNECTED

A 56-KBPS modem, an ethernet connection, and built-in 802.11b wireless networking come with the package. An optional $299 docking station offers desktop-style access via keyboard and mouse; it doubles as a battery recharger. A camera built into the top of the bezel swivels away from the tablet so you can focus on an

VIVA VIVO?
Aqcess's new tablet PC weighs 4 pounds—but starts at $1799.

external subject. Microphones built into the bezel let you create e-mail messages and other documents just by speaking.

While some features weren't ready in my preproduction unit, I found that the Vivo's intuitive ease of use makes it great for armchair computing or for jotting notes on the go.

But while it's less expensive than the $3000 Qbe Original, the Vivo is still priced slightly out of this world at $1799 for a PC with a 450-MHz Celeron CPU, 64MB of RAM, and a 5GB hard drive.

If you can handle living with Windows CE—and without a hard drive—you'll get a slightly better deal (and a lighter load) with the 2-pound, $1495 Fujitsu Pen-Centra 200. The unit has an 8-inch color transmissive screen, 32MB of RAM (upgradable to 64MB), and 16MB of flash memory. Other tablets are on the way. Qubit's $799 Orbit tablet is slated to appear this spring, as is Siemens' 2-pound, $1300, Windows CE–based 4600 Gigaset SIMpad. In the meantime, National Semiconductor is working on a Web tablet that will access the Internet via the Ricochet wireless service.

Tablets may appeal to mobile users who prefer using a stylus to typing. But according to IDC analyst Bryan Ma, consumers may balk at today's prices for tablets that target home users. Says Ma of the new devices: "I think of them as niche products going to gadget geeks—or *Star Trek* fans."

—*Laura Evenson*

For more, visit www.pcworld. com/news/april2001. ▶

Top PC World Downloads

❶ **Brewster Kaleidoscopic Screen Saver**

444KB

Simulate a kaleidoscope on your PC's desktop—without staring through a tube.

❷ **Startup Control Panel**

38KB

Automatically launch programs when your system starts up.

❸ **First Name Almanac**

4061KB

Pick a first name for your baby, pet, car, or imaginary friend from a database of 18,500 names.

❹ **Microsoft Security Patch for Windows Media Player 6.4 and 7**

410KB

Fix bugs that allow unauthorized programs to run on your PC.

❺ **HyperSnap-DX**

586KB

Easily capture a screen, and edit it as you would a graphics file.

Find files on www.pcworld.com/downloads/top5/april2001.

REMOTELY POSSIBLE:

Provisioning the
MOBILE
Workforce

Users turn to outsourcing to
lower costs, improve support

The main driving force in virtually every business today is simply this: Get as close to the customer as is humanly possible. Whether your job is sales, support, or account management, you have got to be out and about making the customer feel truly like a king.

So it is not surprising that the ranks of remote and mobile workers in the United States are soaring. As figure 1 shows, by 2004, more than half of the 100-million-person workforce will be categorized as remote and mobile workers. This legion of on-the-go employees can be divided into several types, including:

→ Telecommuters, who work at home for several days or more per month
→ Mobile professionals, who typically spend a quarter or more of their time on the road
→ Work extenders, who very often bring their work home with them. They represent the fastest-growing segment of the mobile worker population.

Armed with high-performance laptop computers, this mobile workforce demands levels of support and reliability that mirror what it would get from a central office. But there are problems in delivering such levels of support to this demanding user base. These problems translate into support costs that are up to 50% higher than the costs of supporting desktop users.

Experts point to several reasons why remote-user support costs are often so high. For important tasks like file sharing, data communications, and file updates, it is very helpful that the lap-

REMOTELY POSSIBLE:
Provisioning the
MOBILE
Workforce

tops and other remote devices in the field are properly synched up with servers back in the main office. Productivity can be dealt a fatal blow should unreliable network connections interrupt or terminate the uploading or downloading of vital files. Simply having different versions of the same software package loaded onto different laptops can disrupt the smooth flow of data communications, and therefore the smooth flow of business.

It is not surprising that many people charged with the task of managing and supporting the remote worker would choose not to, if they had the choice. The bottom line is that heavy support challenges continually crop up because the support staff cannot always assume users will maintain their laptops and other mobile devices uniformly.

A very rapidly growing number of managers charged with supporting remote workers are finding the solution to their support challenges in outsourcing providers. In his report, "Network Outsourcing Services and Trends," International Data Corp. analyst Richard Brewer noted the following:

"As local and wide area network technologies continue to increase in complexity and infrastructure build-outs continue at a rapid pace, organizations are increasingly contracting with outside service providers for a wide range of selective outsourcing engagements, including ... backup, recovery and help desk outsourcing. Thus they are helping customers to free IT departments to focus on core businesses and long-term strategic objectives."

One such outsourcing provider is Everdream Corp. (www.everdream.com), whose unique approach to customer service has struck a resonant chord with a fast-growing clientele (see related story, page 3). At the heart of its desktop and laptop outsourcing offerings is 24x7 support that includes the capability of remote-control diagnostics, available as part of the predictable, per-user monthly fee. Everdream also offers remote, automated daily back-up over secure connections.

To attack the problem of incompatible hardware and software, Everdream offers only Hewlett-Packard hardware for all the desktops and laptops it provides, while custom-configuring the machines with exactly the right software for the user's specific applications. Software updates are done across all machines simultaneously, saving customers valuable time. And Everdream can provide fully-configured servers in remote locations, again offering remote control diagnostics as well as 24x7 phone support.
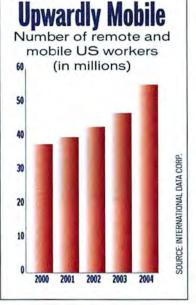
Other embedded services under the Everdream umbrella include virus protection, automated software maintenance, PC self-healing capabilities, unlimited Internet access including a Web-based email account, and Web design and hosting.

"For firms that have lots of remote offices where it isn't cost-efficient to staff each location with technical staff, or where IT staff may be otherwise occupied, outsourcing may be a very reasonable alternative," says Damian Rinaldi, an analyst with First Albany Corp. "Based on what I've seen, Everdream's market focus, its portfolio of services, and its affordability make it an attractive choice for handling 'traditional' desktop, mobile and lower-level LAN management."

Figure 1

Upwardly Mobile
Number of remote and mobile US workers (in millions)

SOURCE: INTERNATIONAL DATA CORP.

Making Connections
The good, the bad, and the ugly
of remote connectivity

Deciding upon a connection method for your remote workers or for your own needs can be a business-critical decision when you need files and information quickly. Here's a quick look at the merits and drawbacks of the most popular remote connection types.

→ **Dial-up modems.** They max out today at about 56 Kb/sec, but downloading a 5-MB slide presentation can take you 20 minutes due to file overhead and other factors. They are, however, inexpensive, and reliable too.

→ **ISDN.** You get a true 128 Kb/sec, if you can find a provider. And the quality of service will vary wildly from one region to another. This is fast becoming yesterday's technology.

→ **DSL.** Leverages the existing huge installed base of copper phone lines to speed downloads at 1.5 Mb/sec, with upload speeds slower. Very reliable once up and running, with the better service providers gaining market share.

→ **Cable modems.** With cable lines virtually ubiquitous, cable modems are gaining favor and can offer download speeds in the multi-megabit range. However, they are built like the old shared LANs, meaning there are security issues and performance degradation when several users are working simultaneously.

Good Partners, Good Planning

Desktop and server outsourcing leaves IT worries to others

There are practical limits to the financial and pension services that a small office can deliver. Just don't tell that to the folks running Pension Professionals up in Biddeford, Maine.

Armed with a strong belief in the benefits of outsourcing, a technology partner they call "exceptional," and a strong measure of Yankee ingenuity, partners Richard Butler and Roland Gagne have amassed an impressive array of services and clients that extends nationwide.

With just the two partners and an office manager, Pension Professionals (http://www.valueofadvice.com) manages to serve three distinct markets. First, the company helps create or modify existing pension plans. Second, it works with individual employee groups by providing personal financial education and planning services. And third, Pension Professionals has a thriving family financial planning service. While serving any of these markets, Pension Professionals can call in members of its advisory network, including attorneys, accountants, and personal advisors: a reflection of the company's passion for outsourcing whatever isn't a core competence.

Richard W. Butler (left), vice president, with Roland Gagne, president at Pension Professionals

© CHRISTOPHER FITZGERALD/MERCURY PICTURES

The Role of IT

"We need and want to leverage technology and the Web to deliver our services across the country or across the street," notes Gagne, who co-founded the company in 1995. "But we don't have the time or patience or know-how to mess around with machines and software, even though our business is quite dependent on them."

So Pension Professionals has outsourced the responsibility for an ever-increasing part of its IT resources to Everdream (http://www.everdream.com). Butler says he and Gagne chose Everdream after mulling the offers of several PC and LAN outsourcing companies. "Everdream was easily the most responsive of the bunch," Butler recalls. "There was a lot of clarity in what they provided, as well as value."

Originally, Pension Professionals had purchased and leased its own IT gear, while an employee set up and maintained the network. But when that employee left, so did the person with the skill and time to keep the system running smoothly.

The Right Technology Partner

Enter Everdream, which initially provided Pension Professionals with its server solution, including hardware, software, and unlimited tech support, on a 24x7 basis. "I've yet to call their service line and wait more than three rings for someone to pick up. They get things fixed right away, which gives us confidence that they really know their business." Server uptime is absolutely key to Pension Professionals' catering to a national clientele, which accesses server-based account information 'round the clock.

In addition to the server, Everdream provides automated off-site backup services. In the unlikely event of a catastrophic server crash, the Everdream team would utilize the backed up data in restoring the system, thus minimizing the impact on business-as-usual at Pension Professionals. Now Gagne and Butler are planning on having Everdream replace their existing leased PCs with the Everdream solution, which includes all new Hewlett-Packard hardware, to access the Everdream services.

But for Gagne, the value proposition Everdream delivered has already gone far beyond server maintenance and back-up services.

"We were having some back-up issues with the non-Everdream machines as a result of problems with our DSL provider," Gagne recalled. "Even though these machines are outside the boundaries of our service agreement with Everdream, they still jumped in and helped us find a suitable solution that will tide us over until our leases are up and we can bring in Everdream hardware throughout. That's the real benefit to us–the ability to just let go of worrying about our IT, knowing that someone really competent is going to take care of us."

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

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A Notebook for the Pen-and-Paper Set

N O T E B O O K

FOR MOST of us, the paperless office remains a myth. Pen, pencil, paper—and note taking—are still very much with us. But it can be a chore to search through handwritten notes, and whipping out a laptop midmeeting can prompt frowns.

IBM's answer: the eye-catching ThinkPad Trans-Note, which starts with a conventional notebook, includes a touch screen, adds a very unusual paper pad that digitizes and imports your notes to the unit, and then wraps it all in a chic portfolio.

You can tell right away that this is not a typical notebook. Closed, it looks like a leather portfolio. When you open it, on one side of the fold you'll see typical notebook components, but they're laid flat: The 10.4-inch FlipTouch active-matrix screen covers a small-ish but usable keyboard, complete with IBM's signature TrackPoint device. You position the screen as you wish. You can even flip it over so the screen faces away from the keyboard—handy for presentations (controls let you flop the image as well).

On the other side of the fold lie a standard paper pad and a stylus pen holder. But beneath the paper is a digital pad, much like Cross's stand-alone CrossPad. (That's no coincidence: IBM helped Cross develop the earlier device.) As you take notes in meetings or

IBM TransNote

Street price: $3099; 888/746-7426; www.ibm.com/thinkpad

in preparation for a report, the digital pad records your pen strokes and sends the data as a vector graphics file to the TransNote. The notebook doesn't have to be switched on; the pad stores the data and can synchronize it later. You can then use the included Ink Manager Pro software to access the page images.

The TransNote software can't turn notes into text documents. But with Ink Manager Pro, you can easily select keywords for later searching or designate certain items as to-do's or messages.

The notebook has an Intel Pentium III-600 processor, 64MB of RAM (expandable to 320MB), a 10GB drive, two USB ports, a video port, a 56-

IBM's newest ThinkPad, the $3099 portfolio-like TransNote.

kbps modem, 10/100 ethernet, a CompactFlash slot, and one Type II PC Card slot. It runs Windows 2000, Me, or 98. Its floppy and CD-ROM drives are external, though easily attached and detected through the USB ports. The whole package weighs about 5.5 pounds, and the four-cell lithium ion battery lasts about 2.5 hours, according to IBM. The digital pad uses the same battery but can last a lot longer—about 8 hours—and stores 50 pages of notes.

The TransNote is available in right- and left-handed versions, so IT managers must figure out how many of each to buy. Mainstream audiences may opt to pass, but salespeople who travel constantly and execs who want to integrate their paper notes into an electronic system will certainly appreciate the TransNote.

—*Anush Yegyazarian*

Computing Through an Energy Crisis: How to Save Money and Power

F I R S T   L O O K

YOU'VE PROBABLY never thought twice about leaving a PC on at work or at home. There was always juice to run it—all day and all night, if necessary—and the few pennies it cost wasn't a big concern.

Times have changed. As California residents found out this winter, the limitless availability of electricity isn't guaranteed. The rolling blackouts that darkened the Golden State probably won't happen in yours, but if they do, consult the chart on page 54 for some backup remedies.

In any case, you'll probably be paying higher energy prices in the months and years ahead. The reasons: a growing population, heavily dependent on electricity, coupled with the

slow pace of building new power plants nationwide.

As we look forward to summer, traditionally the season of soaring electricity demand, how can PC owners and buyers save money, conserve power, and still manage to reach their computing goals? These sections will give you some tips on how to best cut your energy costs.

LIGHTS OUT

SIMPLE, BUT TRUE—turning off lights is the single most effective thing you can do to reduce your energy ▶

When Disaster Strikes, Backup Power to the Rescue

WHEN NATURAL DISASTERS—or man-made crises—strike, a good uninterruptible power supply (UPS) can help you save your data and avoid the headaches involved in trying to reconstruct your work. We tested the battery life of several of the latest UPS products designed for the home and home-office market.

PRODUCT	List price	Output capacity (volt-amperes/ watts)	Run-down time, PC idle (minutes: seconds)	Run-down time, running PC WorldBench 2000 (minutes:seconds)	Files saved auto- matically?
APC Back-UPS Pro 500 800/800-4272 www.apc.com	$180 [1]	500/315	24:15	19:30	● [2]
Belkin Regulator Pro Gold 650 VA USB 800/223-5546 www.belkin.com	$169 [1]	650/390	29:20	22:08	●
Invensys Powerware 5115 500 877/797-9273 www.powerware.com	$300	500/320	23:45	19:23	●
MGE Pulsar Ellipse 800 USB 800/523-0142 www.mgeups.com	$299	800/520	50:05	42:23	○
Tripp Lite SmartPro 700 NET 773/869-1111 www.tripplite.com	$339	700/450	45:23	37:37	●

● Yes ○ No   [1] Street price.   [2] The unit did not perform this function every time.

HOW WE TEST For the run-down tests, we attached a PIII-600 PC with 17-inch monitor to a fully charged UPS, cut off incoming power, and measured the time the UPS kept the PC running—once with the PC idle (with files open in three apps) and once while running PC WorldBench 2000. Then we used each UPS's shutdown software to see whether open files were saved before shutdown.

costs. According to the EPA, lighting accounts for approximately 24 percent of total end-use consumption of electricity in commercial offices—the largest piece of the energy consumption pie.

To start saving, look into an automated shutoff system that kicks in after-hours. That way you don't have to rely on workers to remember to switch off individual lights as they leave. For your home, consider an automation system such as X10's ActiveHome (prices range from $50 to several thousand), which allows you to control the times when lights go on and off, and more.

To save while lights are on, consider switching to energy-efficient lightbulbs such as 25-watt spiral fluorescent models. Although they are initially more expensive, they offer much longer life, cost substantially less to operate, and provide lighting comparable to the incandescent lightbulbs you use today. Also, try a dim-mer system in hallways and other parts of the building for additional savings.

CHOOSE THE RIGHT EQUIPMENT

MANY PC makers participate in the EPA's Energy Star program (www.energystar.gov). To qualify, PC manufacturers must design models that con-

> **Lighting is the largest piece of the energy consumption pie, accounting for 24 percent of end use in commercial offices.**

sume 15 watts of power or less when in sleep mode and remain connected to the network. At full power, PCs can consume up to 200 watts. Other office machines (fax machines, copiers, printers, scanners, multifunctional devices, and so on) can be Energy Star–compliant, too.

According to the EPA, office equipment accounts for approximately 8 percent of com-mercial energy end use—slightly less than space cooling does (9 percent)—and it will only go up as equipment costs drop. Using Energy Star–compliant equipment can mean energy savings of at least 50 percent per machine.

"Think about it. You have a home office equipped with a computer, a scanner, a printer, and a fax machine. If those things are running all the time, they're consuming electricity," says EPA's Craig Hersh-berg, product manager for the Energy Star program. "And those products are generating heat, which means you'll have to use more electricity to cool down this summer."

THINK FLAT

HAVE YOU been drooling over the new flat-panel monitors, but couldn't come up with a good enough reason to justify the premium price tag? Did you know these LCDs use only about a third of the energy required for a CRT monitor?

It's true. They also run cooler, so you'll save money on air-conditioning costs, too.

USE YOUR OS

MICROSOFT'S operating systems feature power-management controls (Settings•Control Panel•Power Management) that will automatically put your computer to sleep after it idles for a pre-specified amount of time—anywhere from 5 minutes to more than an hour.

If you don't turn off your monitor, you should remember to power it down when you're done for the day. "The monitor may use 90 to 110 watts when it is on," Hersh-berg says. "When it shuts down and goes to sleep, that goes to 15 watts or lower. Deep sleep is 8 watts or lower."

LOOK FOR IAPCs

INTEL HAS developed the Instantly Available PC (IAPC) standard, which is only now appearing on the newest systems from such vendors as IBM, Compaq, Dell, Sony, and HP. After a user-set time of inactivity, it sends the PCs into a very-low-power sleep mode (the goal is 5 watts)—deeper even than Energy Star requirements. Before going into sleep, it saves to RAM the information about apps you have open and communications connections, so you can resume work nearly instantaneously, right at the point where you left off.

Even if the higher cost of energy doesn't pose a cash crunch for you now, taking steps to make your PC system more efficient and less costly to operate will pay dividends in months and years ahead.

—*Frank Thorsberg* ▶

Is Your PC Safe From the Enemy Within?
Updates Plug Potential Firewall Leaks

FIRST LOOK

MOST SOFTWARE firewalls adequately protect you from outside hackers who try to access your files or otherwise probe your PC. But what if the danger comes from within? Several personal firewall vendors have released updates addressing your vulnerability to intruders who get in when you unsuspectingly run a malicious application that masquerades as a friendly one.

The problem garnered public attention thanks to PC security guru Steve Gibson, whose Gibson Research Web site (www.grc.com) is best known for ShieldsUp, a test designed to expose a firewall's vulnerability to external attacks. Gibson's latest offer-

ing, dubbed LeakTest, is a free, easy-to-run download that will tell you whether your firewall can detect and stop an internal Trojan horse program—innocent-looking software that is spread via e-mail or download. Antivirus software can alert you to known Trojan horses, but if a new one gets through, your firewall is supposed to provide a second line of defense. Unfortunately, most personal firewalls failed LeakTest when it was released in December.

APPS IN DISGUISE

ALL FIREWALLS are meant to block unauthorized attempts to access a PC from the out-

side. But many legitimate applications running on your computer open it to outside access. Firewalls have to let you receive e-mail and Web pages, for example.

So how does a firewall know when an app is legitimate? Most rely on the name of the executable file—for example, netscape.exe—together with the port number assigned to an Internet connection created by a specific application. A malicious Trojan horse could fool the firewall into thinking it was a legitimate app by renaming itself when it ran and using an appropriate port.

SAFE SIMULATION

LEAKTEST SAFELY simulates such an attack strategy. After you download the 27KB program, Gibson recommends changing its name to that of a popular executable Internet application such as Internet Explorer or Eudora. When you run the program, it uses the FTP protocol to attempt to connect to one of Gibson's servers. If it succeeds, it confirms your PC's vulnerability

(but doesn't send any personal data), Gibson says.

No LeakTest-style Trojan attacks are known to have occurred outside a lab. Still, most major firewall vendors now have updates that address the problem (see the chart).

When the test was released, only one major firewall, Zone Labs' Zone-Alarm, passed. Vendors whose products were fooled by LeakTest include McAfee.com, Network Associates, Sygate, and Symantec. Almost all of them offered free updates by early February.

These patches change the way the firewall identifies apps that users have authorized to access the Web. Instead of relying on name and port, the firewalls look at content or code.

Getting this extra protection may inconvenience people. To fully update Norton Personal Firewall, for example, you may have to run Live Update, its downloadable upgrade service, more than once. Symantec also turned off Norton's automatic rule-creation feature, which results in users being pestered by pop-up authorization request windows.

But all firewalls—even ZoneAlarm—rely first on the user's good judgment. And that means not authorizing suspect software.

The bottom line: When it comes to protecting your data, caution is king. It's better to put up with a strict firewall now than to cry later when some stranger downloads all your personal finance files.

—*Cameron Crouch and*
Seán Captain
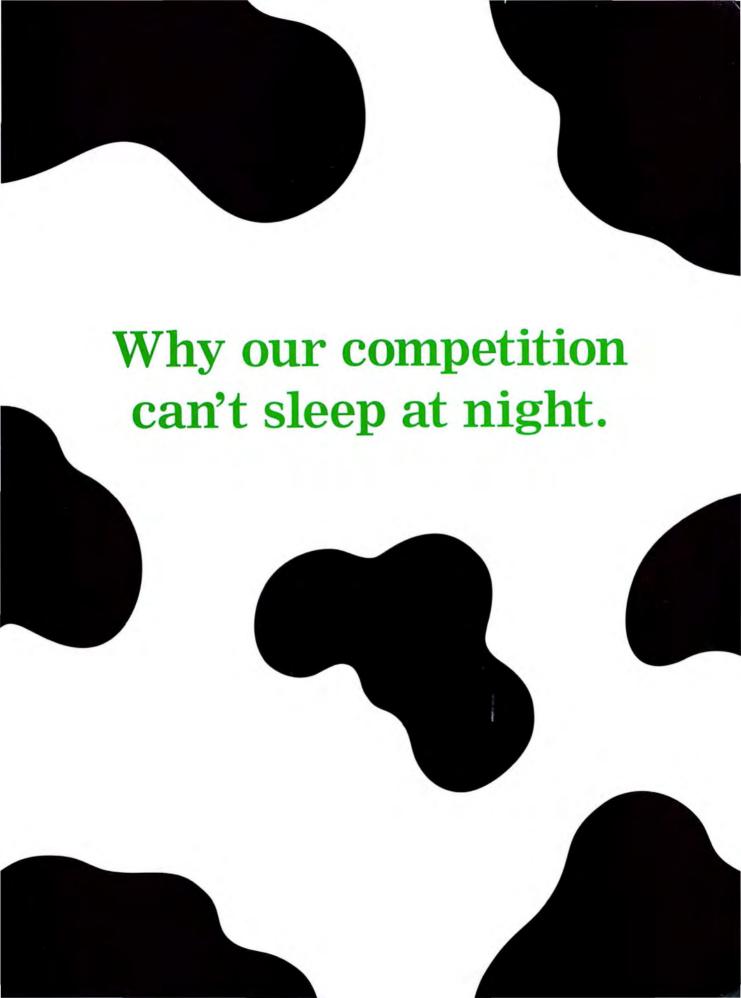
Patching Up Your Firewall

PRODUCT	Version that passes LeakTest
McAfee.com Personal Firewall www.mcafee.com; $20 per year	Update due by March
Network Associates McAfee Firewall www.mcafee-at-home.com; $29	Version 2.15; patch due by March
Network ICE BlackICE Defender www.networkice.com; $40	No update required [1]
Source Velocity PC Viper www.sourcevelocity.com; free	Version 3.1.6 or later
Sygate Personal Firewall www.sygate.com; $40	Version 2.1, built 475 or later
Symantec Norton Personal Firewall 2001 www.symantec.com; $50	Version 2.05 or 2.55
Tiny Personal Firewall www.tinysoftware.com; free [2]	Version 2.07 or later
Zone Labs ZoneAlarm www.zonealarm.com; free	No update required [3]
Zone Labs ZoneAlarm Pro www.zonealarm.com; $40	No update required [3]

[1] Watches for harmful patterns of data into and out of a PC, not the applications sending or receiving them. Company says product did not pass LeakTest because it deemed the pattern of data transmission nonthreatening.

[2] $39 for business use.

[3] Identifies trusted applications by their content.

Why our competition can't sleep at night.

They're all scared they can't compete.

Gateway Essential™ 933

Intel Pentium III Processor 933MHz • 64MB SDRAM • EV700 17" Monitor (15.9" viewable) • Intel 3D AGP Graphics • 10GB Hard Drive • 48X Max CD-ROM Drive • Enhanced Audio • Boston Acoustics BA265™ Speakers • 56K Voice Modem • Microsoft Works Suite 2001 • 1-Year Limited Warranty • 1-Year America Online Internet Access (new members only)

$999 or as low as $28/mo. (APR 14.9%) for 48 mos.

Value Pack - Power Upgrade Pack
Upgrade to 19" Monitor (18" viewable) • Upgrade to Boston Acoustic BA735 speakers with subwoofer • Upgrade to 3-Year Limited Warranty - $200 (savings of $99)

Gateway Performance™ 1000

Intel Pentium III Processor 1GHz (1000MHz) • 128MB SDRAM • EV700 17" Monitor (15.9" viewable) • Intel 3D Graphics • 20GB Hard Drive • 3.5" Diskette Drive • Recordable/Rewritable CD-ROM Drive • Sound Blaster Audio PCI 128D Soundcard and Boston Acoustics BA265 Speakers • Home Networking/56K Modem Combo Card • MS Works Suite 2001 • 3-Year Limited Warranty • 1-Year America Online Internet Access (new members only)

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Upgrade to Boston Acoustics® BA735™ Speakers with Subwoofer • CD Stomper™ Pro CD Labeler • MusicMatch® Jukebox Plus - the award-winning all-in-one Digital Audio Jukebox • Training Course: "Using Your PC to Explore Digital Music Your Way"® • Getting Started Guide - $100 (savings of $94)

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Intel Pentium 4 Processor 1.3GHz (1300MHz) • 128MB RDRAM • EV700 17" Monitor (15.9" viewable) • 32MB NVIDIA™ GeForce2™ MX AGP Graphics • 20GB Hard Drive • Recordable/Rewritable CD-ROM Drive • Sound Blaster Live!™ Value Card and Boston Acoustics BA735 Speakers and Subwoofer • Home Networking/56K Modem Combo Card • MS Works Suite 2001 • 3-Year Limited Warranty • 1-Year America Online Internet Access (new members only)

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Visioneer® One Touch™ Flatbed 5600 USB Scanner • CD Stomper Pro CD Labeler • Corel Print House™ Magic and Corel Print Office™ Software • Training Course: "Using Your PC to Explore Digital Photography Your Way"® • Getting Started Guide - $199 (savings of $44)

Gateway Performance 1400

Intel Pentium 4 Processor 1.4GHz (1400MHz) • 128MB RDRAM • EV910 19" Monitor (18" Viewable) • 32MB NVIDIA™ GeForce2 MX™ AGP Graphics Accelerator • 40GB Hard Drive • 3.5" Diskette Drive • Recordable/Rewritable CD-ROM Drive and 48X CD-ROM Drive (2 optical drives) • Sound Blaster Live! Value Sound Card and Boston Acoustics BA735™ Digital Speakers and Subwoofer • Home Networking/56K Modem Combo Card • MS Works Suite 2001 • 3-Year Limited Warranty • 1-Year America Online Internet Access (new members only)

$1999 or as low as $56/mo. (APR 14.9%) for 48 mos.

Gateway Video:)Ware™ package - Advanced Digital Video
IEEE 1394 PCI Card • MGI VideoWave Software • Digital Video Camcorder Connector Cable • One half-day Instructor-led course, "Using Your PC to Explore Digital Video Editing," through Gateway Country® stores • Getting Started Guide - $149 (savings of $85)

Toll Free from Mexico 001-888-888-0074   Toll Free from Puerto Rico 800-846-3613   Toll Free from Canada 888-888-2039

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14.1" XGA TFT Color Display • Intel Pentium III Processor 700MHz • 64MB SDRAM (expandable to 512MB) • 10GB Hard Drive • 24X Max/10X Min CD-ROM Drive • V.90 56K[1] Modem • 2X AGP 8MB S3 Savage IX 3D Video • MS Works Suite 2001 • 1-Year America Online Internet Access (new members only)[3]

$1999 or as low as $56/mo. (APR 14.9%) for 48 mos.[4]

Value Pack - Traveler's Pack
Casual Carrying Case • APC® Pnote Pro Surge Protector • USB Mouse • Kensington® Lock • Upgrade to 3-Year Warranty[2] • Internet Training Subscription[6] - $239 (savings of $102)[5]

Solo 9300CL

15" XGA TFT Color Display • Intel Pentium III Processor 800MHz • 96MB SDRAM (expandable to 544MB) • 10GB Ultra ATA Hard Drive • 8X DVD-ROM Drive • V.90 56K[1] Modem • MS Works Suite 2001 • 1-Year America Online Internet Access (new members only)[3] • 3-year Limited Warranty

$2499 or as low as $70/mo. (APR 14.9%) for 48 mos.[4]

Gateway Money:)Ware™ package
Quicken® 2001 Suite including: Quicken 2001 Deluxe, TurboTax Deluxe® mail-in coupon, Quicken Family Lawyer™ 2001 • Getting Started Guide • One Half-day Instructor-led Course: "Managing Your Finances Using Quicken 2001 Suite" through Gateway Country stores[6] - $129 (Savings of $69)[5]

Gateway Connected™ Music Player:
Hear streaming digital music in any room of your house, even different music in different rooms with additional music players, all controlled by a simple remote. $299

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Ad code: 005259

NEW PRODUCTS

Pretty Package Packs Value; Performance Lacks Punch

HP'S GOOD-LOOKING, value-packed Pavilion XT846 uses Intel's new Celeron-800 processor.

DESKTOP

HP'S CONTEMPORARY little **Pavilion XT846** PC isn't screamingly fast. But it does bring together a new Celeron-800 processor, 128MB of RAM, a 17-inch monitor, Windows Millennium, and a CD-RW drive for just $999, making it a good deal.

The Pavilion's 800-MHz processor breaks with Intel's earlier Celerons by supporting a faster front-side bus—100 MHz, up from the 66 Mhz supported previously. (This bus passes information from the CPU to the main memory.) But in our performance tests, the bus-speed bump-up didn't enable this shipping unit to compete with systems that use AMD's value-class Duron processor (which works with a 200-MHz bus). The HP earned a sluggish PC World-Bench 2000 score of 116—about 13 percent below the 134 mark posted by a comparable Duron-750 PC. The HP was almost 15 percent faster than a Celeron-700–based PC carrying 64MB of RAM, but the Pavilion's extra RAM probably accounted for the lion's share of the difference. We suspect that upgrading a Celeron-700 system to 800 MHz would net a performance boost of less than 5 percent.

The contemporary-looking Pavilion XT846 is designed with convenience in mind. A covered tray on top of the case can accommodate three frequently used CDs or recovery disks, and handy serial and USB ports are on the front. The case's back holds additional serial and USB ports, game and parallel ports, and color-coded connections for monitor, speakers, and more.

Though the 0.28-dot-pitch Pavilion MX70 monitor provides a decent viewing area and has easy-to-use function buttons, its text was fuzzy even at a resolution of 1024 by 768. The Polk speakers provided no depth of sound and lacked volume, bass, and treble controls.

Under the Pavilion's hood lie a network adapter and modem, a CD-ROM drive, and a 4X/4X/24X CD-RW drive. The motherboard's 810E2 chip set provides integrated graphics, but you also get an open AGP slot that lets you upgrade to a graphics board.

The Pavilion XT846's competitive price includes a good mix of features—from CD writing to networking—for users who want a multimedia-ready PC. But if it's speed you need, focus on similarly priced Duron, Athlon-800, or PIII systems, which deliver better performance for the price.

—*Kalai Murugesan*

Pavilion XT846

PRO: Great price covers CD-RW drive and network card.
CON: Lackluster performance.
VALUE: Good starter PC for a student or an undemanding home user.
Street price: $999
Hewlett-Packard
800/752-0900
www.hp-at-home.com

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

CONTENTS

Mobility Inspires Dell's Inspiron 2100

NOTEBOOK

SHEDDING WEIGHT and inches is a national obsession, and notebook PC users are not immune to its appeal. Who wouldn't love to get the power of a 2-inch-thick, 7-pound laptop cinder block in a portable with half the weight and volume? Dell's new **Inspiron 2100** notebook seems designed to grant your wish.

The Inspiron 2100's svelte 1-inch profile and 3.5-pound weight belie the power packed inside the rugged magnesium alloy case. The $1899 base unit sports a 700-MHz Pentium III processor; a 5GB hard drive; 64MB of RAM; a 12.1-inch, 1024 by 768 active-matrix screen; an ATI Rage Mobility graphics card with 4MB of SGRAM; a 56-kbps V.90 modem; a 10/100 ethernet port; and your choice of either Windows Millennium or 2000. In addition, you get a Type II PC Card; USB, monitor, parallel, and PS/2 ports to accompany an external drive bay; and a built-in microphone. On the other hand, a CD-ROM drive will cost you an extra $99.

The fancier $2223 shipping unit I tested was spruced up with Windows Me, a nearly 10GB hard drive, 128MB of SDRAM, and an optional convertible external drive bay that held Dell's $199 DVD-ROM drive. I found typing quite comfortable on the 95-percent-of-standard-size keyboard, and Dell's Synaptics Touchpad was remarkably responsive.

The unit's battery life of 2.5 hours is about average for a notebook today. The 2100's performance was respectable, too: Its PC WorldBench 2000 score of 127 is in line with the marks recorded by other notebooks with its configuration.

The Dell Inspiron 2100 may be just right for users who seek a laptop that can fit any carrying case as well as handle a much larger PC's workload.
—*Michael S. Lasky*

SMALL SIZE, BIG POWER from Dell's Inspiron 2100 laptop.

Inspiron 2100
PRO: Lightweight notebook offers the power of a big portable.
CON: Base price quickly disappears when you add needed options.
VALUE: If you want power in a small package, look no further.
List price: $2223
Dell
800/388-8542
www.dell.com

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

Bring MP3s to Your Stereo With Ease

HOME MP3 PLAYER

YOUR STEREO can become the best MP3 player you've ever heard, thanks to Voyetra Turtle Beach's $300 **AudioTron** digital music player. Unlike more-expensive stand-alone MP3 stereo components, the AudioTron uses your PC as a music server, connecting via an ethernet or HomePNA 2 network (HPNA lets network data use phone lines). Your music files reside on the PC's hard drive, and they stream to the AudioTron when you select them via the device's built-in LCD display.

Tinker with a network, and you risk trouble. In setting up my shipping unit, I found a compatibility problem with the router I use for DSL bandwidth sharing on my ethernet network. Voyetra tech support eventually found that the conflict involved the router's firmware; an upgrade from that vendor's Web site resolved it.

Once set up, the AudioTron sounded great. It plays MP3, WMA, or WAV files. Even an MP3 file recorded at a skimpy 96 kbps—which sounded garbled when played on my PC—came out defect-free via the AudioTron. At 320 kbps, the sound approaches CD quality.

The AudioTron's easy-to-read, backlit LCD lists artist, song, album, and time during playback. When not playing music, you can use the included remote control to browse your library over the LCD by song title, artist, album, genre, or playlist (assuming you've created these on your PC).
—*Michael Gowan* ▶

AudioTron
PRO: Great sound quality, easy access to music library, affordable.
CON: Network setup can be trouble.
VALUE: Worth possible headaches.
List price: $300
Voyetra Turtle Beach
800/233-9377
www.voyetra-turtle-beach.com

Agile Add-ons Enhance Palm Versatility

SIMPLICITY OF design and ease of use make Palms and Palm OS–based Handspring Visors today's most popular PDAs. But Palm and Handspring don't include all the product features we'd like. They've left that to enterprising third-party vendors. So I checked out shipping units of three useful Palm accessories: Northstar Mobile's **MemorySafe** data backup and restore unit, Belkin's sensible **USB PDA Adapter**, and IBiz Technology's why-didn't-Palm-think-of-that **Folding Travel Cradle**.

Though the Palm OS will

back up your handheld's data and applications whenever you sync it with your PC, what if your Palm device crashes or you accidentally delete a file when you're not near your PC and you can't perform a restore? In the past, you were toast. But with the $70 MemorySafe for the Palm V—a tiny 8MB flash memory module that plugs into the PDA's HotSync port—you can back up all or just selected files. Northstar Mobile has modules available for other Palm models, too; 2MB versions are $50.

I found MemorySafe a cinch to set up and use. One hitch: If you need to perform a full restore, you must first load the

MEMORYSAFE backup device.

MemorySafe application onto your Palm. The company suggests beaming it from another Palm device, but realistically you will have to transfer it via HotSync from a PC.

Palms have connected to PCs via serial port since the first PalmPilot. But many new laptops come with USB, not serial ports; and while Handspring Visors sync via USB, Palms still do not. Belkin's solution is the $48 USB PDA Adapter. The 1.8-ounce cable is a bit expensive, but its no-hassle PC-to-Palm connection makes it worthwhile. Compatible with virtually all serial-connected Palm OS devices, this adapter includes built-in status LEDs to check

on data transfer activity, and it's also somewhat faster.

Both Palm and Handspring design their mobile devices as if they weren't mobile. To wit: Their HotSync cradles do not pack easily. But IBiz Technology's Folding Travel Cradle folds completely flat, and it can be set up in five different positions, like the back of a deck chair. Cradles for Palm devices cost $30; a Handspring model, with a combination USB/serial cable and five color face plates, is $35.

—Michael S. Lasky

IBIZ FOLDING PDA syncing cradle.

Folding Travel Cradle
PRO: Folds flat for easy packing.
CON: None.
VALUE: A must-have for travelers.
List price: Palm models $30; Handspring model $35
IBiz Technology
800/234-0707
www.ibizcorp.com

MemorySafe
PRO: Protects you against data loss due to PDA crashes.
CON: For full restore, you must load the app onto your Palm with a PC.
VALUE: Worth it if you sync infrequently and your PDA info is valuable.
List price: 8MB $70; 2MB $50
Northstar Mobile
408/845-9200
www.northstarmobile.com

USB PDA Adapter
PRO: Lets you sync your Palm to a USB notebook.
CON: A bit expensive.
VALUE: Essential for syncing to a notebook that lacks a serial port.
List price: $48
Belkin
800/223-5546
www.belkin.com

Watch Personal TV on Your Pocket PC

WATCHING TV on your PDA may sound far-fetched, but you can do it with **PocketPVS**, a new program included with the latest version of SnapStream PVS (Personal Video Station) software. When used on a PC equipped with a TV tuner card and hooked up to cable, broadcast, or satellite TV input, SnapStream PVS lets you record TV shows to your PC and play them back when you wish. PocketPVS allows you to watch the shows on a Pocket PC (but not on a Palm). I looked at a beta version included with the $50 SnapStream PVS.

The system is fairly straightforward: You record shows onto your PC and select the ones to transfer to the Pocket PC; then the software converts the video into a Pocket PC–ready format. In my informal tests using a PC with a 500-MHz CPU, conversion time roughly matched the recorded video's length. When I synced the Pocket PC, the PocketPVS software transferred the video files to the PDA. To view, just select the show you want.

Though not DVD quality, the video was definitely watchable on the small, 240-by-320 screen of a PocketPC. The only problems were a rather

low frame rate and occasionally jerky video playback (the audio sounded fine).

Because a half-hour clip requires about 30MB of storage, springing for extra storage for your PDA might be worth it.

—Richard Baguley ▶

PocketPVS
PRO: Easy to set up and use.
CON: PDA video is a bit jerky; for Pocket PCs only.
VALUE: Good for commuters who would rather watch video than read.
List price: Beta is included with $50 SnapStream PVS
SnapStream Media
713/644-6240
www.snapstream.com

Two Ways to View and Record TV on Your PC

PC - TV

IF YOU'RE A TV junkie looking to control your daily dose, ATI Technologies and Asus Computer International offer computer geeks two alternatives to the popular TiVo personal digital recorder and service. Both ATI's $100 **TV Wonder USB Edition**—a 125-channel external tuner that plugs into a PC's USB port—and Asus's $189 **AGP-V7100 Deluxe Combo** graphics card let you view and record television programs on your PC. I tested shipping models of each.

Both products accept input from cable or antennas and have inputs for a VCR, Super VHS, and audio. The ATI TV Wonder USB plugs into your PC's USB port; you need not open the lid. In contrast, you have to go inside your PC's case to install Asus's V7100, a combination graphics and TV tuner card that replaces your regular graphics card.

The ATI's easy installation comes with significant trade-offs. Because USB transfers data more slowly than an AGP bus (which the Asus, for its part, does use), the ATI can't

handle data-intensive TV time-shifting, the feature that lets you pause live TV.

In addition, it can't record video at resolutions above 352 by 240. In my informal tests,

RECORD AND PAUSE TV with Asus's V7100.

when I ran multiple programs concurrently, the ATI's TV sound and video sometimes got slightly out of sync.

PROGRAM GUIDE

YOU CAN USE ATI's searchable interactive TV program, Guide Plus+, to schedule and record shows for later playback. To do so, download seven days' worth of television programming schedules from ATI's partner Gemstar; you can search program listings by actor, genre, or show.

Once you locate the program you want to see, click the *Record* button and make sure

your PC is on when the show airs. Unfortunately, accessing the guide was a struggle: ATI's software had the wrong URL embedded in my copy, and as a result I had to call tech support to get help with reconfiguring the software.

One ATI feature that I liked, called TV Bar, combines Microsoft's Internet Explorer browser with the ATI video feed. Activate TV Bar, and a mini-TV screen appears embedded in the upper-left corner of the browser window, allowing simultaneous Web and channel surfing.
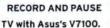
Asus's AGP-V7100 Deluxe Combo comes with personal video recorder software for rewinding, pausing, and run-

ATI'S TV WONDER USB tuner is very easy to install.

ning almost-live TV in slow motion, which gives you full time-shifting capability. Although this software is far less robust and polished than TiVo's, it provides the same basic functionality, and it permits you to record video at a resolution of 740 by 480.

To handle your PC's video needs, the AGP-V7100 uses NVidia's GeForce2 MX graphics chip set with 32MB of onboard memory. But while this low-cost graphics chip set takes adequate care of your comput-

er's graphics needs, it really can't compete with high-end graphics boards.

To install it, your PC must have an AGP slot. Besides offering TV support, the card can handle another VGA monitor or television; and the included SmartVR 3D glasses add 3D effects to some video games. You also get utility software, including Ulead's VideoStudio 4 for video editing.

A FEW GLITCHES

THE PACKAGE is a veritable Swiss Army knife of PC entertainment options, but too many of the blades are dull: The 3D glasses didn't work, the video editor is fairly rudimentary, and the time-shifting feature occasionally froze the program, forcing me to crash the software.

Asus should have shortened the features list and ironed out the kinks in the software it included.

Initially I was excited by the prospect of having swanky video options on my desktop, but ultimately I was disappointed with both these products. Still, boob-tube tubers interested in digital video recording without investing in TiVo ($300 or more for the hardware and $10 per month subscription fee) might want to give one of these PC-based approaches a try.

—Tom Spring ▶

TV Wonder USB Edition

PRO: Hassle-free installation; the price is right.

CON: Lack of features proves less isn't always more.

VALUE: Good enough for beginners who want to put TV on their PC.

List price: $100

ATI Technologies

905/882-2600

www.ati.com

AGP-V7100 Deluxe Combo

PRO: Graphics card enables time-shifting digital video recording.

CON: Clunky, funky features.

VALUE: Okay for budget-minded videophiles who don't mind some rough edges.

List price: $189

Asus Computer International

510/739-3777

www.asus.com

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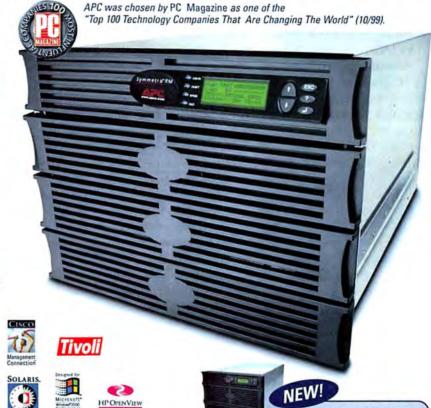
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APC was named to the 2000 InformationWeek 500 ranking of the top IT innovators (09/11/00).

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Easily Move Videos From Camcorder to CD

I DON'T WANT to be Fellini. I just want to transfer aging VHS tapes of classic horse races to a more stable medium. Creative Labs seems to have read my thoughts in designing its USB-based **Video Blaster MovieMaker** video converter.

Connecting the device to your video source—camcorder, VCR, or whatever—and to your PC is easier than plugging a VCR into a cable TV

converter box because you don't have to bother with any coaxial cable. Simply run the three color-coded RCA cables (left audio, right audio, and video) from the source's output to the front of the Movie-Maker, and then run the USB cable from the back of the Video Blaster to your PC's USB port. I loaded the device's drivers without a hitch, and within minutes, I was watching Sunday Silence outduel Easy Goer—again—in the stretch of the 1989 Kentucky Derby, this time on my PC. The converter box has S-Video and microphone ports, too.

Once you've converted your analog video to digital format, software bundled with the $200 MovieMaker lets you edit your videos, add sound and titles, and introduce basic transitions and other effects. In my tests with a shipping unit, the Video Blaster Control

software let me readily adjust brightness, contrast, saturation, and sharpness (though I wish it had provided numerics with its controls for more precise adjustment). You also can limit the unit's recording time; select among Video CD, MPEG-1, or MPEG-2 as your output file format; and choose from four video quality settings (from 500 kbps to 2 mbps) and two audio quality settings (192 kbps or 224 kbps). I liked the control software enough to bypass the included Ulead Video-Studio 4 software and use that disk space for MPEG files.

When I was ready to trans-

fer my assembled videos from hard drive to CD, I had no problem using the shipping MovieMaker's single-click CD-burn feature.

Digital video requires lots of memory and processing power. Creative Labs recommends a system with a Pentium II-300 or better CPU, 64MB of RAM, and 2GB of free hard disk space. A PC equipped with a PIII processor, 128MB of RAM, and a graphics board made since 1999 would probably work better. But if you have the horsepower and the megabytes, the Video Blaster MovieMaker could help you smoothly convert from yesterday's medium to today's.

—*Dennis O'Reilly*

SHARK FIN: Creative Labs' Video Blaster MovieMaker.

Video Blaster MovieMaker

PRO: Video conversion as easy as U-S-B; nice design; inexpensive.
CON: Stringent hardware and memory requirements, limited ability to change settings.
VALUE: Worthwhile for amateur videophiles with the processing power and memory to spare.
List price: $200
Creative Labs
800/998-5227
www.creative.com

Info Select 6: Power Organizer on Steroids

THERE'S NO other way to say it: Micro Logic's **Info Select 6** is amazing. This software allows you to collect many different kinds of information on your PC in one organized, searchable space. Version 6 adds many new functions while simplifying the learning curve for newcomers. The shipping version I looked at did retain some rough edges—irksome at a list price of $150 (upgrade, $100), but not fatal.

You choose what to organize: text documents with ad-

vanced formatting and group editing; simple databases (ideal for contact lists); calendars, appointment lists, and Web addresses. You can feed Info Select just about anything.

This version does have a few blemishes. You can color-code the calendar entries on your screen, but they won't print in color. And you can undo a single-item deletion, but not a multiple-item one. Finally, there's no printed documentation, and the onscreen help isn't entirely current.

The software's look is remi-

niscent of Windows Explorer: To the left is the Selector, a tree of all items in your Info Select file. A right-hand pane displays the contents of the Selector's current item. Any item can be marked "To-Do" or given a Tickler that triggers an alarm on a given date. For instance, attach a Tickler to a project proposal to remind you when to submit it. If you plan to do that via e-mail, Info Select can handle that, too: Version 6 adds POP3 Internet e-mail support, so your Inbox becomes a Selector branch.

You can arrange and categorize items in several ways, keeping everything accessible with minimal clicks. A great search function is always available. Too overwhelming? New Skill Level settings let you hide advanced features.

—*Matthew Newton* ▶

Info Select 6

PRO: Unique information manager.
CON: Its everything-in-one-place approach can overwhelm.
VALUE: A knockout product, marred by high price, minor rough spots.
List price: $150, upgrade $100
Micro Logic
201/342-6518
www.miclog.com

CD and MP3: A Match Made in Music Heaven

MUSIC PLAYERS

NEVER MIND those pricey, pocket-size MP3 players with limited storage: Give me a portable CD player that can handle 10 hours of MP3 music (about 150 files) burned to a single CD. In addition to providing dual-mode (CD/MP3) playback, these players run $50 to $180 cheaper than their all-digital MP3 counterparts.

I tested the newest such players from TDK, Pine Technology USA, and D-Link with a CD holding 134 MP3s of varying bit rates (96 kbps to 360 kbps). Many of the songs' ID3 tags—which contain artist, track, and album information—were incomplete or improperly formatted.

Fortunately, TDK's preproduction, $180 **Mojo** was not bothered by this. The black, sleekly contoured Mojo had no difficulty reading the associated (and often unorganized) ID3 information on my music CD. Plus, TDK throws in a PC utility that lets you reorganize your music's ID3 tags before you select which MP3s to burn to CD via the included Music-Match 6 software and your PC's CD-RW drive. The utility

flags each music file so the Mojo can browse through a CD by track, album, artist, or genre. Although the device made it a snap to create playlists of song subsets, I could not put the songs in a specific playback order.

The TDK's large, easy-to-read backlit LCD screen is packed with icons and text information, including the track title and artist, equalizer presets, battery life, and repeat modes. Menus are generally well-organized and simple to navigate, and the button controls are conveniently placed.

Thanks to an anti-skip 8-minute buffer for MP3 files, no matter how roughly I jostled the unit, the music never

missed a beat—either with an audio CD or an MP3 CD.

Also handsomely designed is Pine's **D'music MP3 CD Player SM-200C+**, with sound quality

MUSIC PLAYERS from D-Link, right, and Pine Technology USA.

that's on a par with the Mojo's. This silvery $229 shipping unit features a handy, rocker-style button for playback controls. Though the D'music's LCD is significantly smaller than the TDK's, it provides most of the pertinent information you'll need (track time, track number, battery life, playback mode, and a single scrolling line that provides the track title). As I soon learned, however, if your MP3 files are improperly formatted, the player won't display track title and

artist information. You can't create playlists, but you can scan ahead to a point within a track (TDK expects this scan feature to be available in the shipping version of the Mojo, too). Pine's model has 50 seconds of electronic shock protection (ESP), which proved adequate for weathering most jolts it suffered while using either standard audio CDs or CDs with MP3 files. Like the Mojo, the D'music has several equalizer presets. Although neither player offers a significant sound boost through its presets, the D'music's settings were slightly more effective than those on my preproduction TDK unit.

If your budget is tight and you're willing to make compromises, D-Link's bare-bones, blue-and-silver **DMP-CD100** may be for you. My shipping copy of this $120 player lacked a detailed track information display, but it did provide a short-cut button to simplify skipping to higher-numbered tracks.

One attractive feature of the DMP-CD100 is its programming mode, which lets you establish an ordered playlist. There are no equalizer presets, but a bass boost switch does its job nicely. Still, the sound isn't as good as on the other two players, and 10 seconds of ESP did little to prevent skipping.

Overall, the TDK Mojo is the best-designed, best-sounding player in this group, with the Pine SM-200C+ finishing a close second. But any of these three units will support hours of enjoyable music playback.

—Melissa J. Perenson ▶

DMP-CD100

PRO: Low cost; programming mode.
CON: Display lacks track information; inadequate shock protection.
VALUE: Entry-level player at insignificant price premium over a standard portable audio CD player.
List price: $120
D-Link
800/326-1688
www.dlink.com

D'music MP3 CD Player SM-200C+

PRO: Excellent player controls.
CON: Does not have a programming or playlist mode.
VALUE: Good choice if playlists aren't a priority.
List price: $229
Pine Technology USA
626/912-9100
www.pineusa.com

Mojo

PRO: Full track and artist info; easy track search and playlist generation.
CON: Can't specify a particular song order within a playlist.
VALUE: Best design and playback options available today.
List price: $180
TDK
800/835-8273
www.tdk.com

Hide Your PC From Prying Internet Eyes

FIREWALLS

IF FEAR of an imminent hack makes you paranoid, you may want to consider two new firewall options for your PC or network. In informal tests, **Sphinx PC Firewall**, an application from Biodata Information Technology, and SonicWall's **Tele2 Internet Security Appliance** firewall hardware, blocked probes and intrusions, but used very different approaches to accomplish the task.

Like all other software firewalls, Sphinx needs to be installed on each computer you want to protect. Configuring Sphinx on every Windows-based PC on a large network would be a chore, but Sphinx can protect PCs that use analog modems as well as LANs.

The $49 shipping copy of Sphinx that I examined could use some polish, especially on the interface. It's easy to set

the firewall to allow some common applications—such as e-mail clients—to connect to the outside world. But if you use an application the menus don't list (like Napster), you're on your own. With no contextual help, or even a user FAQ

THE TELE2 INTERNET Security Appliance from SonicWall.

on the Sphinx Web site, you may spend a fairly long time trying to figure out how to tweak Sphinx's advanced settings, which define the ports applications can or can't use.

By contrast, a single $595 Tele2 can protect up to five computers—regardless of the operating systems they use—and it offers optional virus protection as well as filters that you can set to block offensive Web sites.

However, the Tele2—a box that accepts a standard 10-Base-T ethernet plug on one end and connects to a PC's ethernet port on the other—can't protect a computer that dials out to the Internet using a common internal 56-kbps analog modem.

You configure the Tele2 via a familiar Web-style interface. Unlike Sphinx, the Tele2 requires you to enter your Windows networking information into the firewall's internal interface and then change

your PC's settings to ones that work with the firewall box. Fortunately, a quick setup guide takes the pain out of this potentially tough process.

The setup menus on the shipping Tele2 I looked at accommodate more applications than the Sphinx software does, so you can enable the firewall to permit games, Napster, and other varieties of programs more easily. The Tele2 has a dynamic addressing server, so you can also use it to share a single broadband connection among several computers, but you'll still need a hub to connect the device to more than one PC on your LAN.

If you don't mind delving into the technical details of a powerful (but poorly documented) software firewall, Sphinx offers a lower-cost alternative to Symantec's popular and user-friendly (but not highly configurable) Norton Personal Firewall. If you need to protect more than a couple of networked PCs, or you want something that can protect all

SPHINX'S MAIN panel shows the firewall blocking Internet traffic.

Sphinx PC Firewall

PRO: Inexpensive, highly configurable, powerful firewall protection for individual PCs.

CON: Advanced settings require advanced understanding of networking principles.

VALUE: Best for users who are experts or use the Web sparingly.

List price: $49, $42 for the downloadable version.

Biodata Information Technology
510/647-0540
www.sphinxwall.com

A Sound Supreme

LOOKING FOR good PC audio? A new $299 speaker set from Sonigistix, the **Monsoon MM-2000**, delivers a veritable storm of desktop sound. This five-speaker, four-channel, surround-sound system cranks 100 watts of power through the subwoofer and 60 watts each through the four satellites. Your ears should appreciate every watt.

Despite awesome audio output, the 4-by-8-inch satellites are slender—barely half an inch thick—because Sonigstix generates sound by using a thin polymer sheet suspended between two magnetic bars, instead of the traditional paper cone. In my informal tests, sound from both games and MP3 files was crisp, even at maximum volume.

The system's setup was very quick and easy, including the separate control module that connects in-line between the subwoofer and your PC's sound card. Sonigistix, 877/722-8346, www.monsoonaudio.com.

—Joel Strauch

your computers, no matter which operating system they use, then the SonicWall Tele2 makes a great (albeit somewhat pricey) choice.

—Andrew Brandt ▶

Tele2 Internet Security Appliance

PRO: Easy to use with networked applications, works with any PC operating system.

CON: Correcting network settings can take time; doesn't work with analog modems; expensive.

VALUE: Relatively easy to set up for a small broadband LAN.

List price: $595

SonicWall
408/752-7819
www.sonicwall.com

Adobe Premiere 6 Video Editor

GRAPHICS

A GREAT LEAP forward for a well-regarded and popular video-editing product, **Adobe Premiere 6** offers vastly improved editing tools, techniques, and Web integration. Its solid features will satisfy pros, while its intuitive ease-of-use could attract serious beginners.

At $549, version 6 isn't cheap, but it has plenty to offer, including true plug-and-play capability and simple, precise controls for capturing digital and analog video. In tests of a beta version, moving from video capture to finished product took only a few minutes with the new storyboard approach. You drag and drop video clips to the storyboard window, rearrange them if you like, trim individual clips, and then click to transform your project into a timeline for additional fine-tuning.

Premiere will convert your finished project to play on a Web site as streaming video or as a download optimized for common bandwidth speeds. Version 6 supports all popular and professional video formats, as well as MP3 audio. An audio mixer, which version 5.1 lacked, lets users manually change volume and balance during editing while Premiere captures their actions.

A full palette of special effects and scene transitions is

EASILY DRAG AND DROP video clips into a storyboard window with Adobe Premiere 6.

available in one window; apply them to a scene by dragging and dropping. Experimenting is encouraged, and mistakes are easy to repair: A new history tab can track up to 99 changes and lets you go back as many steps as you need.

Another improvement: If you have a fast processor—700 MHz or higher—you can see all of your edits, special effects, and audio fixes play back in real time or while you drag your cursor through your project. Slower processors may incur minor delays during more complex transitions.

For most current Premiere users, the new features make the upgrade well worth its $149 cost (users of competing products can switch for $299).

—*Jeff Sengstack* ▶

Adobe Premiere 6

PRO: Full-featured video editor.
CON: It's just too expensive for simple editing projects.
VALUE: Software with complete digital-video-to-Web capability.
Street price: $549, upgrade $149, competitive upgrade $299
Adobe Systems
800/685-3504
www.adobe.com/premiere

A Spare Gas Can for Cell Phones

BATTERY RECHARGER

IF YOU DESPERATELY need to call someone, a dead cell phone battery isn't just inconvenient: It can leave you feeling shipwrecked. You can buy a second battery, but the typical rechargeable battery is relatively expensive and slowly loses its charge while stored.

One affordable solution: the tiny, $30 **Instant Power Charger** from Electric Fuel. About half the size of a cassette tape box, this 3.6-ounce cartridge connects to your cell phone's power plug and delivers instant energy. A start-up kit contains an Instant Power Cartridge and a connection cable for your specific model of cell phone. Kits for Motorola and Nokia models are now available. Electric Fuel also plans to offer units for other models.

As soon as you plug the Instant Power Charger in, you can make calls while your cell phone's dead battery begins recharging. I connected a shipping copy to my Nokia 5160i, and it worked as advertised, recharging my phone in just 2 hours. And again as advertised, it fully recharged my phone three times before running out of juice.

Unlike other rechargers, Electric Fuel's battery uses zinc-oxygen technology. As a result, it produces no power until you take it out of its airtight bag and expose it to the atmosphere. Between uses, store it in the bag to shut down its power-generating process. The company says that the battery will retain its charging power for up to two years while sitting in the unopened bag, if temperature extremes are avoided, and for at least six months after being opened, then resealed; obviously, though, I could not test these claims.

ELECTRIC FUEL'S kit delivers instant energy to cell phones.

The cartridges that generate the Power Charger's juice are not rechargeable; you should dispose of them properly when they're exhausted. Replacement cartridges cost $15 each. The company also offers a disposable, $17, long-life, nonrechargeable fuel cell that replaces a cell phone's battery.
—*Tracey Capen* ■

Instant Power Charger
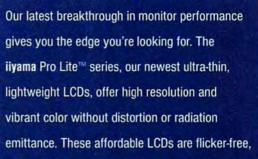
PRO: Small and lightweight, provides instant cell phone power.
CON: Not rechargeable, must be properly disposed of when dead.
VALUE: Cheap enough to keep several stashed for emergencies.
List price: kit $30, replacement cartridge $15
Electric Fuel
888/996-4440
www.electric-fuel.com

Ultimate PC Troubleshooting Guide

STEVE

KIRK

Our experts offer 36 tips to help you fix common hardware, software, and Web snafus that can bring your work to a stop.

BY STEVE BASS AND KIRK STEERS

HERE'S THE PAINFUL TRUTH: Your computer has more mysterious disorders than a season's worth of *ER* episodes—agonizing error messages, sickening slowdowns, and even the tragic blue screen of death. To cure these techno-maladies, you need expert attention. You need us.

Meet your team of seasoned PC health care professionals: Kirk Steers, hardware specialist and author of *PC World's Hardware Tips* department, and Steve Bass, software maven and *Home Office* columnist. We get tons of letters and e-mail messages from readers with PC problems, so we put our heads together to provide you with the most

useful troubleshooting advice—from solving printer problems to speeding up poky Web connections.

Of course, guys as opinionated as Kirk and Steve didn't always see eye to eye. "I see Steve's approach to troubleshooting as fast and furious," says Kirk.

"And I think Kirk is way too quick to crack open a machine's case, when a software fix might do the job," retorts Steve.

But our differences are good news for you: We took the best elements from both of these points of view and compiled a thorough troubleshooting guide that offers solutions for everybody—PC newcomers and grizzled veterans alike. ▶

ILLUSTRATIONS BY MARK MATCHO

Solve Your Hardware Hassles

By Kirk Steers Yes, it's a chore to open up your computer. Most PC problems, though, don't require you to crack open the case—even if your troubles involve a graphics board or a hard drive. You can take care of common hardware problems yourself. I'll guide you through each step.

MONITOR MIGRAINES

TROUBLE: Your monitor flickers like crazy. When you try to increase the refresh rate, it offers only a setting of 60 Hz.

FIX: I feel your pain—a flickering screen gives me terrible headaches. Setting my monitor's refresh rate—that's the number of times per second a PC's graphics subsystem draws a complete image on the screen—to anything less than 75 Hz has me reaching for an ibuprofen. Depending on the limitations of the monitor and graphics card or chip, you may be able to increase your monitor's refresh rate to a more comfortable setting. In Windows 9x, 2000, and Me, right-click the Windows desktop, select *Properties•Settings*, and then click the *Advanced* button. Under the Adapter tab (or, in Windows 2000, the Monitor tab) you'll find a list of available refresh-rate settings. Select the highest setting offered, ideally 75 Hz or above. Sometimes Windows offers 60 Hz as the only option when it can't find the monitor's Plug and Play configuration. (Forcing too high a refresh rate can damage a monitor.) To find the configuration, go to the Monitor tab, check A*utomatically detect Plug & Play monitors*, and reboot. Otherwise, click the *Change* button and reinstall the monitor.

If it turns out that the monitor doesn't support anything higher than 60 Hz, lower the screen resolution and recheck the available refresh rates.

UNRELIABLE USB PORTS

TROUBLE: The USB port on your keyboard is convenient but inconsistent—some connected devices work and some don't.

FIX: What you have is a power shortage. A USB port doesn't just connect the PC to peripherals, it also delivers electricity to power them. Some USB ports, like those on a PC or on the base of a monitor, are self-powered and can easily run USB devices. But ports with no power source of their own, including those on a keyboard, provide less power. Adding an item with limited power requirements, such as a mouse, usually doesn't pose a problem. But power-hungry USB devices, such as speakers and scanners, can cause an overload—or sometimes even shut down the entire USB port. You have two choices: Either connect the power-hungry peripheral to a self-powered port (like one on a computer), or invest in a multiple-port, self-powered hub like the $80 Belkin BusStation (www.belkin.com).

DON'T GET DUMPED

TROUBLE: All of a sudden, you lose your connection to the Internet.

FIX: I *hate* when that happens. That's when I'm tempted to go online, buy a new modem via next-day delivery, and take out my tool kit. But let's not get ahead of ourselves. I'll fix this the Bassian way—through Windows. The modem probably just got inundated with too much data. In Windows 9x, go to *Start•Settings•Control Panel*, and open *Modems*. On the Modem Properties dialog box's General tab, your modem should be highlighted; click *Properties*, and in the *Maximum speed* drop-

down list, select the next lower setting. Although this may slow your modem down, it'll keep it from dropping your Web connection. Next, click the *Connection* tab and take the same approach with the *Port Settings* button. Drag the slider on each of the two bars back a notch and see if that fixes your problem.

In Windows 2000, go to *Phone and Modem Options*, and click the *Modems* tab. Highlight your modem and click *Properties*. The General tab lets you drop the maximum port speed. Clicking the *Change Default Preferences* button under the *Advanced* tab

Maximum speed
115200
☐ Only connect at

brings up a dialog box with a General tab that lets you set your preferred port speed.

In Windows Me, open *Control Panel*, select *Tools•Folder Options*, click the *View* tab, and check *Display all Control Panel options and all folder contents*. There are two drop-down lists, each with the choices *Low*, *Medium*, *High*, and *Maximum*.

POSSESSED PC

TROUBLE: Your PC has a will of its own: The cursor grows and shrinks; letters appear and disappear; and graphics look psychedelic.

FIX: When I see strange screen behavior, I immediately suspect the driver (a small program that works with Windows to control hardware) for my graphics card.

To isolate or eliminate your graphics driver as the culprit (my pal Steve will be happy to know that I'm about to give another software fix), install the Windows VGA graphics driver. Right-click the desktop and choose *Properties•Settings•Advanced•Adapter*. In Windows 95, select *Change* to open the Select Device dialog box, and click *Show all devices*. In the *Manufacturers* list, select the first option, *Standard display types*, and in the *Models* list, select *Standard Display Adapter (VGA)*.
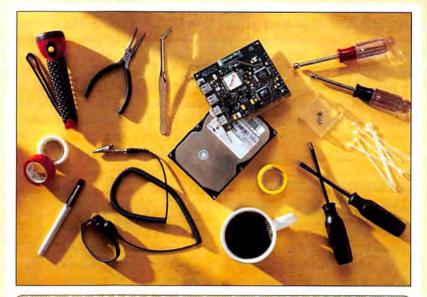
In Windows 98, select *Change* to open the update wizard. Choose *Display a list of* and then select *Show all hardware*. Under Manufacturers, select *Standard display types*, and install the Standard Display Adapter (VGA) driver.

In Windows Me, select *Change* to open the update wizard. Then select *Specify the location of the driver (Advanced)•Next•Display a list of all the drivers in a specific* ▶

Perform PC Surgery

Some PC problems can be solved only by rolling up your sleeves, popping off the PC's cover, and getting your hands on the innards. Does replacing an expansion card or setting motherboard jumpers sound too complicated? It isn't. Simply follow these steps:

1. Find the right workspace. Good light and plenty of room are essential. Working in tight spaces or under your desk will benefit only your chiropractor and your local repair shop.

2. Avoid unexpected charges. Unplug the computer. Even when powered off, some PCs deliver current to the motherboard, which can send a damaging jolt to both you and your PC. Always ground yourself; static charges can destroy your machine. Use a grounding strap or touch an unpainted, metal portion of the chassis before unplugging the PC and handling components.

3. Remove the cover. Some PCs have covers that pop off easily without tools; others require a small Phillips screwdriver or a six-sided torque driver. Place screws (and any other hardware you remove) in a cup or box.

4. Clear the path. If a rat's nest of cables and power cords hinders your access to the interior of the case, remove them. Labeling each cord and connector will save you time during reassembly.

5a. Remove or replace an expansion card—carefully. Start by removing the bracket screw that holds the card in the chassis. Handle the card on its edges only; avoid direct contact with any chips or circuitry. Apply even pressure across the length of the card when inserting or removing it, and make sure you don't bend the motherboard. Try

Tools of the Trade

Before diving in to fix any hardware problems inside your PC, get the proper tools.

BASIC REPAIR TOOL KIT, ABOUT $25
- **13/16- and 1/4-inch nut drivers** for adding or removing a PC's cover, cards, and drives
- **Needle-nose pliers** for setting jumpers
- **Small Phillips and standard screwdrivers** for adding or removing a computer's cover, cards, and drives
- **Tweezers** for retrieving dropped parts and manipulating small components
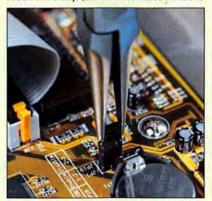
OTHER HANDY TOOLS
- **Antistatic wristband** and **leash** for avoiding unexpected charges; $8
- **Felt-tip marker** and **tape** for marking cables and wires; $5
- **Cup** or **box** to keep parts in one place; $1
- **Plastic ties** for bundling cables; $2
- **Small flashlight** for providing adequate illumination inside the PC; $10

not to make any sharp or jerky movements.

5b. Change a DIP switch or jumper. If you don't have documentation that locates the switch or jumper on the motherboard and describes how to set it, don't guess. A mistake can fry your motherboard. And be gentle; jumper pins can bend easily.

5c. Add or remove a drive. Prepare the drive: Set any jumpers or switches on your hard drive to their proper EIDE or SCSI settings *before* sliding the drive into a hard-to-reach drive bay. (EIDE drives must be set to

either Slave or Master, and SCSI drives must be set to the proper SCSI ID number. Read the drive manual for details.) Sometimes it's helpful to use a small piece of compressed foam or cardboard to line up the drive's screw holes with those in its bay.

6. Check your connections. Just before replacing the machine's cover, recheck all your cables and connections one last time. Power connectors sometimes require a stiff push to seat properly.

—Kirk Steers

location, so you can select the driver you want•Next•Show all hardware. Under *Manufacturers,* choose *Standard Display types,* and install the Standard Display Adapter (VGA) driver.

If that cures the on-screen ills, download the latest version of your graphics card's driver from the vendor's Web site. If you can't find it, call the company's technical support staff.

FOLDER FREAK-OUT

TROUBLE: Some files and folders look like they've been translated into Russian. Worse, one folder seems to have disappeared.

FIX: These trouble signs make my blood run cold, because they're indications of a dying hard drive. First, rescue critical data that hasn't been backed up by copying everything to another hard disk, a CD-RW disc, a Zip disk, or some other storage medium. Then I recommend that you run the Windows ScanDisk utility. Go to *Start•Programs•Accessories•System Tools•ScanDisk* and run the *Thorough* option (which checks the PC for physical damage). If ScanDisk finds a handful of lost or cross-linked clusters, delete them—they're bits and pieces of lost and broken files that can be discarded. The same goes for bad sectors; expect a few

STEP-BY-STEP

Keep Your PC Neat and Tidy

A clean PC is a happy PC. Accumulations of dirt, dust, smoke, and grime can cause all kinds of problems—from a jumpy mouse to a full system crash. Performing the following tasks every six months—or more often if your computer is in an exceptionally dusty or smoky room—should keep your system running smoothly.

1. Get the right tools. Computers need special cleaning supplies. See "PC Cleaning Closet" at right for a list of proper cleaning items. And remember the supreme rule of PC cleaning: Never apply cleaning solution directly to the machine. Always spray cleaning solution on a rag.

2. Clean the case. Clogged air vents lead to overheating, which can slowly kill your PC. Clear all case openings—especially the vent for the power supply fan—of accumulated dust or other obstructions with a lint-free rag or compressed air. When spraying air, try not to blow the dust back into the case.

3. Clean the motherboard. Open your system (follow the guidelines in "Step-by-Step: Perform PC Surgery," page 81). Try to remove dust with a small vacuum cleaner. Otherwise, blow out any dust with compressed air. Make sure you remove dust from the case, not just relocate it. Wipe surfaces with a lint-free rag or swab.

4. Clean the mouse. Cure jumpy cursors with a quick mouse cleaning. Rotate the circular cover on the underside of the mouse and remove the ball. Take a swab or the end of a paper clip and scrape any accumulated grime from each of the guide wheels in the cavity. Rub the mouse ball with a cloth to remove any oil or grime.

5. Clean the keyboard. Blow out dust from between keys with a shot of compressed air. Wipe surfaces with a smooth rag moistened with a diluted computer cleaning solution (both are available at your local computer store).

6. Clean the monitor. Monitors are literally dust magnets. Wipe dust from the screen with a damp, soft rag. If you need to use a cleaning solution to remove stuck-on dirt, make sure your monitor has no

PC Cleaning Closet

Here's a list of cleaning supplies you'll need:
- **Canned air:** A PC janitor's best friend. Goes where wipes and brushes can't reach; $7.
- **Contact cleaning solution:** A special solution for removing dust, grime, and corrosion from the metal contacts on expansion cards; $10.
- **Handheld vacuum cleaner:** A real time-saver in a dusty environment; $35.
- **Lint-free wipes and swabs:** Won't leave unwanted residue as most rags and paper towels do; $9.
- **PC cleaning solution:** A circuit board-safe solution for cleaning the interior of a computer; $7.
- **Small and medium-size brushes:** Wonderful for cleaning those hard-to-reach nooks and crannies; $8.

special coatings that may be damaged by cleaning solvents. Also, remember to remove dust from any vents or openings.

–Kirk Steers

from basic hard disk wear and tear. If bad sectors continue to appear (say, in weekly runs of ScanDisk), the hard disk may be approaching the end of its life and may need to be replaced.

If you can't back up your files—and it looks like more files are disappearing—you'll need to turn off the computer, remove the hard drive, and take it to a data recovery service such as OnTrack EasyRecovery (www.ontrack.com/easyrecovery).

RUNNING ON EMPTY (MEMORY)

TROUBLE: All of a sudden your system is running unusually slowly, crashing, and issuing Low Memory errors.

FIX: My first thought: Invest in a new CPU and/or RAM upgrade. But my esteemed colleague Steve would scoff at the idea of opening up a PC when there may be a less drastic way to fix things. For this problem, I agree.

Windows 98 and Me users should have at least 64MB of memory. If you run multiple applications at once, anything less than 64MB will feel like computing in quicksand. If you already have plenty of RAM, then you have two other options: Beef up your PC's *virtual memory*, and look for a memory leak.

Virtual memory is a special file on the hard disk—often called a swap file—where the PC stores overflowing data that won't fit in RAM. Windows adjusts the size of the swap file as memory needs grow and shrink. But if the hard disk starts to run out of free space, the swap file may not be able to grow to the size it needs, and the machine will run sluggishly as a result. Either delete or remove files to make room on the hard drive. Or move the swap file to a partition or an additional hard disk that has available space. On the Windows 9x or Me desktop, right-click *My Computer*, select *Properties*, go to the *Performance* tab, and choose *Virtual Memory*. To see a list of available partitions and disks, select *Let me specify my own virtual memory settings*. For Windows 2000 users, select *Advanced• Performance Options•Change*.

The other option is to check for a memory leak. Sometimes software—because it's damaged or poorly designed—won't let go of its assigned memory when it's done using it. If you keep opening and closing the application, it gobbles up more memory until the system has no available RAM. Rebooting the machine can temporarily fix the problem by resetting your memory to its normal settings.

Finding the source of the leak is a lot more work. Select *Start•Programs•Accessories•System Tools* and use the System Monitor utility to monitor your PC's memory usage. If it's not there, install it from the Windows CD using *Add/ Remove Programs*. Shrink the utility's window to a manageable size, and select *View•Numeric Charts* and *View•Always on Top*. Then select *Edit•Add Item*. In the *Category* list of the dialog box that appears, select *Memory Manager*. Then hold down **<Ctrl>** and select the following memory statistics in the Item list: *Unused physical memory* (*Free Memory* in Windows 95), *Swapfile in use*, and *Swapfile size*. Watching those stats as you open, use, and close different applications will give you an idea as to which programs are using up a lot of memory. Also keep an eye on the Kernel category's Threads statistic; it should decrease when you close an application.

PRINTER GOES CLUELESS

TROUBLE: Your printer is sending out an 'Error writing to LPT1' message in Windows.

FIX: This is a very common printer error, and there are a few ways to fix it. First, take care of the obvious: Make sure that the printer is online and that it has paper in the tray. Then clear the printer's memory by turning the unit off, waiting a few seconds, and turning it back on. Next, check the printer cable to ensure that it's firmly connected to both the printer and the PC. If the current cable is old, poorly constructed, or too long, signals from your PC may not be reaching your printer. Consider buying a new, IEEE 1284–compliant cable. Priced at about $10, it enables bidirectional communication, so the printer—if capable—can send information to the PC, such as an out-of-paper message.

Before buying a new cable, however, reload the printer driver—in case it's corrupted or outdated. Download the latest driver from the manufacturer's Web site. After you do, select *Start•Settings•Printers* to open the Printers folder, right-click the icon for the printer, and select *Delete*. Then reinstall it by clicking the *Add Printer* icon, which is also in the Printers folder.

If you still can't print, check your PC's parallel port settings. Right-click *My Computer* and select *Properties*. Go to *Device Manager*, then double-click *Ports (COM and LPT)*. Double-click *Printer Port (LPT1)*, select the *Resources* tab, and check the 'Conflicting device list' box for an IRQ (Interrupt Request line) or DMA (direct memory access, a fast link to your computer's RAM) conflict. If another device is using the printer port's IRQ, disable that device or assign it a new IRQ. To disable the device, find it in Device Manager, open its Properties dialog box, select the *General* tab, and check *Disable in this hardware profile*.

To look for a DMA conflict, first check whether your printer port is configured as an ECP port (the latest parallel port technology designed to speed up printing by using a DMA; older settings are *Standard*, *Bi-directional*, and *EPP*). If yours does support ECP, assign your parallel port to an unused DMA—usually done in your PC's CMOS setup program.

If your printer doesn't support ECP, configure the parallel port to a slower, compatible setting: The next-best option is EPP. If your printer doesn't support that either, go with Standard—the slowest, yet most compatible setting. ►

Vanquish Windows Worries

By Steve Bass Everyone suffers through Windows errors, even yours truly. I get cranky, sure, but you don't see me switching to a Mac (yet). I'll show you the errors most people get, how to resolve them, and how to keep from getting them again. So sit down, take a breath, and read on.

TOO-FAST SHUTDOWNS

TROUBLE: When you shut down Windows, the system often hangs, leaving you with a blank screen and a flashing cursor.

FIX: Flashing cursors—sounds like another migraine attack. Thankfully, this isn't. The perpetrator is Microsoft's Fast Shutdown feature. Usually when you shut down your computer, Windows removes device drivers from memory. Windows 98 unceremoniously closes Fast Shutdown device drivers, and the more abrupt shutdown causes many applications to crash.

Disabling Fast Shutdown is easy: Select *Start*•*Run*, type **Msconfig**, and press **<Enter>**. Then select the *Advanced* button. Check

Disable Fast Shutdown. Good news: If you use Windows 95 or 98 SE, you're exempt from this fast shutdown problem.

VIRUS PANIC ATTACK

TROUBLE: Your PC might have a virus—and you're not running an antivirus utility.

FIX: Start panicking. (You'll do it even though there's no need yet; I always do the same.) Once you're calm and you have access to your browser and the Internet, head for HouseCall (housecall.antivirus.com), Trend Micro's free virus scanner utility. After downloading a copy of this small program onto your PC, HouseCall scans your computer's hard drive, finding and removing pesky viruses.

Can't go online? You should have an antivirus utility running at all times. And if you've got one, dig out your virus program's rescue disk or your backup recovery disk. (You *are* backed up, right?)

The best advice? Preventive maintenance (like Kirk's advice in "Keep Your PC Neat and Tidy," page 82): Always scan e-mail attachments and new downloads, back up your data at least weekly, and update your virus program often. For more information on how to protect your system from viruses, go to www.pcworld.com/features/killviruses or www.pcworld.com/heres_how/lockwindows.

GET FILES BACK FROM THE DEAD

TROUBLE: You deleted a file and just realized that you need it for something.

FIX: Now you've done it. You were so sure you didn't want that file that you bypassed the Recycle Bin and permanently erased it by holding down the <Shift> key when you deleted it. Solution? Download a trial version of OnTrack's EasyRecovery (www.ontrack.com/easyrecovery). It resuscitates the first five lost-beyond-the-grave files. You can also buy EasyRecovery for ▶

STEP-BY-STEP

Battle the Enigmatic Blue Screen of Death

It's big, it's blue, and it fills your screen—the infamous Windows General Protection Fault. If you get GPFs often, your PC may have two or more DLLs slugging it out. Have no fear. Grab your gloves and safety goggles, and we'll dig into Windows and see what's causing the trouble.

1. **Uninstall that new program.** If your PC crashes or locks up after you install a new program, uninstall it; your computer may return to normal.

2. **Check the DLLs.** Dynamic link libraries are small programs used—and often shared—by many Windows applications. First look for duplicate DLLs, compare the versions, then get rid of the old ones. Follow these steps.

From the Windows desktop, press <F3>, which brings up the Find: All Files box (or the Search Results box in Windows Me). Make sure *Include subfolders* is checked (*Advanced Options* and *Search Subfolders* in Windows Me) and the 'Look in' field shows *My Computer*, then type *.dll in the 'Named' field. The results window will be jammed with files. Sort them by selecting *View*•*Details* and clicking the *Name* column heading.

Search tip: To ease your search, first look for DLLs that cause the

most trouble, which are usually files that begin with the following letters: BWCC, CO, CTL, MFC, MSV, and OLE. Use the "wild card" trick and add *.dll after each set of those letters. For instance, typing **MFC*.dll** will find all DLLs that start with MFC.

3. **Compare and zap the duplicates.** To do this, right-click each duplicate file, select *Properties*, and click the *Version* tab. Then compare the versions (and I'll bet files with higher version numbers will be in the Windows System folder). Remember: The date isn't important—it's the version number that is critical.

4. **Rename the DLLs.** If you discover a DLL with a lower version number in an application's folder and in the Windows System folder, *don't* delete it. Instead, highlight the file and press <F2> to rename the file extension to .d_l. Doing so keeps the old DLL version from loading and forces the program to look in the System folder for the right DLL. After each DLL renaming ceremony, reboot your PC. If all's well, rename more old DLLs.

Shortcut: Download a copy of DLL Checker (www.vb2java.com), a shareware program that finds and highlights duplicate DLLs; it makes renaming DLLs quick and easy.

—Steve Bass

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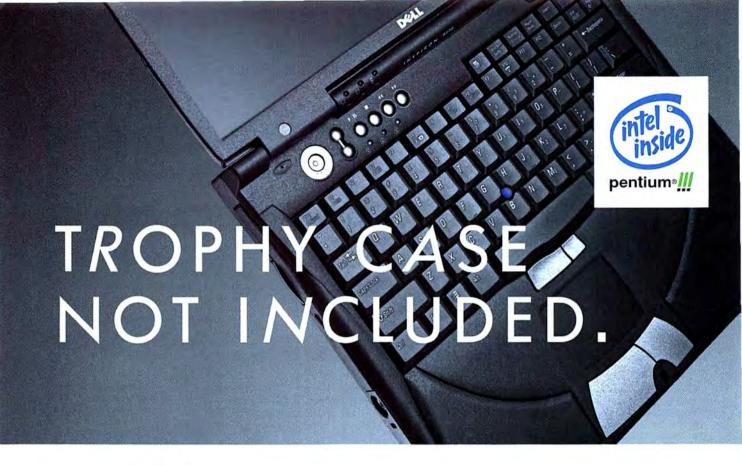
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PC World – "Best Buy/Top 15 Power Notebooks" – December 2000

Hey, it wouldn't fit in the box anyway. We don't like to brag, but it contains quite a number of impressive awards and citations. Need names? How about *PC World's* – "Best Buy/Top 15 Power Notebooks," *Computer Shopper's* – "Best Buy" and *Smart Business's* – "A-List." The only other things you need to know are that they don't hand these things out to just anyone, and that the Dell™ Inspiron™ 8000 has a dual optical drive and is powered by an Intel® Pentium® III processor. By the way, this notebook would look quite nice on the mantle.

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$89, or get Lost & Found from Power-Quest for $70. Both programs bring deleted files back from the dead—even if you've already formatted your drive.

FIX INVALID PAGE FAULTS

TROUBLE: Windows calmly tells you 'Msgsrv32 caused an invalid page fault in module Kernel32.dll'. "What the hell does that mean?" you ask, grabbing a hammer.

FIX: Though it may appear capricious, Windows doesn't flash error messages willy-nilly. Unfortunately, the messages aren't explicit. So you need to note everything—and I mean *everything*, including changes or anything new—on your PC to diagnose the problem. Then visit the Knowledge Base page on Microsoft's Web site (search.support.microsoft.com/kb) and see what it has to say about the error. I learned that the 'Msgsrv32' error might be caused by one of two events, depending on what's happened to your system.

If Windows recently crashed or your PC locked up, it's likely that your password list is corrupt. From the Windows desktop, press **<F3>** and then type ***.pwl** into the 'Named' field and **c:\windows** into 'Look in' field. In the list of found files, delete each file ending in .pwl (there may be more than one). Windows will re-create the files the next time you boot up.

On the other hand, if you're using Windows 95 and just recently installed a Plug & Play device, you may need a more current device driver. My buddy Kirk might suggest removing the device and fiddling with the Device Manager; I'd visit the hardware vendor's Web site, go to its support page, and look for an updated driver.

LOST AND FOUND DEVICE DRIVERS

TROUBLE: When you boot up your system, you get a lengthy error message explaining that Windows can't find a particular device driver, usually ending in .vxd or .386. Windows whines, telling you it *needs* that file but the file no longer exists.

FIX: Keep your fingers crossed, because if there was an interruption when you recently uninstalled a program or the process wasn't completed, this will be a snap. Reinstall the program, then uninstall it again, and reboot. Still getting the error message? If the file name ends with .386, go to *Start• Run*, type **Sysedit**, and

press **<Enter>**. Select *System.ini*, then type the file name. Type a semicolon (;) at the beginning of the line that starts with 'device=', close *Sysedit*, and answer *Yes* when Windows asks to save System.ini.

This is hardware, Kirk's territory, but we have to do it: Reboot your PC and you should be home free.

If that file name ends with .vxd, however, your life just got complicated. You'll need to tinker with the Registry. First back up your PC, which saves a copy of the Registry. Go to *Start• Run*, type *regedit*, and press **<Enter>**. Select *Registry* and then *Export Registry File*, type *regsafe* in the 'File Name' field, and press **<Enter>**.

Next, select *Edit• Find*, and type in the exact name of the file in the 'Find What' field. Click *Find Next*, and when the search stops, delete the highlighted key—the name of the .vxd file. Press **<Enter>** to confirm and **<F3>** to continue searching until the 'Finished searching through the registry' message pops up.

Stomp Out Web Woes

By Steve Bass Have you noticed how many problems you encounter while foraging on the Web? If you're like me, you run into slow connections and browsers that freeze. Dig in. I have plenty of solutions.

DOWNLOAD DILEMMAS

TROUBLE: You find a cool file you want to download. You click the link, but it just plays dumb, displaying itself in your browser instead of downloading.
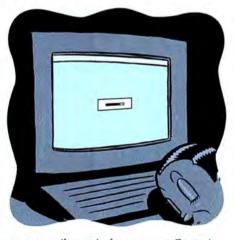
FIX: Don't get riled up, this one's easy: Within Internet Explorer, place your cursor on the download link and right-click. Select *Save Link As* or *Save Target As*. If you're using Netscape, hold down the **<Shift>** key while clicking on the link.

IE STOPS WORKING

TROUBLE: You're Web-surfing along smoothly, and life's good. Then one day, your system locks up. No sweat, you think. You reboot, but IE won't load.

FIX: First thing to do is call Bill Gates and complain. While you're waiting on hold, run ScanDisk: Select *Start• Programs• Accessories• System Tools• ScanDisk*. If you're lucky, this step alone will fix the problem. Even if the program still won't run, it's the first thing you need to do in preparation for the next step.

If you're using IE 5.5 (and I urge you to upgrade, if only for the following feature),

you can easily repair the program. Go to *Start• Settings• Control Panel*, and open *Add/Remove Programs*. Scroll to IE and click *Add/Remove*. Choose *Repair Internet Explorer* and pack up your cares and woes. (Microsoft Office 2000 has the same feature for Word and its other applications.)

WEB SITE NOT FOUND

TROUBLE: You can send and receive e-mail but can't browse the Web.

FIX: Check your fingers if you're seeing typical Web error messages—'400 - ▶

Bad request', '404 - Not Found', or 'File Not found'. Any of those errors means you may have typed the Web address incorrectly. Check the syntax and try again. If that doesn't fix the problem, you'll need to check if another program (or someone else using your PC) fiddled with your browser's proxy settings, which determine the way your computer looks for data on the Internet.

If you use IE, you'll need to go to *Tools• Internet Options* and click *Connections*. Click *LAN settings* and check *Use a proxy*

server. Then click *Advanced* and see if there's a familiar-sounding program listed in the 'HTTP' field. My guess is you may have once experimented with—and subsequently uninstalled—a program that changed your browser's proxy settings.

If you use Netscape Navigator, you must first click *Edit• Preferences*, double-click the category *Advanced*, and select *Proxies*. In the panel on the right, choose *Direct connection to the Internet*. As with IE, check Netscape's *Manual Proxy configuration* for a leftover program.

STEP-BY-STEP

Eradicate Browser Crashes

You're going to laugh, but sometimes even *my* browser crashes. It's an Internet fact of life. Poorly written Java applications are often the culprits, as are imperfectly designed Web pages (and maybe errant sunspots). You can either stop browsing altogether or step through these tips:

1. Cache in the History. Corrupt files in both Internet Explorer and Netscape can lead to errors and subsequent crashes. Deleting the Cache and History files may help. In IE 5, select *Tools•Internet Options*, and in the Temporary Internet Files area, click *Delete Files*. (In older versions of IE, go to the *View* menu to find *Internet Options*.) Next, click *Clear History*. Myself, I keep the History trimmed down to ten days, helping to reduce the chance for corrupt files. It's just as easy in Netscape: Simply go to *Edit• Preferences*, click *Navigator* (*History* in Navigator 6) in the tree on the left, and then select *Clear History* when it appears on the right. Double-click *Advanced*, select *Cache*, and click *Clear Disk Cache*.

2. Inactivate ActiveX. I still get anxious when I see the 'invalid Page Fault in Kernel32.DLL' error. For a while, whenever I exited IE, the message would gleefully pop up. A corrupt ActiveX control was causing the error. In IE, select *Tools•Internet Options* and click the *Settings* and *View*

Objects buttons. Once there, choose *View•Details*. If you see ActiveX items that are listed as 'damaged', right-click each one and remove it. No damaged items? Update each by right-clicking it and selecting *Update* (you'll be prompted to go online).

Netscape users should first close the browser and use Windows Explorer to head for the C:\Program Files\Netscape\Navigator\Program folder. Rename the Plugins folder 'Plug-safe' (highlight the file and press <F2>), and then reload Netscape. If you experience no more crashes, copy one file at a time from Plug-safe into the new Plugins folder Netscape created when you reloaded it. After you add each new file, restart Netscape and watch for crashes, so you can spot—and remove—the culprit.

3. Update Vitriolic Video Drivers. If you're still getting Page Fault Errors and General Protection Faults, there's a chance your video drivers are corrupt or out-of-date. Get fresh drivers from Frank Condron's Web site (www.worldowindows.com); it has driver details with links to vendors.

4. Check the Desktop for DLLs. It's a long shot, but stranger things have happened: Make sure you haven't inadvertently dragged and dropped any DLLs on your desktop. Check by right-clicking each icon, selecting *Properties*, and examining the 'Target' field for the .dll extension.

—Steve Bass

POKY INTERNET CONNECTIONS

TROUBLE: Your Internet connection is slow—small files download as if they're coming from Afghanistan by way of Norway.

FIX: Move to Norway. Just kidding. You'll need to experiment with a couple of things. If you're using a phone line to dial into the Internet, try another access number. While online, check your connection speed by clicking the modem icon in the system tray. No difference? Try another line or call your ISP and complain (switch ISPs if they won't help you).

There's a slight chance that the Windows Registry properties, which control the way your PC connects to the Web, are messed up. The settings—MTU (Maximum Transmission Unit), RWIN (Receive Window size), and others—are obscure (though nerds like me and my cohort Kirk love 'em). Rather than fiddling with the Registry, though, grab a copy of EasyMTU (members.tripod.com/~EasyMTU/easymtu), a freebie available on PC-World.com's Downloads. Once EasyMTU is up and running, click its *Suggested* button, reboot, and see if your connection speed improves or worsens. If it's still slow, load EasyMTU again and click *Default* to restore your old settings.

If you enjoy tweaking, try the $11 High Mountain Software ISpeed (www.hms. com); it has many fine-tuning features for speeding up your Internet connection. Even if you have high-speed Web access such as a cable modem or DSL, you may still run into connection hassles, in which case, give EasyMTU and ISpeed a shot. But you should visit the Registry Tweaks page at www.speedguide.net for advice on the best settings for cable and DSL. Fair warning, however: Fluency in geekspeak is a necessity at that site.

Contributing Editor Steve Bass writes the Home Office *column and is the president of the Pasadena IBM Users Group (www. pibmug.org). You can sign up for his "Tips and Tweaks" newsletter at www. pcworld.com/bass_letter to get more troubleshooting tips. He can be reached at steve_bass@pcworld.com. Contributing Editor Kirk Steers writes the* Hardware Tips *column. E-mail him at kirk_steers@ pcworld.com.* ■

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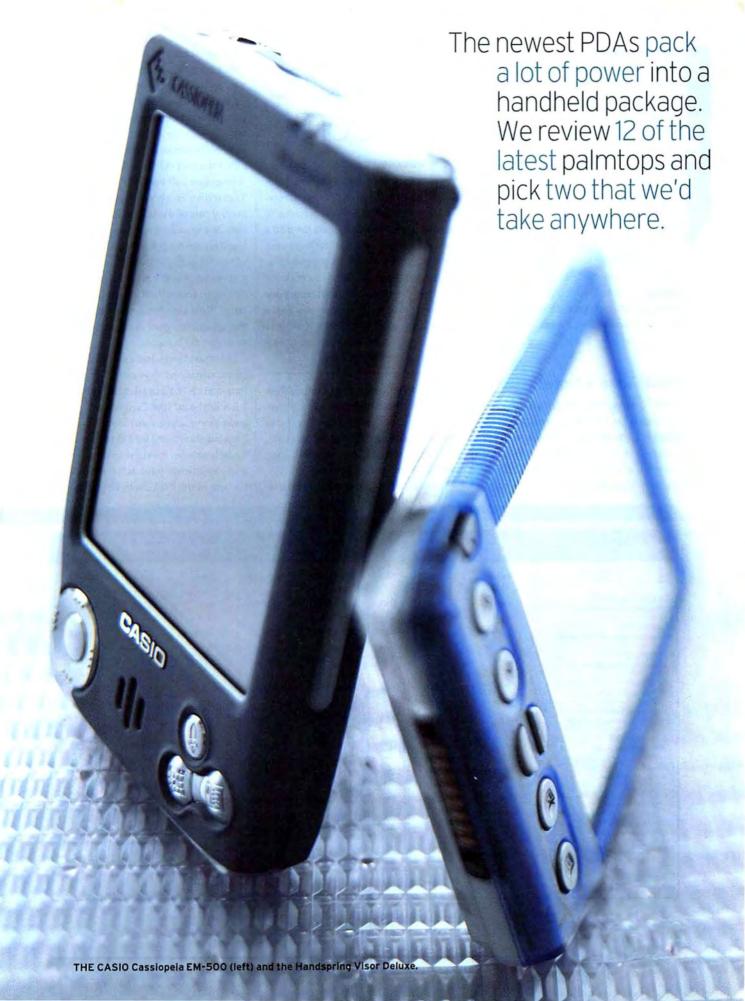
Palm vs. Pocket PC

By Carla Thornton

WORK. LEISURE. Even dating. His electronic organizer has improved just about every area of his life, claims Christopher Pfeiffer, an enthusiastic Compaq IPaq owner. Pfeiffer, director of programming at Ann Arbor, Michigan–based Outrage Entertainment, a PC games company, takes notes on the IPaq at company meetings, catches up on e-mail messages while lying in bed, and plugs in headphones to listen to MP3s at the gym. The IPaq even helped further a personal relationship; after failing to write

down the phone number of a new friend scheduled for wisdom-teeth surgery that day, Pfeiffer found it among the e-mail he had downloaded to the IPaq before leaving his apartment. "She thought it was so sweet that I remembered to call, it led to our first date."

Peter da Silva, a software engineer for ABB Network Management, an industrial and utility control systems provider for

power companies, is just as enamored of his Handspring Visor Deluxe, a PDA based on the Palm operating system—but for more practical reasons: It's a work tool. In addition to taking notes and scheduling his day on his Visor, he uses it with a serial cable to help configure and diagnose problems in networking equipment such as routers and modems. In da Silva's opinion, its OS makes the Palm quicker and more reliable than the newer Pocket PCs. He's tried the IPaq, but its OS was too much like Windows for him. "It hangs for 30 seconds or more for no apparent reason," da Silva complains.

More and more professionals and consumers are relying on PDAs. According to the Gartner Group, sales of handhelds in the United States will increase by 300 percent to about 28 million over the next four years. Not too long ago, the choice was simple: The 5-ounce, monochrome-display Palm III reigned as the de facto stan- ▶

The newest PDAs pack a lot of power into a handheld package. We review 12 of the latest palmtops and pick two that we'd take anywhere.

THE CASIO Cassiopeia EM-500 (left) and the Handspring Visor Deluxe.

dard because it was practically the only option. These days, shopping for a PDA means sifting through lots of choices.

Consider the Pocket PC PDAs that are based on the latest version of Windows CE from Microsoft. About the same size as Palms, but with color screens and Pocket versions of familiar Microsoft applications such as Word and Excel, Pocket PCs make the first good case for Palm fans to switch (see "Pocket PC or Palm: Which Will Win Out?" on page 102 for more on this competition).

Which to buy? We looked at 12 in all, and put each to the test in six areas: note taking, personal information management, e-mail, expense tracking, document handling, and entertainment.

Here's what we found.

PDA, Take a Note

(BEST) Compaq IPaq H3600, Casio Cassiopeia EM-500, HP Jornada 720

(WORST) Diamond Mako, RIM BlackBerry 957

THERE'S A REASON PDAs aren't called personal note-taking assistants: Most are terrible input devices. Poor handwriting

The Choice Is Yours

POCKET PCs ARE improving by leaps and bounds. Excellent multimedia features, a first-rate screen, and the MultiMedia Card slot combine to make the $499 **Casio Cassiopeia EM-500** a great package that earns our Best Buy award, although its 16MB of RAM could be limiting.

At the other end of the price spectrum, our other Best Buy—the $249 **Handspring Visor Deluxe**—boasts 8MB of memory and a Springboard slot. This makes it easy to expand and use with add-ons ranging from digital cameras to MP3 players.

recognition software and cramped keyboards can thwart efforts to add a phone number correctly, much less allow you to take notes during a fast-paced meeting. This latest crop of PDAs, however, gave us a couple of pleasant surprises.

Palmtop devices rely mainly on charac-

ter recognition, and none outperform the new Pocket PCs. Transcriber, an application on the ActiveSync CD-ROM included with the Casio and the IPaq (but not preinstalled on these devices), represents a major advance in handwriting translation. More streamlined and flexible than either the Pocket PC's onboard Character Recognizer software or Palm's Graffiti, Transcriber accepts characters scrawled on any part of the screen in any application. We mixed cursive with letter printing; Transcriber got the words right most of the time, though it did have trouble with some people's scrawly handwriting. Filling in forms with Transcriber was a snap: Write anywhere on the screen, and the application puts the recognized text wherever the cursor is.

Even fast longhand can't keep up in some situations, however. For writing long e-mails or taking detailed minutes, a PDA keyboard like Targus's $99 Stowaway (www.targus.com) is your best bet. This travel keyboard for Palms is as big as a notebook's, yet it weighs only 7.9 ounces and conveniently folds in fourths down to the size of the PDA itself. Using one, we

PERSONAL DIGITAL ASSISTANTS

DEVICE	Operating system	Street price (1/5/01)	Memory	PDA size (height/width/depth, in inches)	Screen resolution	Screen type	Number of colors/shades of gray	Screen size (height/width, in inches)
Casio Cassiopeia EM-500 800/836-8580 www.casio.com	Pocket PC	$499	16MB	5 by 3.3 by 0.7	240 by 320	Color	65,536	3.0 by 2.3
Compaq IPaq H3600 800/888-9909 www.compaq.com	Pocket PC	$499	32MB	5.1 by 3.3 by 0.6	240 by 320	Color	4096	3.0 by 2.2
Diamond Mako 800/468-5846 www.diamondmako.com	EPOC	$340	16MB	3.1 by 6.2 by 0.7	480 by 160	Monochrome	16	1.5 by 4.5
Handspring Visor 888/565-9393 www.handspring.com	Palm OS	$179	2MB	4.8 by 3.0 by 0.7	160 by 160	Monochrome	4	2.2 by 2.2
Handspring Visor Deluxe 888/565-9393 www.handspring.com	Palm OS	$249	8MB	4.8 by 3.0 by 0.7	160 by 160	Monochrome	4	2.2 by 2.2
Handspring Visor Prism 888/565-9393 www.handspring.com	Palm OS	$449	8MB	4.8 by 3.0 by 0.8	160 by 160	Color	65,536	2.2 by 2.2
HP Jornada 720 888/999-4747 www.hp.com	Windows for Handheld PC 2000	$899	32MB	7.4 by 3.7 by 1.3	640 by 240	Color	65,536	2.1 by 5.9
Palm m100 800/881-7256 www.palm.com	Palm OS	$149	2MB	4.7 by 3.1 by 0.7	160 by 160	Monochrome	16	1.8 by 1.8
Palm VII 800/881-7256 www.palm.com	Palm OS	$339	2MB	5.2 by 3.2 by 0.7	160 by 160	Monochrome	16	2.2 by 2.2
Palm Vx 800/881-7256 www.palm.com	Palm OS	$399	8MB	4.5 by 3.1 by 0.4	160 by 160	Monochrome	16	2.1 by 2.1
RIM BlackBerry 957 877/255-2377 www.blackberry.net	BlackBerry	$499	512KB	4.6 by 3.1 by 0.7	160 by 160	Monochrome	16	2.1 by 2.1
Sony CLIE 877/413-7669 www.sony.com	Palm OS	$349	8MB	4.5 by 2.8 by 0.6	160 by 160	Monochrome	16	2.0 by 2.0

Best Buy   ¹ Unless otherwise noted, all PDAs come with a lithium ion battery.   ² Rechargeable battery is removable and can be replaced.

zipped along at 70 words per minute, with every single stroke entered correctly on the attached Palm. The device now is also available for the IPaq.

At the price of extra weight, the 1.1-pound Jornada 720 offers a relatively large built-in keyboard. Once we got used to a few oddly placed keys, we touch-typed at about 40 wpm on the 7-inch-wide keyboard, with few mistakes.

The Mako and BlackBerry, both of which include small keyboards, rank at the bottom of our list for quick note taking. The Mako's 5.5-inch-long keyboard is too small and shallow for all but the most determined hunt-and-peck typists. The BlackBerry's tiny keyboard is only good for typing out a short e-mail reply.

Organize Your Life

(BEST) Casio Cassiopeia EM-500, Compaq IPaq H3600
(WORST) RIM BlackBerry 957

DESPITE ALL THE EXTRA roles PDAs are taking on, information management remains their primary purpose. For this task, Pocket PCs once again pull ▶

Keep Your PDA in Sync

PDAs ARE TECHNOLOGICAL MARVELS that let you carry useful information like contacts, to-do lists, and appointments around in your pocket. But the software that most PDAs provide to synchronize this information with your main PC is limited. If you use a PIM other than Outlook, Palm's HotSync and the Pocket PC's ActiveSync software can't help.

That's where third-party synchronization packages come in. Puma Technology's $70 Intellisync (www.softonline.com) and the $40 CompanionLink Express (www.companionlink.com) expand the number of apps you can sync to your PDA to include programs like Goldmine, Lotus Notes, Lotus Organizer, and Symantec's Act (though CompanionLink can't handle e-mail). Other options are Extended Systems' $60 XtndConnect PC (www.extendedsystems.com), and Web-based services such as FusionOne (www.fusionone.com) and Palm's own MyPalm.com.

Intellisync and CompanionLink also filter data, so you don't have to download your company's entire phone book, and field-mapping capabilities let you redirect data from your desktop so that your PDA contains the information you prefer to see. For instance, you could map an assistant's name stored in your desktop PIM into the notes stored in the PDA contacts program. Otherwise, this data would not be copied because the PDA contacts programs don't have a section for it.

No syncing package is seamless. Chances are, you'll encounter quirks and glitches that require workarounds to make sure that you get all of the data you need. But that is a small price to pay to keep your little marvel all synced up.

ACTIVESYNC 3.1 is bundled with all Pocket PCs, but it can synchronize data only with Microsoft Outlook.

FEATURES COMPARISON

Active screen area (square inches)	Weight (ounces)	Sync connection type	Battery type [1]	Extra features	Summary
6.9	7.7	USB	Rechargeable [2]	Headphone socket, microphone, MultiMedia Card slot, backup battery	**PRO:** Excellent screen. **CON:** Limited expansion options, low battery life.
6.7	6.3	USB	Rechargeable	Headphone socket, microphone, infrared port	**PRO:** Excellent screen, plenty of memory. **CON:** Limited battery life.
6.8	7.0	Serial	Rechargeable [2]	Infrared port, docking station	**PRO:** Small and light, plenty of features. **CON:** Small, nontactile keyboard; limited expansion options.
4.8	5.4	USB	AAA [3]	Springboard expansion slot, infrared port	**PRO:** Inexpensive, plenty of expansion options. **CON:** Limited memory, expansion packs use a lot of battery power.
4.8	5.4	USB	AAA [3]	Springboard expansion slot, infrared port	**PRO:** Plenty of memory and expansion options. **CON:** A big price increase from the Visor.
4.8	6.9	USB	Rechargeable	Springboard expansion slot, infrared port	**PRO:** Plenty of memory and expansion options, such as MP3 players. **CON:** Screen looks very pixelated.
12.5	17.0	USB	Rechargeable	Headphone socket, microphone, CompactFlash, PC Card expansion slots, docking station	**PRO:** Good screen and excellent keyboard. **CON:** Heavy and expensive.
3.3	4.4	Serial	AAA [3]	Infrared port	**PRO:** Low-cost, lightweight. **CON:** Limited expansion, no e-mail program.
4.8	6.7	Serial	AAA [3]	Wireless modem, infrared port	**PRO:** Wireless e-mail and Web-clipping capabilities. **CON:** Limited memory and battery life.
4.5	4.0	USB	Rechargeable	Infrared port	**PRO:** Very lightweight; bright, high-contrast screen; long battery life. **CON:** Limited expansion options.
4.4	5.3	Serial	Rechargeable	Wireless modem, thumbwheel	**PRO:** Always-on e-mail, very long battery life. **CON:** Tiny keyboard, poor screen, limited PDA functions.
4.0	4.3	USB	Rechargeable	Sony MemoryStick expansion slot, thumbwheel, infrared port	**PRO:** Lightweight, nicely designed. **CON:** Screen lacks contrast.

[2] Nickel-metal hydride.   [3] Requires two AAA batteries.

ahead of the others. The Palm offers lots of power and flexibility, but the IPaq and Casio are just as useful overall and superior in some areas. Where Pocket PCs really shine, however, is in their interface. Their bright screens, shortcut menus, and handy pick lists simplify adding and viewing appointments, tasks, and contact information, making them more fun to use than any other organizer we tried.

To help you keep track of all the people in your life, Pocket PCs include the powerful Contacts application, which provides over 40 fields for information. The Calendar application turns the IPaq and Casio into great appointment books. Day, week, month, and year views let you see and fine-tune the busiest of schedules. And it's easy to find open spots and add and reschedule appointments, recurring meetings, and all-day events.

With their meeting invitation feature for Schedule+ and Outlook, Pocket PC PDAs make the best palmtop choice for corporate users who need to stay in the loop. They do come up short in one major area, however: task and appointment integration. Palms excel at melding these important components of a busy schedule, providing several ways to look at them together.
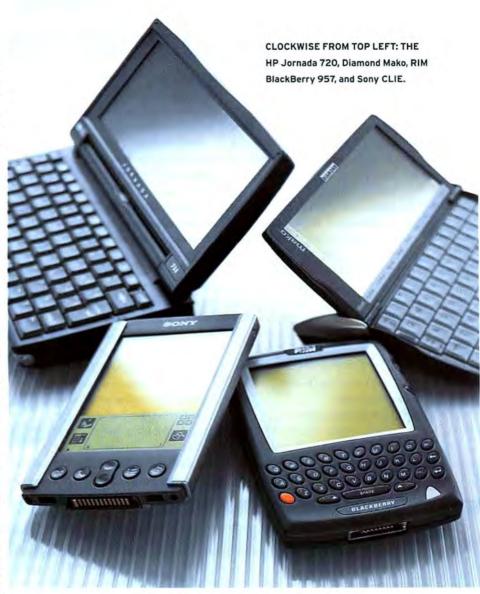
The chunkier Jornada matches Pocket PCs feature for feature and displays a larger part of your contacts list and schedule at once, including a separate window for tasks. The Diamond Mako offers users a mixed bag. People who need complete control over their address books might like its Contacts application, which lets you relabel and rearrange every one of its 23 fields—even name, address, and phone number. But we found the quirky Agenda application difficult to use.

The little RIM BlackBerry handles PIM basics—just. Minimalists might like the stark screens—the calendar's week view consists of two labeled axes—but most will want a more informative interface.

You've Got PDA Mail

(BEST) Palm VII, RIM BlackBerry 957
(WORST) Palm m100

A PDA IS A GREAT TOOL for staying on top of e-mail, and most of the PDAs we reviewed allow you to take your e-mail with you, answer it on the move, and send your

CLOCKWISE FROM TOP LEFT: THE HP Jornada 720, Diamond Mako, RIM BlackBerry 957, and Sony CLIE.

answers when you sync with your desktop machine. Only the low-end Palm m100, which lacks an e-mail client, can't do this.

The Casio Cassiopeia EM-500, Compaq IPaq H3600, and HP Jornada 720 come with the most-attractive mail application—a Pocket version of Microsoft Outlook. The Diamond Mako offers a similar-looking Inbox e-mail program, and Palm PDAs use the plainer but still very good Mail. In all cases, we could easily read, sort, and reply to messages.

To pick up corporate mail over a standard phone line, you'll need a PDA equipped with a modem—and among this group, only the $899 Jornada includes a standard built-in 56-kbps modem. Add-on modems, most starting at a pricey $300, are available for all the others except the CLIE. Modems made for Handspring's Visor PDAs, such as Card
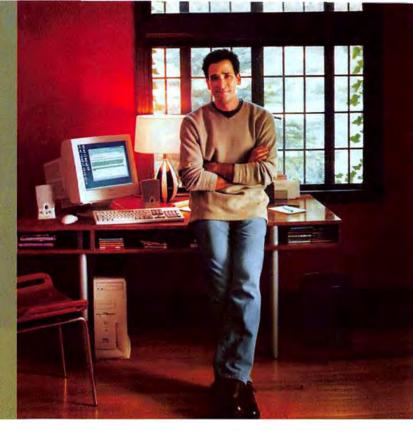
Access's ThinModem, add a minimum of weight and no bulk because they fit inside the Visor's Springboard expansion slot.

The Palm VII and the BlackBerry are the only PDAs reviewed here that are capable of receiving e-mail wirelessly. You have to lift an antenna on the Palm VII to pick up service; the BlackBerry beeps whenever e-mail arrives—a great feature for busy people and e-mail addicts. You can add wireless modems to the Palm III, IIIx, and V; to the IPaq; and by this summer, to the CLIE as well.

Because of their slower connections, PDAs send and receive e-mail more sluggishly than your desktop or laptop, although several vendors, including Compaq, have announced partnerships with the 128-kbps Ricochet wireless service. And Web browsing on a PDA remains something of a parlor trick. If you ▶

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don't need real-time access, an easier and cheaper way to obtain the same type of Web content is to install the free application AvantGo (www.avantgo.com). Every time you sync your PDA, the AvantGo site automatically downloads an abbreviated version of the Web site you select so you can read it offline.

Only the Jornada, with its 7-by-2.2-inch screen, let us browse nearly complete Web pages in real time, albeit with twice as much scrolling. But even here we missed out on a lot of content: The Pocket Internet Explorer Web browser built into the Jornada won't let you download applications, or view animations or videos.

Pocket Money Managers

(BEST) Palm-based PDAs
(WORST) Diamond Mako, HP Jornada 720, RIM BlackBerry 957

WHETHER YOU'RE attending a two-week conference in Toledo or you always forget to enter lunch receipts back at the office, PDAs are naturals for jotting down expenses on the spot. Visors, the CLIE, and every Palm but the m100 include Expense, a handy expense-tracking application. It lets you record method of payment (cash, check, credit card), currency (23 countries), vendor, location, and any of 28 expense types (airfare to snacks). Back at your desktop just sync your Palm device, click *Expense* in the Palm Desktop application, and pick one of the five editable expense report templates to dump your data into. Our expenses mapped correctly into the handsome spreadsheets within seconds.

Expense is not a personal money management tool, however. It doesn't handle checking, money-market, or savings accounts, nor stock portfolios. To add these capabilities to your Palm, you can choose from various commercial and shareware programs, including Quicken- and Microsoft Money–compatible applications such as the $15 Personal Expense Manager (www.umap.net).

Pocket PC models come with Microsoft Money but no expense-tracking software. Half a dozen third-party apps are available, including the $15 PocketExpense (home.mpinet.net/mathieux).

The Jornada, the Mako, and the Black-

ITS COLOR SCREEN and larger display area make it much easier to view maps on the Compaq IPaq (left) than on the monochrome Palm Vx.

Berry come up empty in the money-management department. None bundle financial software aside from calculators.

Shrunk-to-Fit Documents

(BEST) Diamond Mako, HP Jornada 720
(WORST) Palm-based PDAs

FOR TIMES WHEN you can't or don't want to take a laptop along, a PDA makes a decent stand-in for viewing and even doing light editing in Word and Excel documents. Downloading desktop documents into a PDA is easy. You just place them in a special synchronization folder, pop the PDA in its cradle and voilà, the syncing software compresses your spreadsheet to more manageable size for your PDA.

Just remember that, to make files small enough to fit in the PDA's limited amount of RAM, the conversion process strips out some features and formatting. For example, spreadsheets lose complex formulas and Word documents lose headers and footers, among other things.

With the biggest screen and a relatively large keyboard, the Jornada handles documents best of the devices in our roundup. Like the Casio and IPaq, it comes with Pocket versions of Microsoft's

familiar, easy-to-use Excel and Word applications. The Jornada's screen—at 6 inches long by 2.2 inches high, it's a third larger than a Pocket PC's—can display up to ten tightly squeezed spreadsheet columns; in addition, a healthy subset of Word and Excel features is available.

The midsize Mako offers many of the same features as the Jornada, and its Excel-like Sheet application lets you create charts and draw graphs.

We liked the Casio and IPaq next best after the Jornada and Mako. Although both Pocket Word and Pocket Excel are somewhat weaker than their desktop cousins, they offer most of the everyday features people expect. Still, spreadsheet views are cramped on the 3-by-2-inch screens.

Palm-based PDAs are the least robust for document viewing and editing. Their screens are even smaller than Pocket PCs' because the Graffiti panel takes up a third of the screen area. They also lack built-in word processing and spreadsheet programs, so you'll have to add a third-party application such as DataViz's $50 Documents to Go (www.dataviz.com). This add-on did a good job of converting our desktop documents, but it's mainly a file viewer. Formatting is limited, and the ▶

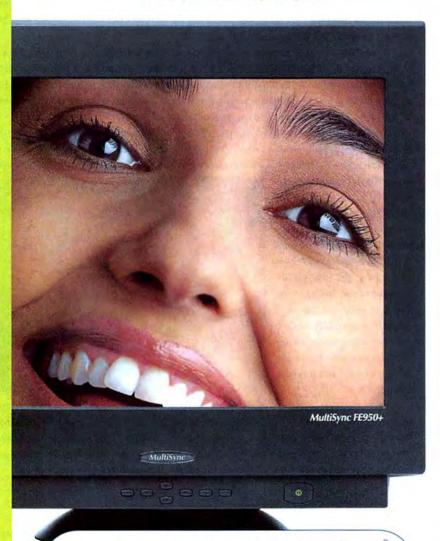only way to create new documents is to copy an empty Word or Excel file onto your PDA. We found navigating spreadsheets horizontally with the on-screen arrows extremely difficult.

That's Entertainment

(BEST) Casio Cassiopeia EM-500
(WORST) Palm-based PDAs

YOU'RE ON A LONG FLIGHT and you've seen the in-flight movie 15 times. Or maybe you're sitting at the doctor's office or growing old in line at the DMV. With a Pocket PC, you can while away your down time playing MP3 tunes, reading e-books, or showing off videos and snapshot-quality color photographs of your kids.

Palm organizers come with more games in the box, but Pocket PC units trump them with built-in headphone jacks and a miniature version of Windows Media Player that works with the desktop version to convert and download songs onto the PDA. In addition, the Casio Cassiopeia EM-500 has a built-in MultiMedia Card slot, which can hold a card with up to 64MB of storage—enough for an hour's worth of music. The IPaq can use CompactFlash cards with an optional $40 sleeve, while the Jornada has a headphone socket and slots for both CompactFlash and PC Card devices.

The IPaq does a nice job with photographs, but the Casio edges it out as an electronic photo album. Its Picture & Video Player compresses high-resolution photos better than the IPaq and displays them in landscape mode so you can see more of your shot on the small screen. Test pictures on the Casio had truer, more brilliant colors, thanks to the device's ability to display 65,536 colors, compared with the IPaq's 4096, although the Casio's 16MB of memory can be limiting.

For Palm fans in search of a little entertainment, Handspring's Visor Prism is the best choice. The only Palm-based unit with both a color screen and an expansion slot, it can do almost everything a Pocket PC can, though it lacks a built-in headphone jack. Like all Visors, it works with two add-in MP3 players, Good Technology's $269 SoundsGood (www.good.com) and Innogear's $259 MiniJam (www.innogear.com). Both players come with ear bud headphones and loader software (which you install on your desktop) for transferring MP3 files to the PDA. The 0.9-ounce SoundsGood is lighter and slides into the Visor's Springboard flush with the PDA, while the bulkier 1.4-ounce MiniJam extends about a quarter inch. Both carry 64MB of memory, but the MiniJam has two MultiMedia Card slots, so you can add more music by buying another MultiMedia Card.

Pocket PC or Palm: Which Will Win Out?

CALL IT THE CLASH OF THE TINY TITANS. The two main electronic organizer operating systems are headed for a showdown, and the outcome rests in users', er, palms. For the moment, PDAs based on the industry-standard Palm operating system continue to take the lion's share of the market; last year Palms accounted for about 62 percent of sales in the category of keyboardless "handheld companions." But analysts predict that by 2004, the Pocket PC will own as much as 40 percent of the market, with Palm falling to 45 percent.

Pocket PCs are expected to woo nonbusiness users and corporate types alike by virtue of their bright 240 by 320 screens, faster StrongARM processors, and familiar Windows-like interface and applications. Palm PDA owners tend to be fiercely loyal to their devices, however, citing streamlined operation and longer battery life as key benefits.

Strategists at 3Com and Microsoft predictably disagree over what users want. "We're not trying to produce a night light," says Palm's chief competitive officer Michael Mace. "We're trying to give users the right balance of weight and battery life. When you try to make a handheld act like a PC, you end up screwing it up."

Ed Suwanjindar, product manager of Microsoft's mobile devices division, praises the Pocket PC's appeal to sophisticated users who've decided they want more. "We're striving for depth. Our users have decided that if they're going to carry around a device, they want it to do more than just hold phone numbers. They want to read Excel and PowerPoint and get e-mail attachments. They want to enjoy music and read e-books."

Meanwhile, both camps are busily nudging their products toward the middle. The next version of Microsoft's PDA operating system will be designed to conserve power, says Suwanjindar. To catch up with Pocket PCs, Palm is planning to release Palm OS 4 later this year; it will support faster processors and increase screen resolution, says Palm's Mace.

Work toward a common expansion device standard continues, and Palms and Pocket PCs due out later this year are expected to standardize on the new Secure Device (SD) slot. Based on the MultiMedia Card specification, postage stamp-size SD cards will add storage as well as LAN and Internet connectivity.

However they evolve, analysts expect that both Palm-based and Pocket PC PDAs will secure their marketplace niches. "The overall demand for PDAs will continue to grow over time and there will be more than enough room for everyone," says Gartner Group analyst Ken Dulaney. "People are pretty committed to the Palm. The gem of the product is the software, which has not changed much over the last four years. But Microsoft has been creeping up on them."

Like the Casio, the Visor Prism can display 65,536 colors; unfortunately, its screen resolution of 160 by 160 makes images appear pixelated.

Sony's CLIE is the only Palm-based PDA that has video-playing software, but with a monochrome screen and no sound, it doesn't live up to its multimedia label.

Carla Thornton is a contributing editor for PC World. ∎

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FUTURE Web

Wait till you see what's coming. With high-speed access, new services, and graphics-rich interfaces coming soon, the Net will truly be a part of everything you do. ▶ **By Michael Gowan**

● ILLUSTRATIONS BY JIM LUDTKE

After technology's bleak 2000, you have to wonder if the skeptics were right: Maybe this thing called the Internet won't last. Tech stocks reside at frightening lows; online sales have slowed; layoffs are happening across the board.

But wait till you see what's coming. Until now, the Web has existed as a separate medium, a place you had to think about visiting. You decided to shop online instead of at a store. You sent an e-mail instead of giving your friend a call. But with a flurry of new developments—high-speed access, new ways of getting services, graphics-rich interfaces—the Net will become a part of everything we do.

The Net has evolved and simultaneously entered our everyday lives at dizzying speed. What began as a simple text interface has blossomed into a fully visual medium that can satisfy our desires for video, audio, and more. What started as a way to share information has become a worldwide marketplace where customers can buy anything at any hour. Where once we accessed this virtual world with 9600-bps modems, we now use DSL and cable modems to reach speeds at least 40 times greater.

Sure, the Net has endured its share of setbacks. A recent avalanche of dot-com deaths has shown the fallacy of launching a site without a good business plan. Even sites that have enjoyed some success, like Amazon and Etoys, are in a bit of trouble. And it turns out that buyers want to receive the items they buy on time—not a strong point of many sites. Fac-

Trend ONE

E-Commerce: End of the Free Ride

OH, THE FOLLIES of youth. In 1998 and 1999, thanks to much-improved Internet technology, low start-up costs, and huge infusions of capital, we saw a multitude of e-commerce sites spring up, trying to sell us everything from pet food to automobiles. To attract customers, the companies devised some outrageous promotions: For instance, 800.com—a site that sells electronics, music, and videos—launched with a special offer of three CDs for $1, including shipping. A host of sites promised free Internet access to drive traffic to their sites.

But in 2000 the bubble burst. Over-inflated stock prices fell, and the venture capitalists who backed many of the sites declined to invest any more. Some flourishing sites overextended their reach and burned through their VC cash. Sites that counted on drawing traffic by offering impossibly great deals learned a different lesson: Selling at a loss doesn't translate into profits.

The idea behind the giveaways and steeply discounted prices was, in trade speak, to build the brand. The greater the number of people who came to the site, the faster the site would become prof-itable. But that business plan won't work today or in the future.

"You don't want to drive traffic anymore," says Esther Dyson, chairman of EDventure Holdings and a former chairman of the influential Internet Corporation for Assigned Names and Numbers (ICANN). "The whole concept of 'We've got traffic' is like, 'Hey, I've got a lot of people in my store.' That's not what retailers want. They want a lot of people buying. Driving traffic is a notion of the year 1999. Who wants traffic? You want revenues."

A glut of sites selling similar products and services created fierce competition. And just as happens in the offline world, the abundance drove many online start-ups out of business and paved the way for small, specialized businesses to be swallowed up by larger, more established firms. Take Fatbrain.com. The online bookseller started as a consumer book site a few years ago and evolved into a fairly successful business-to-business bookseller site. But when the dot-com shake-out came, Fatbrain.com found itself in a fiscally sticky situation.

Dan Rush, Fatbrain.com's vice president and general manager, explains: "We grew rapidly—sales doubled each of the past two fiscal years. Like any Internet company, we had growing pains. We were

tor in some persistent privacy concerns, and the utopian society some foresaw doesn't look so likely.

While perhaps no one could have forecast the Net's roller-coaster ride of the past five years, we've donned our prognosticating goggles to see where the next five years will take it. We talked to visionaries, key industry players, and analysts to find out where we're headed and when we'll get there. Ahead lies a world where you rent software and music instead of buying it; an Internet available anywhere, anytime, thanks to high-speed wireless access; a place where text, video, and sound merge into a seamless multimedia experience.

We begin with one of the most popular online areas, and the one that saw the most meteoric rise and fall during the last five years: Let's go shopping!

> "Driving traffic is a notion of the year 1999. Who wants traffic? You want revenues."
>
> —Esther Dyson, Chairman, EDventure Holdings

probably spending too much. We had two choices: Go get additional funding, or look for merger partners." The result: Competitor Barnes & Noble.com acquired the company, which now serves as its B2B arm. Thanks to the addition of Barnes & Noble.com's infrastructure and customer support, Fatbrain.com predicts it will turn a profit in 2001.

The lengthy list of dead dot coms is littered with high-profile sites such as Pets.com (remember its wildly popular sock puppet mascot?). Clearly, growth and name recognition aren't enough to guarantee that a business will survive.

Successful e-commerce sites give you a reason to come back, and good service is one of the the best ways to do that. Good customer service has many ingredients, but the most important are an easy shopping experience, a smooth-running site, and

THE FUTURE TODAY

Circuit City (www.circuitcity.com) Look for physical stores to become more fully integrated with online stores. With Express Pickup at CircuitCity.com, you can buy something online and pick it up at a store near you instead of having it shipped.

on-time delivery. If a site can't provide these, you won't be coming back anytime soon. So look for sites to focus more on service than on providing the lowest price. This strategy may yield higher prices, but it will deliver a better overall experience.

With so many different places to shop online, a site that crashes or can't ship an order on time won't hold on to customers for long.

Convenience is another reason we shop online, and it's another area online retailers will look to improve. For example, online shops that are allied with physical stores can simplify the return process. If you buy an item from an online store and then decide you want to return it, you usually have to pay to ship it back. But now megastores such as Best Buy and Circuit City let you return items bought at their Web site to a real-world branch near you.

Expect this click-and-mortar trend to continue. Vint Cerf, chairman of ICANN and one of the innovators of TCP/IP, the protocol that lies at the root of the Internet, envisions a situation where small stores handle product returns for multiple online merchants. Some physical stores and their online siblings will merge, too. Sporting goods store REI is already experimenting with this setup. Walk into a store, and you'll find a kiosk that's connected to REI.com. If the local REI is out of snowshoes in your size, you can immediately order them online. It's the consolidated future.

But what about the bargains? Convenience may have kept people shopping online, but unbelievable discounts are what brought them there in the first place. On the Web of the future, you won't find three CDs for a dollar anymore, but great deals will still be out there. You'll just have to do some more comparison shopping to find them. Most of the best deals will feature overstocked goods and last season's products. ▶

Trend TWO

Rethinking Ownership

TRADITIONALLY, commerce has been straightforward: Customers pay for something and receive a physical product to have and to hold. You buy a music CD that you can carry around from your house to your car to your workplace. You buy Office 2000 and receive a CD-ROM that loads the program onto your computer. But that arrangement is going to change.

Just as with cable TV, you'll pay a monthly fee to get music and movies through the Net, or you'll pay a charge based on what you use. The first place this model will emerge is with music.

Right now, you can subscribe to sites such as EMusic.com, where $10 per month fetches you unlimited MP3 downloads. Once you download a song, it's yours to play when you wish, as many times as you want.

Soon subscriptions will include access to an unlimited amount of music streamed across the Net—but subscribers won't be able to save that music on their hard drive. With streaming services, your PC holds a few seconds of a file in a buffer, then plays that file while refreshing the buffer. Once the song is done, the data is gone. Right now, however, streams are plagued by bandwidth problems. A high-fidelity expe-rience requires at least a 128-kbps stream for MP3 files (RealAudio and Windows Media Audio require less). If the connection lags, the song pauses.

MP3.com has relaunched a service that may serve as a bridge between product ownership and streaming subscriptions. With My.MP3.com, you buy a CD and place it in your PC's CD-ROM player while connected to the site. The service confirms that you possess the CD. So after you activate David Gray's latest CD, for example, My.MP3.com will stream "Babylon" to you wherever you are, regardless of whether you have the CD with you. Taking this idea a step further, Sony Music, Universal Music Group, and Warner Music are developing streaming services that require no physical product. You'll be able to listen to any song in the collection as many times as you want. But unlike downloads that you can transfer to a portable player, streamed music is available only while you're online. Eventually, subscription services will stream movies to you in the same way.

But entertainment isn't the only thing you'll subscribe to. In the future, you'll get your software this way, too, by subscribing to an application service provider (ASP) and accessing your applica-tions through a Web browser. The software won't reside on your computer; it will remain on the ASP's servers.

ASPs exist now, offering access to database programs, project management apps, e-mail clients, and even Office 2000. Microsoft is so sure that this idea will succeed that the company is building an entire platform around it, called .Net. .Net will allow various Web services to talk to each other and to consolidate their functions in one interface.

For instance, all your financial information—bank account balances, money market performance, and so on—may be available on the Web, says Alfredo Pizzirani, .Net's Windows product manager. But the pieces of information reside on different sites. "The only way to build a consolidated view of what my financial situation is, is to go to all these Web sites and cut and paste things into Excel," Pizzirani says. According to Microsoft, .Net will make it easier to build a Web site that consolidates this information.

ASP backers say these services are easier to use than traditionally installed software. In some cases, using an ASP can reduce costs, especially for small businesses. ASPs update clients' software automatically as patches are released, and they handle maintenance issues that IT

THE FUTURE TODAY

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Don't buy, subscribe. Personable.com previews the way you might one day get all of your software. This application service provider offers subscriptions to many apps, including Office 2000 for $20 a month and ACT 2000 for $13 a month. The site also gives subscribers 10MB of storage space on its servers.

UCLA INTERNET PROJECT'S JEFFREY COLE

THE NET TAKES HOLD

Jeffrey Cole's Internet Project studies the social impact of the Net.

departments would otherwise have to do.

This isn't a new idea. Before computers became inexpensive enough for consumers and small businesses, renting was a common strategy for obtaining computer access. "We've seen the return of time-sharing in some funny way," Cerf says. "Web browsers have become the character terminals of the 21st century. That was the way people did time-sharing with the big mainframes in the 1970s. And now people are going online to connect and use Web interfaces to interact with software."

But like other Net-based services, ASPs require that you be online to access your apps. If your access is down, so are you: You won't be able to use your apps and data because they reside on servers scattered across the landscape. The big question is, are you ready to give up control of your software and music?

Even tech luminaries aren't completely ready to yield control. "I'm still a little uncomfortable with it," Cerf admits, "because I'm offline enough of the time that I would like to have the software running on my PC."

Still, we've been subscribing to offline services for a long time now. As Dyson puts it, "People are used to renting cars and renting hotel rooms. Subscribing is more the concept. You have this service,

you can get a premium package or a simple package, and it's yours to use."

To make all of this work, you must be able to access the Net wherever you need it. If you could listen to streaming music in the car, would you care whether you

owned a CD copy? If you had access to your software at the coffee shop, would you need it loaded on your hard drive?

When the wireless Web arrives, you'll never have to be disconnected again—unless you drive through a tunnel.

Trend THREE WE'VE already witnessed the emergence of high-speed Internet connections at work and at home with T1, DSL, and cable modems, all capable of 1.5-mbps data rates. This year, satellite links to the Net will approach those speeds. Couple that pace of access with a wireless LAN, and you can surf the Web comfortably from your recliner.

The Internet Everywhere

Already, you don't have to connect to the Web through landlines. In 1999, according to International Data Corporation, 125 million people subscribed to a wireless service—including pagers, mobile phones, and messaging services. By 2004, IDC predicts, that number will reach 207 million. We already have cell phones and PDAs that can access the Web without wires. At present, their ▶

SKEPTICS PREDICTED that the Internet would breed alienation and loneliness as people turn to machines for information instead of to their neighbors. Not so, says Jeffrey Cole, director of the Center for Communication Policy at the University of California, Los Angeles. Last year, the Center began the Internet Project, an ongoing survey of the Internet revolution's effects on our lives. Cole explains how changes in the Net have changed the way we live—and perhaps empowered us in the process.

PC WORLD: How did survey respondents view the Internet's impact?

COLE: I was surprised at how optimistic people are about technology. People believe it enhances their social and personal communication networks. People also believe that they gain political power through the Internet. They believe that it may even ultimately make the world a better place by reducing ethnic strife or even warfare as people communicate. People thought they were better informed about what was happening politically.

PCW: We've seen changes in the way that commerce on the Web works—fewer great deals, failing dot coms. What effect will those changes have on Internet users?

COLE: People are not necessarily going to the Internet because they perceive it's cheaper. They go because they can't find what they want elsewhere. They go because they don't want to shop in 12

stores. Companies that provide only a price advantage may find that business will shrink.

PCW: Will people be comfortable paying a fee to access entertainment and software, rather than buying a physical product?

COLE: If we have options, people prefer not to do that. It will require more of an adjustment. Clearly we're not going to be able to get the kind of content we want long-term for free. We have subscription models everywhere else, so I think ultimately they will work. But we'll go kicking and screaming.

PCW: How do you think widespread high-speed wireless and broadband access will affect the way we use the Web?

COLE: Broadband changes everything. People go to broadband because of speed. But speed doesn't change their entire relationship with the Internet. What changes the whole relationship is the direct connection. We found that the average household is [online] a little over an hour a day, in two or three chunks of time. When they go to broadband, not only does their use go up about 50 percent, but they're on 20 or 30 times a day. We even see access devices starting to be a kind of kitchen appliance that people walk past to check e-mail on their way to the television. Wireless broadband we can only speculate about. The U.S. is a third-world country where wireless is concerned. I wish that was only a bad joke.

connections run at a measly 19.2 kbps or less, but that will change. New wireless protocols will enable us to connect to the Net at high speeds. Meanwhile, other new technologies aim to eliminate the wires between the various devices you'll use—no more cords to sync your PDA to your PC. Together, these innovations will let you access the Web anywhere, anytime.

Currently in development, 3G (for third-generation) wireless will connect your cell phone, PDA, or Web tablet to the Net at speeds of up to 2 mbps—faster than a T1 line permits today. With that kind of bandwidth, you'll be able to stream CD-quality music while typing data into a database supplied by your ASP, all while riding the train on your morning commute.

But we won't see 3G in the United States for a few years yet. Tom Nyberg, a business development manager for cell phone giant Nokia, expects the first 3G networks to arrive in Europe this year and looks for the technology to hit the States in 2002, with widespread use in 2003.

Cliff Raskind, a senior analyst for wireless data and computing at Strategy Analytics, thinks that timetable is optimistic. "We don't believe 3G will get a significant foothold until 2006 or 2007," he says. In the meantime, an interim technology, called 2.5G, should arrive; it will support data rates of about 100 kbps. Raskind says that the real speed of 3G wireless will be about 384 kbps, far below the advertised maximum of 2 mbps, "unless you're standing next to a base station."

A more familiar new technology, Bluetooth, will cut the wires between your PC, your notebook, and your PDA. This short-range wireless technology can connect devices via radio waves across distances of up to 30 feet at 1 mbps, with no line of sight needed. Bluetooth permits you to sync your PDA with your PC as soon as you enter the 30-foot range.

Instead of looking for a phone jack in an airport or hotel, you'll walk into a Bluetooth-enabled zone and your notebook or PDA will be connected. This will transform the Net. Dyson says, "It will become much more like a service—like electricity. You don't plan on turning on the lights; you just switch them on."

Cerf expects constant connectivity to change how we use the Web as well. "A lot of people use the Net now as an information source," he says. "A few years from now people interested in sports events will turn to the Net instead of TV or radio. That will be quite a shift."

Of course, 3G is years away. And the more people who use wireless in your area, the slower your connection will be. An even bigger shift will happen once broadband reaches every corner of the globe: It will change what you see on your screen and how you interact with the Net.

Trend FOUR

HOW WILL the Web work and look? On your PC, it will be a graphics-intensive environment, overflowing with 3D and video. On your mobile device, it will take a more space-efficient form that gives you location-sensitive information. And with either machine, you'll soon be using voice commands to go from site to site.

Getting to the Web of the future from the Web we have now may involve reducing the role of the traditional Web browser. Instead of serving as your sole Web interface, the browser will share time with smaller, application-specific programs that focus on doing one thing well.

Bruce Tognazzini, a specialist in interface design who has worked with Apple and Sun Microsystems, says that the browser is a one-trick pony: "Browsers do simple browsing very well, but they are poor at the many advanced tasks they are being called upon to do. They lack powers enjoyed by the most primitive 1970s programming languages."

So look for specialized applications to augment the browser. Napster, for example, sets up a peer-to-peer connection between computers—a task browsers would have an awful time accomplishing. Other applications may work without any input from you. Let's say you need a new driver for a scanner you just bought. A small PC maintenance application could recognize that you don't have it, find it on the Web, and install it. All you'll have to do is say, "Go."

The Evolving Interface
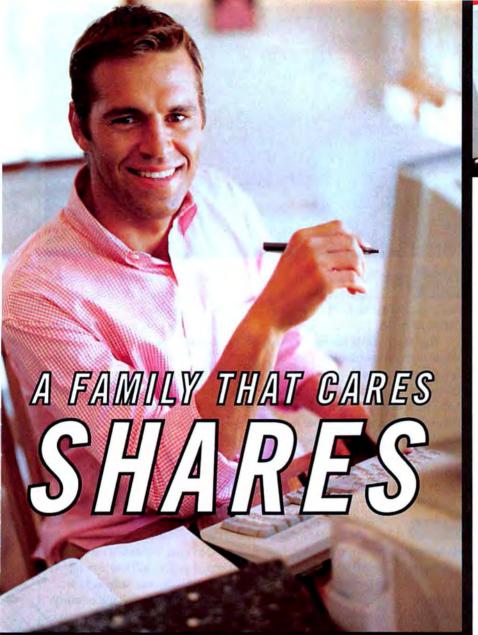
And you will say it, because you'll be able to execute basic functions by your voice instead of via a mouse and keyboard. Simple control and command functions such as up, down, and enter require a limited vocabulary. If you train an application to listen for those few words, it can recognize them with a very high degree of accuracy. Already a product from One Voice called My-IVAN surfs the Web according to your spoken commands.

Your view of the Web will depend on the device you access it on. The bigger your screen, the more graphical the interface will be. On the small screen of a cell phone, the interface ▶

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will resemble the spartan content of Wireless Application Protocol sites. Nevertheless, the next-generation WAP interface should include a few more graphical elements. And when voice-recognition technology improves, it is likely to prove extremely popular in the wireless market.

On the larger screens of PCs, the graphical interface will offer users a much richer experience. High-speed connections will allow real-time, full-screen video-conferencing to replace telephone calls. And we'll enjoy better visual perspective through three-dimensional environments. Chat room participants will use avatars in a 3D world, as if each were a character in a multiplayer, multimedia role-playing game like EverQuest.

Video is already making headway on the Web, and that trend will certainly continue. The Net lets you get your news in any form you like. Thus, you can combine a quick visual summary of a story with in-depth text analysis and background audio.

Though the Net won't replace television anytime soon, TVs that accept Internet packets shouldn't be too long in arriving. A Net-enabled TV will add a participatory dimension to what is now a very passive experience. "You'll be able to take action on something you're interested in on the spot, by clicking on some place in the image," Cerf says. "[TV] will be more flexible, because you'll have more than one avenue for interacting with it."

Before it can do the jobs of TV, radio, and other media, the Net must get fatter. Tognazzini explains, "Broadband today is not broad. It's narrow. It's not up to the task for that kind of traffic." We'll need hundreds of megabits per second to transmit HDTV-quality video to billions of homes. But such transfer rates are not unheard of. Tognazzini says at Sun he worked on a video prototype of a computer that will need 1-terabyte-per-second data rates. Even now, in limited areas, Cogent Communications (cogentco.com) offers 100-mbps access over fiber-optic lines for $1000 a month. As prices decrease and the fiber-optic network grows, that level of speed should become more widespread.

THE FUTURE TODAY

Digital Divide Network (digitaldividenetwork. org)

Funded by the Benton Foundation, the Digital Divide Network brings together the latest studies on the digital divide, publishes features about people working to correct it, and includes a list of resources so you can get involved.

Trend FIVE OVER THE past decade, the technological haves cashed in on the Web, while the have-nots couldn't afford even to buy a PC. This digital divide has received considerable attention in the past few years: Outreach programs sprang up, and Bill Gates's family foundation donated PCs to schools and libraries. The market has chipped in, with free ISPs and cheap PCs that make access affordable to lower-income families.

And the efforts seem to be helping. A report published in October 2000 by the U.S. Commerce Department's National Telecommunications and Information Administration (NTIA) stated that Internet access in the home had jumped from 26.2 percent in 1998 to 41.5 percent in 2000. More than 116 million U.S. residents have access to the Internet by some means, but others—including people with disabilities—remain unconnected.

Jeffrey Cole, director of UCLA's Center for Communication Policy, identifies two types of divide: one involving access to the Internet, and the other involving the ability to use what's there. "If you look at the first million people to go online, it's pretty disturbing," Cole says. "It's white, male, upper-class, and highly educated. But if you look at the last million people, it's very encouraging. More black and Latino, more female, more lower- and middle-class. So I think

Digital Divisions

through free ISPs and low-cost computers, the 'access-to-technology' digital divide is going away."

But knowing how to use the Web is another issue. "Some affluent and educated people have a better sense of what to do with information, how to search for it, and how to use it," Cole says. "So we have to do more than just wire everyone for access; we have to help people learn how to use this to enhance their lives."

Cerf expects the access gap to widen briefly as we move into the next stage of the Internet. "When you have extremely rapid introduction of technology, it's going to go to the sector that can spend money first," Cerf says. "So these terrible apparent digital divides will look like they've opened up like the San Andreas Fault."
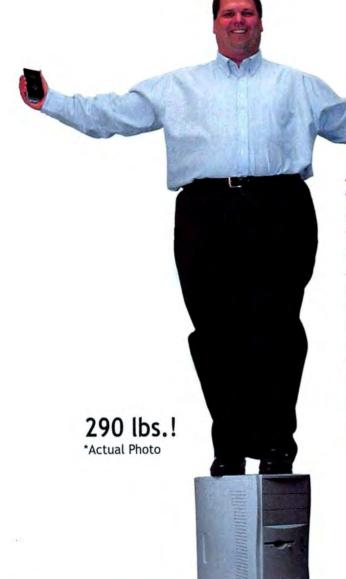
Cerf believes the market will eventually close the access divide. Still, that won't necessarily solve the gap in people's ability to use the Internet. Dyson thinks the way to close that divide is to educate children and adults on how to use technology.

The Internet of tomorrow will have to overcome its share of problems, and access is sure to be one of them. But even so, the future looks bright. The distinction between online and offline will blur as we dabble in both realms interchangeably and in concert to shop, listen to music, and run software. The Web will become easier to use, too, as we use our voices to navigate smarter Web sites. In five years we may even forget that we're using something called the Internet. It might just be a part of life.

Michael Gowan is a freelance writer based in Oakland, California. ∎

The Custom Fit

By Yael Li-Ron

power
browsing

Beef up your browser with these plug-ins, add-ons, and tips for getting the most out of the Web.

If you go online using a Web browser alone, you're only minimally equipped for the Internet. It's like going on vacation with just a ticket and an empty suitcase. A Web browser by itself—be it Microsoft's Internet Explorer, Netscape, or another—can take you only so far. It can't help you do extensive research, for example, or play video clips on its own.

To make the most of your online adventure, you need to stock up on an assortment of plug-ins, add-ons, and stand- ▶

ILLUSTRATIONS BY TERRY ALLEN

alone tools. We've put together a list of our favorites, from the well known to the obscure. We've also gleaned some power tips from professional researchers—all browser aces (see "Browse Like a Pro," page 119). Don't leave your home page without them!

THE MUST-HAVES

THERE ARE A HANDFUL of browser add-ons that you must have if you want to enjoy all the sound and fury the Web has to offer, and to handle certain types of Web content. Once loaded, most of them sit quietly in the background until they're called on to produce a richer Web experience. The majority of tools in this category are free, though a few are low-priced shareware. All are available from PCWorld.com's Downloads.

Audio and video players are the most prominent add-ons. When you install your Web browser, you're given the option to install Microsoft's Windows Media Player, Macromedia's Flash, and other market-leading players along with it. Check the vendors' sites every now and then for upgrades and patches. We recommend that you keep both Windows Media Player and Real Networks' RealPlayer installed. Though some Web sites let you choose between these popular players—and you might prefer one to the other—most sites don't give you a choice.

Shockwave 8 and Flash 5: Macromedia's Shockwave player is the granddaddy of all plug-ins, offering access to interactive, animated content on thousands of sites. It's used to display everything from product demos to jigsaw puzzles and other games, and it works with Netscape 4, IE 4, and AOL 4—and all of their later versions. The latest iteration, Shockwave 8, includes Macromedia's popular Flash 5 animation player.

Install Flash on your system, but use it judiciously. Most Flash-enabled sites also permit you to view their content as plain HTML (see **FIGURE 1**), which cuts down on the gee-whiz excitement but speeds up your browsing.

Macromedia (www.macromedia.com); 225KB; works with IE or Netscape

Acrobat Reader: This ubiquitous file reader from Adobe includes a free plug-in for IE and Netscape that lets you view and print documents in Adobe's Portable Document Format within either browser. Adobe's PDF is used by the IRS (www.irs.gov) and other

FIGURE 1: THE 'TEXT VERSION' of Olympus America's Web site (see upper left) loads faster because it omits the Flash animations.

FIGURE 2: ALONG THE LEFT SIDE of Real Networks' RealPlayer is a list of channels from which you can stream various media.

government agencies to put their forms online, and by major business and general-reference sites.

■ **TIP** When you've read the Acrobat document in your browser, don't close it unless you want to close the browser, too. To close the document but keep the browser open, right-click the *Acrobat* button on your taskbar and select *Close,* or push the browser's *Back* button to return to the previous page and close Acrobat.

Adobe (www.adobe.com); 5.5MB; works with IE or Netscape or alone

AUDIO AND VIDEO PLAYERS

IF YOU LIKE TO listen to music in .mp3 or other file formats, or view video clips on your computer screen while you work (or play), you can stream the sights and sounds over the Internet. But how do you decide which player to use? The primary difference between players is their user interface: Most now support MP3, CD, MPEG, Real (.ra), AVI, and other audio and video standards. Download and use the players listed here; then let your own eyes and ears help you pick the one you like best.

RealPlayer 8: Besides playing several audio file formats—including .ra, .wav, and .mp3—as well as audio CDs, RealPlayer streams video from one of the many "channels" listed on the left side of the player (see **FIGURE 2**). In the bundled Real JukeBox, you can create a playlist of your favorite tunes and even set the synchronized visuals to one of the custom selections. The video quality leaves much to be desired, however. Either the audio doesn't catch up with the video, or the image is jerky and blurry.

■ **TIP** Even when RealPlayer isn't entertaining you by playing media files, it still takes up valuable system resources. You can disable it by right-clicking the cartoon-bubble blue icon in your System tray and selecting *Close StartCenter.*

RealNetworks (www.real.com); 4.4MB; works with IE or Netscape or alone

Windows Media Player 7: Microsoft's free media player is similar to RealPlayer: They both support a wide range of file formats, and neither requires you to launch your browser to play media files. The plug-in supports .mp3, .mov (QuickTime movies), and other file formats, as well as Windows Media Player's two proprietary audio formats, .asf and .wma. And if you'd like to use ▶

browse like a pro:
tips from web experts

EVEN IF YOU'VE been surfing since the dawn of the Web, or you've been going online since ARPANET, there's always more to learn about finding information quickly and efficiently. And who better to get tips from than the people who browse for a living?

These days it seems nearly every other site you visit prompts you to download some plug-in or player that's required to "view the page correctly." Of course, you'd never click the Download button reflexively, right? You've got good reason to be cautious.

"I don't view pages that run VBScript (Microsoft's Visual Basic Script)," says Dave Bohn, who has been developing, managing, and cataloging Web sites since 1993. "Whenever they say, 'You need to install VBScript' I say, 'No, thanks!'" Bohn cites JavaScript as an example of a safer technology that Web developers can use to display dynamic content in the pages they design. VBScript makes it relatively easy for malefactors to disseminate viruses and other potentially damaging files. "There's only a small chance for a security breach with VBS," says Bohn, "but I'm unwilling to assume the risk."

Some browser add-ons receive a warmer welcome, however. Nani Luia-Harris, senior quality assurance engineer at the Web site service provider Atomz, wouldn't want to browse without her favorite IE front end. "I love NeoPlanet," she says. "Its interface is wonderful, and you can change the look by downloading skins," several of which she has designed herself. The plug-in is available at www.neoplanet.com.
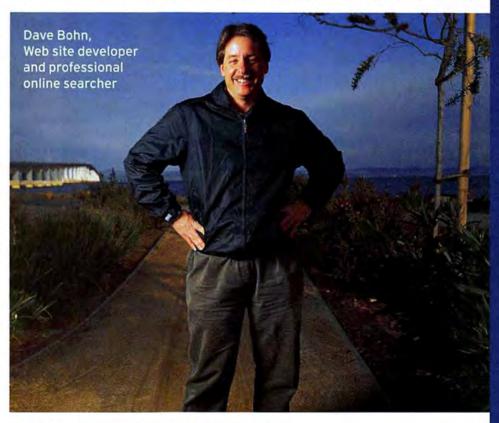
Luia-Harris prefers IE 5 to Netscape, but she has changed

most of IE's default settings. "I set it to clear out the Temp folder whenever I close the browser," she says. This erases confidential information that may have been entered during the session.

Note: If you would like to set IE to empty your Temporary Inter-

net Files folder automatically, click *Tools•Internet Options• Advanced,* select the *Security* heading in the resulting dialog box, and check the box next to *Empty Temporary Internet Files folder when browser is closed.* (In Netscape, you have to clear the cache manually.)

While the professional Web browsers we spoke with agreed

almost unanimously about Web elements they didn't enjoy (pop-up windows, ads), their opinions diverged on one very important subject: security.

"My security levels are pretty much the default," says Bay-Wei Chang, senior research scientist

with search-engine company Google. Bohn is more security conscious. "When I'm linked to a secure server, I always log off before surfing to another page," he says. "If I go to another URL without first logging off, the information I provided to the secure server could remain in my browser's cache."

The browser pros all agree on

how important it is to have a search strategy.

It's not surprising that Bay prefers the Google Toolbar, but he was a fan of the search tool before he joined the company. "The Google Toolbar lets me highlight my terms in the page

so I can quickly scan to see the relevant sections," says Bay. "It adds buttons for each search term so I can jump directly to the words on the page I'm viewing." Luia-Harris of Atomz likes Go.com's ExpressSearch (available at express.go.com), which features a toolbar that lets her use multiple search engines at the same time. –Dennis O'Reilly

Dave Bohn,
Web site developer
and professional
online searcher
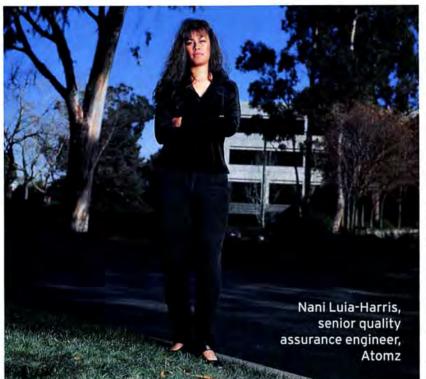
"When I'm linked to a secure server, I always log off before surfing to another page. If I go to another URL without first logging off, the information...could remain in my browser's cache. **"**

Nani Luia-Harris,
senior quality
assurance engineer,
Atomz

"I love NeoPlanet. Its interface is wonderful, and you can change the look by downloading skins."

a more spirited or idiosyncratic interface than the rather bland default, you can choose a new "skin" to jazz up the look.

Microsoft (www.microsoft.com/windows/windowsmedia/en/download); 9.1MB; works with IE or Netscape or alone

QuickTime: Apple's free audio and video player often appears as an option for playing certain video clips found on Web pages. The program has been around for years, but RealPlayer and Windows Media Player have become more popular among non-Mac users. QuickTime's main attraction is its ability to play 360-degree QuickTime VR (virtual reality) clips, which are interactive videos that you can pan and move around in at will. These videos are often used on sales sites to show the interior of a home or car.

Apple (www.apple.com/quicktime); 8.3MB; works with IE or Netscape or alone

MusicMatch Jukebox: In addition to listening to audio playlists in .wma and other popular formats, you can encode your own .mp3 files and create CDs. The registered version ($20) lets you print CD covers with track listings and original art.

MusicMatch (www.musicmatch.com); 8.4MB; works with IE or Netscape or alone

WinAmp: Nullsoft's no-frills audio player supports many popular file formats (but not Real's .ra) and lets you create playlists. WinAmp also seems to crash less frequently than other players.

TIP If you would like to double Win-Amp's playback area, press <Ctrl>-D.

Nullsoft (www.winamp.com); 1MB; works with IE or Netscape or alone

HANDY ADDENDA FOR IE 5

INTERNET EXPLORER 5 supports add-ons called Web Accessories that attach themselves to the browser's toolbars or to the context-sensitive right-click menus inside the browser. The accessories provide quick access to content and add many functions. You'll find an incomplete list of Web Accessories at www.microsoft.com/windows/ie/webaccess. Here are our favorites:

Google Toolbar: You don't need to type www.google.com to go to a superb search engine. Get quicker access by adding Google's search field to IE's toolbar. (For more on the Google Toolbar, see "Browse Like a Pro" on page 119.)

Google (www.google.com); 1MB; works with IE 5

Alexa: The classic version 4 lists links related to the Web site you're currently visiting—as well as the site's address, phone number, and other contact information—in a horizontal or vertical bar. It's ideal for users who do comparative research (the "What's Related" database has also been built into Netscape's browsers since version 4.*x* and into IE 5 and later versions as "Related Links"). The new version 5 of Alexa, on the other hand, is available only as a vertical pane appearing to the left of the browser window; Alexa acts as a shopping assistant, providing information from Amazon.com and MySimon.com.

Alexa (www.alexa.com); 150KB; works with IE 5

FlySwat: This tool was designed as a research aid, but FlySwat helps make all browsing more interactive, instructional, and free-associative. Some on-screen words and phrases become hyperlinks to sites such as NBCi, where you'll find more information on the topic that's highlighted (see **FIGURE 3**).

TIP Check *Open destination in new window* in the program's Settings to avoid wandering too far from your starting point.

FlySwat (www.flyswat.com); 400KB; works with IE 5 or alone

Web Accessories for IE 5: Formerly known as IE PowerToys, this free collection of tools from Microsoft includes a feature that permits you to zoom in or out; a detailed image list within each Web ▶

FIGURE 3: THE FLYSWAT BROWSER add-on enables you to convert some text into hyperlinks that lead directly to other Internet sources containing additional information.

If you think CD-RW is the safest, easiest way to store files, you don't know zip.

"Remember the indestructible CD? Scratch that idea. Just as digital technology is taking over everything from movies to video games, a growing number of people are discovering that discs just aren't what they were cracked up to be." *—The Wall Street Journal* * *02/02/01*

Your important files are simply irreplaceable. Do you really want to store them on a flimsy piece of cheap plastic? With their rugged titanium-based construction, Iomega Zip® disks are far more durable than CD-RW. And they make it easy to organize, share and back up your critical files. No wonder Zip owners give their products higher ratings than CD-RW owners for speed, reliability and ease of use. Why settle for anything less? More than 40 million people around the world trust Iomega—the company that invented quick, affordable, dependable digital space. Available at fine electronic retailers and from iomega.com.

page (which you can view or print); and a valuable Image Toggler that can help you speed up your Web browsing by selectively disabling graphics (including ads!) on the various pages you visit.

TIP The Image Toggler is on IE's Links toolbar; to see it, right-click the main toolbar and select Links. If images don't vanish when you select the Image Toggler, press <F5> to refresh the display.

Microsoft (www.microsoft.com/windows/ie/webaccess/default.asp); 120KB; works with IE 5

Web Developer Accessories: Most of the tools in this set from Microsoft are for hard-core Web developers. However, if you're a casual HTML coder who's curious about how a page is constructed, you'll find the View Partial Source tool a most utilitarian utility.

TIP Whenever you want to view the underlying HTML code, simply select a portion of the screen, right-click, and then choose *View Partial Source* (see **FIGURE 4**).

Microsoft (same URL as Web Accessories for IE 5); 113KB; works with IE 5

SurfSaver: AskSam's free (but ad-supported) research tool works with IE and Netscape. It allows you to save Web pages into folders and search for keywords that you specify or for words within

FIGURE 4: MICROSOFT'S Web Developer Accessories provides the option to view the source HTML for only a portion of the page.

the saved pages (see **FIGURE 5**). The $30 SurfSaver Pro, which is available at www.surfsaver.com, eliminates the advertisements and lets you share search results among several users on a network.

AskSam (www.asksam.com); 5.5MB; works with IE 5 or Netscape

NETSCAPE 6 GETS TABULAR

NETSCAPE 6 LETS you choose from hundreds of "tabs" that you can add to the My Sidebar part of the browser's left pane. The tabs are primarily links to news, sports, entertainment, and other content, but they also include links to a few shopping sites. Some people may like the What's Related tab, though most of us would probably prefer to dedicate as much of our screen real estate as possible to the content of the page we're currently viewing.

TIP To choose the tabs to add to My Sidebar, click the *Tabs* button and select *Customize Sidebar*. In the dialog box that appears, click *Find More Tabs*. This will take you to Netscape's site, where you can make your selections in such wide-ranging categories as Arts & Entertainment, Computing & Internet, Games, Health, Home & Family, Reference, Shopping, and Sports.

manage
your add-ons and plug-ins

AFTER YOU'VE TRIED these add-ons, you'll have to decide which ones to keep and which ones to discard. To remove an add-on, use the uninstall tool in Windows (*Start•Settings•Control Panel•Add/Remove Programs*).

Which Plug-in? To identify the plug-ins installed in Netscape 4,

choose *Help•About Plugins*. Netscape 6 lacks this menu option, and Netscape 6-specific versions of your favorite plug-ins might not yet be available. But there's a simple fix: If you have both versions of Netscape on your hard disk, copy those plug-ins from the Plugins folder in

Netscape 4 to the corresponding folder (ordinarily Program Files) under Netscape 6.

The exact name of the DLL you'll need to delete is listed when you open the About Plugins page. If the particular plug-in you want to remove is not listed in the Programs list under Add/Remove Programs, you must delete it manually from its folder, usually Program Files\Netscape\netscape version\Plugins.

Mind Your Associations: Once you've picked your favorite virtual stereo system—be it Real-Player, Windows Media Player, or some other—make sure that your audio and video files are associated with it and not with its competitors. That option is

usually offered during the player's installation routine, but you can usually change the configuration later by adjusting the player's own menu options.

You can also designate associations from within a folder window. Begin by selecting *View•Folder Options* and clicking the *File Types* tab. Next identify an audio file type on that list, click it, and select *Edit* to change the associated application. Alternatively, you may choose to reinstall your preferred player and then allow it to reclaim its own file associations. The last player that you install always offers to claim associations during its installation process.

–Yael Li-Ron

BROWSER BOOSTERS

THESE UTILITIES WILL give your browser the features and functionality that you wish it had had to begin with.

InterMute AdSubtract: This tool turns off those blinking, winking, annoying ads once and for all. The Pro version also eliminates "special offer" boxes that pop up incessantly and spoil the view. The basic SE version is free, and the Cookie Edition (CE) is trialware that's good for 14 days. If you like CE, upgrade to AdSubtract Pro for $30.

InterMute AdSubtract (www.adsubtract.com); 2.5MB; works with AOL, IE, Netscape, or Opera

Babylon: This translation tool is for people who have international customers, or who simply want to look up a foreign word or phrase. The utility, which pops up when you click a custom-configured mouse key, lets you specify the languages you wish to translate into (the list includes Arabic, Chinese, Hebrew, French, German, and Italian).

TIP If you use the right mouse button as Babylon's hot-key, you lose that button's functionality. You can avoid this result by using a mouse-button/keyboard-key combination instead.

Babylon (www.babylon.com); 1.5MB; works alone

Atomica: If you like FlySwat, you'll love Atomica (formerly called GuruNet). Both products provide a similar service but use slightly different approaches. FlySwat hyperlinks on-screen phrases in Internet Explorer and lets you learn more about words you <Alt>-click in any application. That is Atomica's method, too. But Atomica offers far more information than FlySwat, and its interface is less intrusive.

Atomica (www.atomica.com); 150KB; works alone

IE Speakster: Don't read a Web page—have Merlin read it to you. IE Speakster is a free voice synthesizer that reads Web pages to you when you right-click within the browser and select *IE Speakster*. It's ideal for surfers with limited vision.

TIP When Merlin reads, a small browser window that contains a link to IE Speakster pops on your screen. Don't turn it off unless you want to disable the tool. Merlin disappears automatically when the utility finishes its work.

Customized Computer Software (www.webtalkster.com); 12MB; works with IE 5 or alone

Bay-Wei Chang, senior research scientist, Google

"The Google Toolbar... adds buttons for each search term so I can jump directly to the words on the page I'm viewing. **"**

HandsFree: How are your wrists feeling? Want to give your upper appendages a break? Instead of typing and clicking, use this free add-on for IE to tell your browser where to go and how to fill in Web forms. It requires a microphone, naturally.

TIP To follow a link, say the first few words out loud. HandsFree also assigns numbers to links, so you can say "number three" to open the third link. The Help menu at the bottom of the screen lists keywords and the military alphabet system used to spell out Web addresses in dictation mode. If you say "Type address www dot alpha bravo charlie dot com," for example, HandsFree takes you to www.abc.com.

Edumedia (www.edu-Media.com); 2.5MB; works with IE 5 or alone

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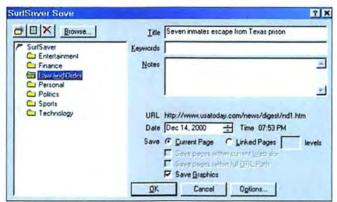
FIGURE 5: ASKSAM'S SurfSaver lets you save Web pages to a local folder. SurfSaver also gives you the ability to search saved pages by category.

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As low as $70 per month†

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ESS Allegro Integrated PCI Audio
JBL Platinum Speakers with Digital Audio Port
2X AGP with 64-bit Hardware Accelerated 3D Graphics
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Featuring Compaq NET Powered by MSN

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8X DVD-ROM Drive
ATI Mobility Hardware Accelerated 3D Graphics
   with 16 MB Video Memory
56K ITU V.90 PCI Modem and 10/100 NIC Card
Hi-Capacity LiIon Battery
256 KB Integrated "On-chip" Cache
Integrated 10/100 BaseT Network Port
Featuring Compaq NET Powered by MSN

Personalize by choosing:
Additional LiIon Battery: Add $99
15.0" TFT UXGA Display: Add $150

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64 MB SyncDRAM
10.0 GB UltraDMA Hard Drive
8X DVD-ROM Drive with FutureBay™ Technology
ATI Mobility Hardware Accelerated 3D Graphics
   with 8 MB Video Memory
56K ITU V.90 PCI Modem
256 KB Integrated "On-chip" Cache
Microsoft Office 2000 Small Business Edition
Featuring Compaq NET Powered by MSN

Personalize by choosing:
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128 MB SyncDRAM: Add $100

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56K ITU V.90 Modem

ESS Allegro Integrated PCI Audio

JBL Platinum Speakers with Digital Audio Port

2X AGP with 64-bit Hardware Accelerated 3D Graphics

Compaq CV535 15" Monitor (13.8" VIA)

Featuring Compaq.NET Powered by MSN'

Personalize by choosing:

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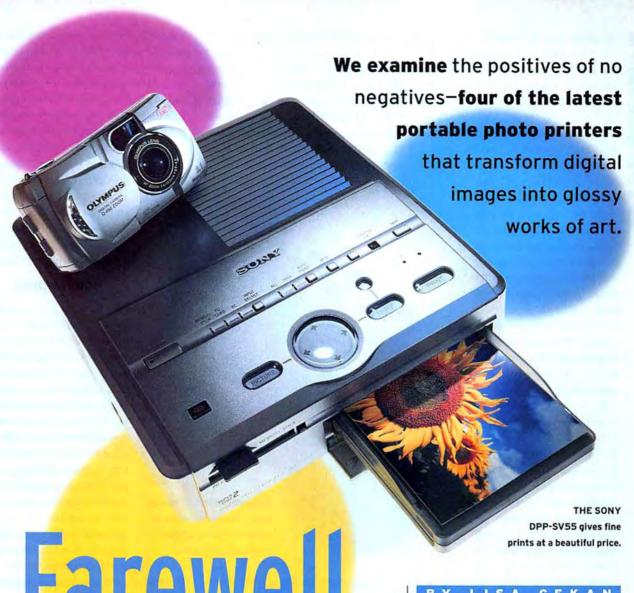
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We examine the positives of no negatives—**four of the latest portable photo printers** that transform digital images into glossy works of art.

THE SONY
DPP-SV55 gives fine
prints at a beautiful price.

Farewell,
Photo
Lab?

BY LISA CEKAN

WITH DIGITAL cameras getting better and cheaper, people are naturally using them to record more of their memories. But while digital photos have their advantages, until recently you couldn't readily give a friend or relative a print to stick into the family album. Instead, you had to download the photos to your PC and then either use an online printing service or print them with an ▶

PHOTOGRAPHS BY KEVIN TWOMEY

ink jet printer, all of which took time. Today you have another option: You can use one of the new breed of portable "snapshot" printers that produce prints quickly and simply. Most of them can read directly from the SmartMedia or CompactFlash memory cards that your digital cameras use, so you don't need a PC. And some can even crop and enhance pictures without a PC. But they do have limitations: None of the printers we tested can produce normal prints larger than 4 by 6 inches (although two can do panoramic shots), and we also discovered that image quality sometimes fell short of what you could expect to get from a good ink jet printer. Nonetheless, these printers provide a quick and easy way to make prints of digital photos.

We looked at four small snapshot printers from Acer, Canon, Polaroid, and Sony; the units' prices range from $99 to $449. The quality of their prints varies nearly as widely as their prices, and there is no correlation between the two. The $299 and $249 printers produced the most- and least-pleasing prints, respectively. Three of the four printers use dye-sublimation, a process that produces high-quality prints that should be more durable and better looking than the output most ink jets deliver. The fourth printer, from Polaroid, uses that company's Type 500 instant film pack.

To test each device, we printed digital photographs of a range of subjects and asked our panel to rate the quality of each print. For comparison, we also printed our test photos on a high-end ink jet unit, HP's $499 PhotoSmart 1218—one of the few ink jets that have ports for Compact-Flash and SmartMedia cards, and one of the best we've tested for printing photos. (For a review of the PhotoSmart 1218, see www.pcworld.com/news/photosmart.)

POLAROID'S P-500 (above) runs off batteries, whereas the Acer FotoPrisa 300P prints only from a PC.

In many cases, we thought the Photo-Smart 1218 printed better-looking photos than our four snapshot printers; its colors especially were sometimes richer and more vivid. Still, ink jets continue to have problems with fading prints (see "Lost in the Ozone: Epson Photos Fade," www. pcworld.com/news/ozone). Independent research by Wilhelm Research has shown that while prints from every type of printer fade eventually, dye-sublimation prints remain vivid much longer than prints from ink jet printers. Plus, the printers we looked at cost less than the PhotoSmart.

Of the portable printers we review here, Sony's DPP-SV55 provides the best combination of print quality and low price, and it earns our Best Buy award. Though the Canon Digital Printer CD-300 produced prints that were very nearly as good, it costs $449—$150 more than the Sony and nearly as much as a good desktop photo printer.

HOW IT WORKS

THE PRINTING process that dye-sublimation printers use differs from that of ink jets: Instead of spraying jets of ink onto a page as ink jet printers do, dye-sublimation printers apply a dye from a dry ribbon. Heat diffuses the dye onto specially treated paper. These printers use a three-pass system, layering cyan, magenta, and yellow dyes on top of one another; they then add a clear coat to protect the print against ultraviolet light. Done properly, this technique creates a smooth picture free of the dithering you see on ink jet prints (see "Dyes Don't Dither," page 132).

Dye-sublimation has one major shortcoming—production cost. Prints from the models we tested were between 80 and 90 cents each, compared with about 30 cents per print to develop standard film. But because you're printing digital shots, you can choose only the photos you want.

PHOTO PRINTERS | FEATURES COMPARISON

PHOTO PRINTER	Street price (2/5/01)	Print speed [1] (minutes: seconds)	Print quality	Maximum print area (inches)	Cost per print [2]	Storage media supported	Computer interface
Acer FotoPrisa 300P 888/723-2238 www.acercm.com	$99	2:11	Good	4.0 by 5.0	80 cents	None	Parallel
Canon Digital Printer CD-300 800/652-2666 www.powershot.com	$449	3:14	Very good	3.9 by 9.8	83 cents	PC Card,[3] CompactFlash	Parallel
Polaroid P-500 781/386-2000 instantphoto.polaroid.com	$249	0:32	Satisfactory	2.2 by 2.9	90 cents	CompactFlash, SmartMedia	None
Sony DPP-SV55 800/222-7669 www.sony.com	$299	1:46	Very good	4.0 by 6.0	80 cents	PC Card,[3] Sony Memory Stick	USB

Best Buy

[1] Average time per picture to print each of five test images at maximum print size.
[2] Includes cost of paper and ribbon.
[3] PC Card slots can be used for either CompactFlash or SmartMedia cards with an optional adapter.

Printers based on dye-sublimation technology are also expensive to manufacture, and the cost increases as the printing area gets bigger. All the dye-sublimation printers we reviewed are limited to 4-by-6-inch or smaller prints. If you move up to a dye-sublimation printer that can produce an 8 by 10, the price rises to the vicinity of $1000. But full-size units deliver stunning results, to judge from prints we created with Olympus's Camedia P-400 (see "No-Squint Printers," page 132).

DPOF DEMYSTIFIED

ALL THE PRINTERS examined in this roundup—except the Acer—can print directly from digital camera memory cards and support Digital Print Order Format, which lets you select the pictures you want to print, quickly and directly. With DPOF, you preview the images and mark those you want to print before taking the media out of the camera. Then you put the memory card in the printer, and it picks the tagged shots and turns them into prints. Some small dye-sublimation printers let you use a TV screen to view and select shots to print. But if a TV set is not at hand and you're bypassing the computer, DPOF is the one remaining workable solution. The only other alternatives are impractical: to print everything in your camera or to try and remember which photos are which by number.

Acer FotoPrisa 300P

AT JUST $99, the Acer FotoPrisa is the least-expensive snapshot printer we reviewed. With a sleek, black case, a weight of 7.1 pounds, and a small footprint, the FotoPrisa looks easy to tote around, but you won't want to: It prints photos only

Photo Prints Compared

ACER FOTOPRISA
Detailed prints with a slightly orange cast.

CANON CD-300
Smooth prints with subtle shading.

POLAROID P-500
Fuzzy prints, much smaller than others.

SONY DPP-SV55
Sharp, vivid prints with realistic color.

from a PC. The FotoPrisa attaches to a computer via the parallel port; it has no slots for digital camera media. Printing from a PC is not as quick and easy as printing from a memory card—a big limitation. But a second port to the back of the FotoPrisa's case simplifies the task of

We had **no trouble** setting the **Acer** unit up. In minutes, we were printing our **first photo.**

adding the unit to a standard peripheral—just plug your regular printer into the back of the FotoPrisa. We had no trouble setting the Acer unit up, and its simple controls consist of ready and status lights. Within a few minutes, we were printing our first photo from a PC. The printer

comes with Ulead's Photo Express image-editing software for touching up photos, creating an album, and making birthday cards and invitations from templates.

Printing a 4-by-5-inch photo with the FotoPrisa took a little more than 2 minutes, longer than with some other printers we tested, but acceptable. Photo quality was good, too: At its fixed resolution of 300 by 600 dpi, the FotoPrisa's prints showed fine detail and smooth transitions, but colors looked a bit too orange. Of the four printers reviewed here, only the Sony produces larger prints—4 by 6 inches—than the Acer's maximum 4 by 5 inches.

Bottom line: If you store photos on your PC anyway, you may not need the versatility of a dye-sublimation printer. The FotoPrisa's price is certainly right.

Canon Digital Printer CD-300

THE CANON CD-300 can print images in several ways. It can connect to your PC via the parallel port, and it can pull images directly from a PC Card or from a CompactFlash card (SmartMedia requires an optional $35 adapter). On top of that, it's the only unit we tested that's able to print directly from a video camera, through the printer's video or S-Video port. The CD-300 is bundled with Canon's own Home Lab software for touching up photos and turning them into calendars or birthday cards; you can also edit images in the printer and preview the results on a TV without using a PC.

The CD-300 produced the second-best photo quality of the group, with beautiful colors, smooth transitions, subtle ▶

Comments

The least-expensive dye-sublimation printer we tested, the FotoPrisa lacks ports for memory cards, limiting it to printing from a PC. Photos looked smooth and sharp, though slightly orange, and the printer's price can't be beat.

The versatile CD-300 can connect to a TV, a PC, a camera, or a memory card. Its many features include a standard tray for panorama paper. The biggest drawback is price—the small unit costs almost as much as a standard-size photo printer.

The only true portable printer in the bunch, the P-500 includes a shoulder strap for easy transport. It prints photos on Polaroid film, but these small pictures don't capture detail well.

The Sony provides just as many ways to connect as the feature-rich Canon, for $150 less. It offers an optional panorama tray, and we loved the crisp, vivid print quality.

shading, and detail nearly as sharp as the Sony's. You can print 4-by-10-inch panoramic prints, and Canon includes paper and a cassette tray for panoramic pictures. You'll have to wait a while for your photos, however; the CD-300 took just over 3 minutes per 4-by-6-inch photo.

The Canon's heady assortment of features comes at a price: The $449 CD-300 is the most expensive printer in this group, just $50 short of an ink jet such as the HP PhotoSmart 1218 that produces photo-quality output. It's also one of the heaviest (at 5.9 pounds), and it can't operate off batteries.

Polaroid P-500

FOR TRUE portability, the $249 Polaroid P-500 wins hands down. It measures just 2.2 by 7.3 by 2.4 inches, weighs about a pound, uses standard Polaroid Type 500 film, and includes a strap so you can toss it over your shoulder. The Polaroid prints from CompactFlash cards, and from SmartMedia cards with an included adapter; it doesn't work with a PC or a television.

Printing could not be easier—just load the film pack and go. The battery that

Dyes Don't Dither

DYE-SUBLIMATION PRINTERS work by mixing dyes, a process that creates solid colors and smooth transitions between colors. With ink jet printers, you'll typically see the individual dots of different colors that the printer uses to create transitions between colors, a technique called dithering. In the output samples above, you can see the dither pattern in the ink jet print; in contrast, the dye-sublimation print looks smoother.

powers the printer resides in the film pack. If the battery runs out, you can't use the rest of the prints in the pack, but fortunately, the printer shuts down automatically after a few seconds of inactivity. The P-500 creates the smallest prints of the group, at just under 2 by 3 inches. Moreover, at $8.99 per pack, Polaroid's film isn't cheap. Each shot costs about 90 cents—the most expensive here.

The P-500's biggest liability, however, is its print quality. The Polaroid's small prints look somewhat fuzzy and lack the three-dimensionality of the other snapshot printers. In our speed tests, prints popped out in just 32 seconds, but as with Polaroid instant cameras, you have to wait 90 seconds more for the photo to develop.

The P-500's portability makes this printer a fun device to add to your digital camera. Still, it is rather limited, and the price is a bit steep for what you get.

Sony DPP-SV55

SONY's $299 dye-sublimation printer appeals to our sense of nostalgia, with a brushed metal look and a wide, flat case that resembles a 1970s tape recorder. Like the Canon, the SV55 is versatile and has a lot of extra features. It connects via USB to a PC and includes slots for printing straight from a

Sony Memory Stick or from a PC Card, though you'll need optional adapters to use SmartMedia or CompactFlash cards, which typically cost about $35 and $20, respectively. Printing directly from a card is easy. You can use DPOF to mark the images in the camera or connect the printer to a TV. From there you simply preview photos and choose the one you want to print; you can also use the buttons on the SV55's control panel to zoom, crop, change contrast, and rotate images. In addition, the SV55 can create calendars and cards with messages on them using creative print functions built into the printer. At 4.6 pounds, the SV55 isn't terribly heavy to carry, but it can't run off batteries.
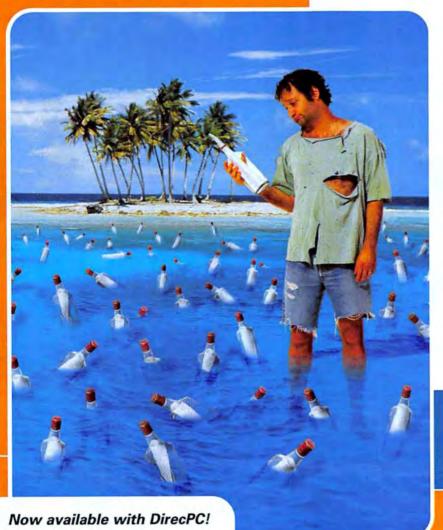
Printing at 403-by-403-dpi resolution, the SV55 produced the best prints of the four units we tested (though the Canon CD-300 wasn't far behind), with realistic colors and fine detail. The Sony's speed was reasonably good—under 2 minutes for a 4-by-6-inch print—and the paper that comes with it has perforated edges just inside the print area for edge-to-edge printing. And with a price $150 lower than the Canon's, the Sony is a better deal.

Lisa Cekan is a staff editor at PC World who regularly covers printers. ∎

No-Squint Printers

IN ADDITION to the four portable printers we reviewed, two dye-sublimation printers from Olympus are worth mentioning. The Camedia P-400, a full-size dye-sublimation printer, has a hefty price tag—$999—but produces near-letter-size 7.64-by-10-inch prints with rich colors and fantastic detail. See our review at www.pcworld.com/reviews/dyesub. Olympus also makes a snapshot printer, the Camedia P-200. It arrived too late for us to include in this roundup, but you can read our online review of this $449 printer at www. pcworld.com/apr2001/photoprint.

THE CANON CD-300 produces great prints, but at $449, it's expensive.

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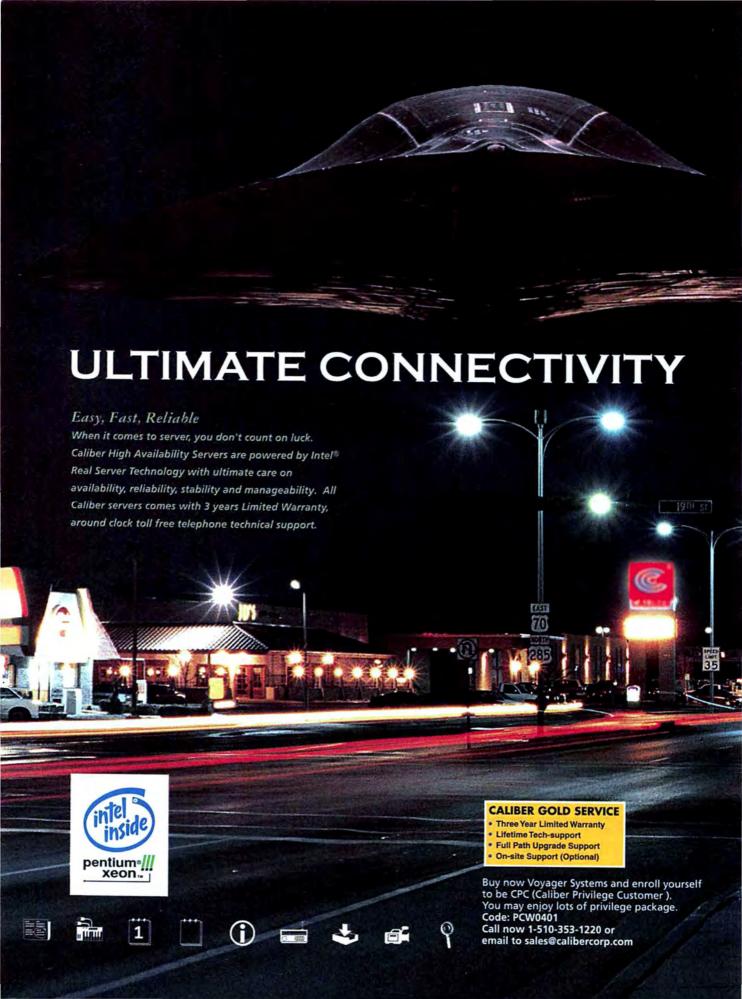
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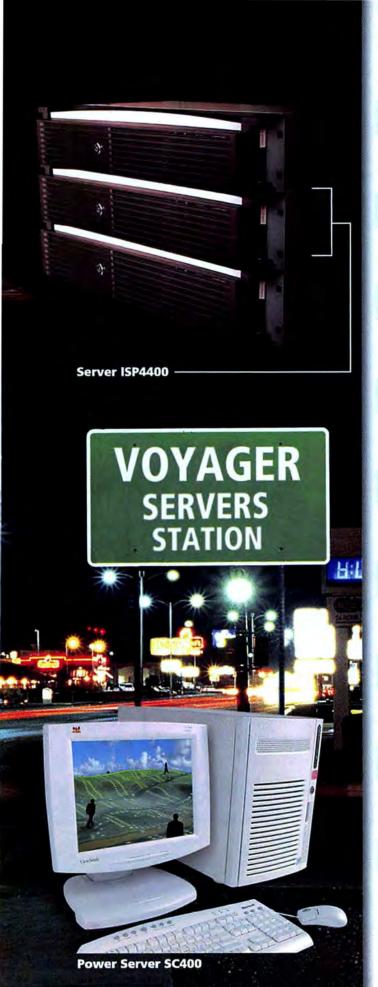
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Got comments on *PC World's Enterprise Technology*? E-mail suggestions and feedback to eddir@pcworld.com.

Inside

Computing by Subscription

A new breed of service company promises to deliver PCs, software, and great tech support for a low monthly fee. Should you get aboard?
By Eric Knorr

CONSIDER THE copying machine. You pay a monthly fee to use it. Nobody thinks about it unless it breaks—at which point a tech visits, replaces a part, and disappears.

What if your company's computers, software, and local-area network could be maintained in the same offhand way? That's the proposition offered by new companies—dubbed outsourced infrastructure providers (OIPs)—that charge by subscription for an officeful of hardware, software, and networking. OIPs rent bread-and-butter IT by the seat. You pay a couple of hundred bucks per PC per month for someone else to shoulder the burden: desktops, laptops, servers, printers, routers and hubs, e-mail, backups, Windows and Office 2000, Internet connectivity, and help desk services.

Led by innovative start-ups CenterBeam and Everdream, OIPs primarily serve small to medium-size businesses that would otherwise handle tech needs internally, rely on a patchwork of vendor support plans, or outsource to a local value-added reseller (VAR) or service company. However, their services may also appeal to large enterprises with small, far-flung offices that don't have on-site IT staffers.

But by no means are OIPs for everybody. For one thing, they support only the hardware and software they supply. In other words, you basically have to upgrade your entire office at once, and then donate the old stuff to charity or hand it out to employees. And because these companies are still in start-up mode, their customers are gambling that OIPs' business model will permit them to provide high-quality service over the long haul.

MIKE GRIMM, chief technology officer at HQ Global, plans to turn over responsibility for 3000 PCs in 370 offices to IT outsourcing company Everdream.

"It was a little hard to swallow at first," says Ravi Kulasekaran, CEO of Appshop in Fremont, California, and one of Center-Beam's largest customers. "We had to give up 25 new computers that we owned outright." But when he ran the numbers—and figured in CenterBeam's willingness to buy those existing PCs for $300 apiece—Kulasekaran was sold. An application service provider (ASP) that in 2000 grew from 20 to 160 seats, Appshop has plenty of in-house tech savvy, but focusing that expertise on the core business made more sense.

The wisdom of disposing of IT infrastructure you've paid for and replacing it with rented hardware and software may seem counterintuitive. But in most organizations, the total cost of ownership remains high. According to the Gartner Group, the average business spends between $4500 and $7500 per PC per year in maintenance and amortization—though with upgrades and acts of God, it's difficult to predict costs year to year. OIPs typically charge between $150 and $300 per month per PC, plus a once-only setup charge of several hundred dollars to move

to start fresh with an outsourced solution. But if you're hemorrhaging uptime and fretting over how to recruit and retain good IT talent, OIPs provide an appealing option. Just keep in mind that in outsourcing a vital part of your business, you have to fully trust the OIP you choose.

MAKING THE LEAP OF FAITH

THE OUTSOURCING of information technology is nothing new. Huge service providers such as EDS and Computer Associates have offered total computing solutions to big corporations for decades. And big customers of IBM, Compaq, and Dell can command special packages that involve a variety of leasing and outsourced IT arrangements. Among system vendors, Micronpc.com comes closest to the OIP model; it offers various comprehensive solutions to small and medium-size businesses, including PCs by subscription and Web hosting, designed to integrate with a company's existing IT plan. (See "The Pros and Cons of PC Makers' Service Plans," page 142, for more on the services offered by major PC manufacturers.)

By contrast, OIPs take complete responsibility for the nuts and bolts of the IT infrastructure, but on a smaller scale and at a cost far lower than that charged by monster companies like EDS. When users have trouble, from an ugly PowerPoint presentation to a downed network connection, they call one number—the OIP help desk. "Everyone I work with has said that the CenterBeam help desk is great," says Angelique Faul, director of operations at Evans Partners, a public relations firm with offices in San Carlos and Santa Cruz, California, that turned to CenterBeam. "Before, we'd call our computer guy, and it might be two days till he could get here."

So how do you choose a partner that will deliver not only this month, but also years from now? "You want to pick a firm that has strong relationships with larger firms," says Rob Enderle, vice president of Giga Information Group, "so it can survive the consolidation that's going to happen in the market." By that measure, CenterBeam and Everdream—the only two OIPs with a national presence—lead the pack. Based in Santa Clara, Cali- ▶

HELP DESK for rent: Everdream's staffers field support calls.
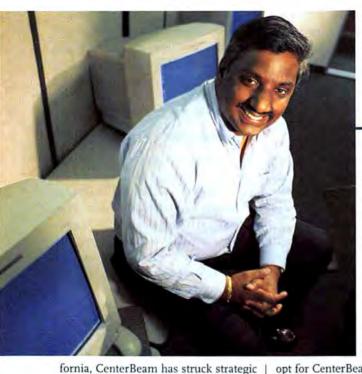
> The wisdom of replacing **IT infrastructure you've paid for** with **rented hardware and software** may seem **counterintuitive.**

HQ Global, the world's largest turnkey office provider and Everdream's biggest customer, is a good example of a large company that discovered that an OIP was a good fit. With 370 business centers across the United States, "it's extremely difficult to provide a high level of IT support," says Mike Grimm, HQ Global's chief technology officer. "I was able to show that through a reduction of head count, depreciation expenses, and an elimination of capital expenses, I would save more than 10 percent [using an OIP]." Grimm plans to turn over responsibility for 3000 PCs to Everdream.

data from each old machine to each new one. That adds up to a cost of around $3000 to $4000 per PC per year, depending on peripherals, the type of Internet connection, PC configuration, and other factors. This fixed rental fee includes continuous software upgrades, data backup, hardware upgrades every three years, and one-stop, guaranteed service and support.

Whether an outsourced, computing-by-subscription solution makes sense for your company depends on several factors. If you've recently invested heavily in equipment and personnel, and you're happy with the results, there's little reason

APPSHOP'S RAVI KULASEKARAN says CenterBeam's IT services make sense for now—but he'll keep tabs on costs as his company grows.

The packages that CenterBeam and Everdream offer diverge in three areas: minimum number of seats, default Internet connection, and networking options. CenterBeam won't support offices that have fewer than ten seats, while Everdream will take on a one-person office. On the other hand, if you opt for CenterBeam's base price of $225 per month for a Dell 600-MHz Celeron desktop, you get a DSL connection and a Lucent wireless LAN setup as part of the package. Everdream's $159 base price includes an HP 866-MHz Pentium III system with a 56-kbps dial-up connection and no local network. XO Communications provides DSL as an option, but Everdream prefers to let its Ingram VAR network make the sale and do the setup for networking. Both OIPs partner with T1 and frame-relay providers.

Other providers that tout similar deals are fast emerging, notably MindShift in the Baltimore-Washington and Chicago areas, and IReadyWorld in the southeastern United States.

These days, even big-company alliances don't guarantee success. CenterBeam's CEO, Sheldon Laube, scoffs at the possibility of business failure but notes, "In the worst case of all, if we disappear, what you're left with is Cisco routers, Dell servers...the same stuff you would have bought most probably anyway." That may be, although the OIP, not the customer, owns the equipment—leaving a particle of risk that your hardware could be repossessed. That nightmare scenario doesn't seem to bother Appshop's Kulasekaran, who asserts that he'd port the data over to new machines and have everything back to normal "inside of a week."

THEIR PROBLEM, NOT YOURS

OIPS AND their customers cite responsive, one-stop service and support as the biggest benefit. "Most problems are fixed within 2 minutes," enthuses RoseMary Anderson, accounting manager for West Coast Office Interiors of Santa Clara, California, a CenterBeam customer. And Everdream is so confident of its help desk, the company will refund a month's per-seat subscription fee if its support line isn't answered within 90 seconds. OIP customers routinely report that the remote support is so good, on-site technicians are seldom needed.

How can OIPs guarantee high-quality service? Everdream's Gary Griffiths extols the virtues of the advanced tools his techs use to diagnose and solve problems over the Internet: "We have nine patents that are pending right now and another dozen or so that are in the pipeline, and they're all related to improved levels of ser- ▶

fornia, CenterBeam has struck strategic deals with Dell and EDS, and it secured $115 million in blue-chip investment last November. Everdream, of Fremont, California, claims Hewlett-Packard and Ingram Micro as partners and last September received $50 million in funding from the likes of HP and Siebel Systems.

Among other benefits, these alliances enable CenterBeam and Everdream to deliver on-site service where necessary. Everdream's contract with Ingram Micro's VentureTech Network of VARs gives the company a national on-site service organization. And similarly, through its relationship with Dell, CenterBeam can call on Banctech technicians for on-site service nationwide.

Outsourced Infrastructure Providers: What You Get, What You Pay

VENDOR	Price per month per desktop	Price per month per notebook	Minimum contract	Help desk		Standard software	Other supported software
				Hours/days	Guaranteed response time		
CenterBeam 408/844-0900 www.centerbeam.com	$225 [1] for Dell OptiPlex with 600-MHz Celeron, 128MB of RAM, 10GB hard drive, and 17-inch monitor	$325 [1] for Dell Latitude with 600-MHz Celeron, 128MB of RAM, 10GB hard drive, and 14.1-inch screen	36 months (typical)	24/7	None [2]	Windows 2000, Office 2000 Professional, Adobe Acrobat	Any Windows 2000 application
Everdream 510/818-5500 www.everdream.com	$159 for HP Vectra with 866-MHz Pentium III, 128MB of RAM, 30GB hard drive, and 17-inch monitor	$219 for HP OmniBook with 650-MHz Pentium III, 128MB of RAM, 10GB hard drive, and 14.1-inch screen	36 months [3]	24/7	90 seconds (or 1 month free)	Windows 2000, Office 2000 SBE, Adobe Acrobat, McAfee ActiveShield, McAfee Clinic, RealPlayer, QuickTime	Any Windows 2000 application [4]

[1] Based on 20-seat price.   [2] Satisfaction guaranteed or customer may terminate contract without penalty.   [3] Optional one-, two-, and three-year service-and-support contracts available with hardware purchase.   [4] Guarantees support for technical issues only.

Voilà!

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vice." That technology, along with the self-diagnosing software preloaded on OIP systems, helped sell HQ Global's Mike Grimm. "Everdream has done a lot of things to solve problems proactively, before they fester into bigger problems," he says. "For example, when your PC boots up, it automatically compares all the DLLs and executables on the hard drive to a standard configuration. If it sees an error, it will correct that proactively."

Beyond technology and crack call-center management lies another explanation for OIPs' quality service and support: These companies handle the software and hardware they ship to customers and generally ignore all other hardware, software, and networking. That strategy means fewer choices for customers. Go with CenterBeam, and you get Dell desktops, notebooks, and servers; go with Everdream and you get HPs. You get some flexibility on configuration, such as memory and monitor size, but not much. Both include Windows 2000 and Office 2000 in their standard packages, along with virus protection, system utilities, audio/video players, an e-mail account, and online tutorials. Accounting software and Web hosting are optional. CenterBeam ships Lucent wireless LAN hardware and Windows 2000 networking by default; Everdream suggests a consultation before you choose a LAN setup. The limited selection is a trade-off, but there's nothing stopping you from deploying other stuff—the OIP just won't support it.

WEIGH YOUR OPTIONS

FROM A PURE COST standpoint, the ideal OIP customer would be a start-up that hadn't spent a dime on IT and wanted to keep capital expenditures low. OIPs, however, prefer to focus on a less risky and more prevalent customer base: existing businesses with IT problems and an office full of outdated equipment.

CenterBeam customer RoseMary Anderson faced just such a situation. When CenterBeam made its pitch to her, "We had a very ancient set of computers, from 386s all the way to Pentium-133s," she says. In addition, after employing a series of "incompetent" IT contractors, she was now carrying the support burden herself. "I had reached between 80 and 96 hours a week and I couldn't take it anymore," says Anderson. Skeptical at first, she grew impressed by CenterBeam's tech-savvy pitch and emphasis on security and reliability. But cost made the decision a no-brainer: "We pay under $48,000 a year for our 21 computers," she says, networking included. "That's less than I would have to pay for a single IT person."

Escaping the upgrade rat race is another key benefit. Included in Everdream's subscription price is an automatic upgrade to more powerful hardware every three years. That pace might be a little slow for an engineering company, but with ordinary office applications it's pretty much ideal. Better, OIPs deliver bug fixes and new versions of productivity applications as soon as they are available.
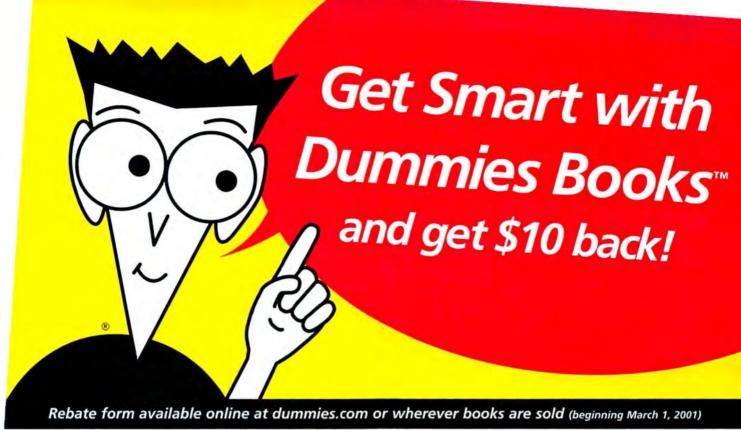
Angelique Faul factors the cost of downtime into her evaluation of CenterBeam's solution. A year ago, her IT situation had deteriorated to the point where she was losing "an hour to 2 hours of billable time per employee per day." According to Faul, now that she's contracted with Center-Beam and downtime is a rarity, recov- ▶

Doing the Math Outsourced IT
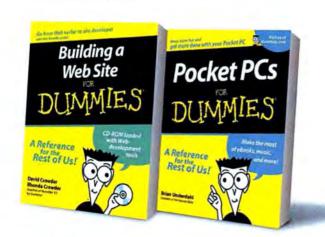
HERE ARE TYPICAL COSTS of setting up a Microsoft-based, 20-person office compared with those charged by a typical outsourced infrastructure provider (OIP). Because OIPs include ongoing software upgrades—and hardware upgrades every three years—in their monthly fees, we've calculated the monthly hardware and software costs of doing it yourself across three years. If you choose not to hire a full-time IT person, you'll dissipate your salary savings on various VAR setup charges, extended support plans, employee training programs, and (very likely) the incalculable costs of downtime. On paper, the core of the OIP value proposition is clearly premium service and support. Your mileage, of course, may vary.

THE 20-SEAT OFFICE: DOING IT YOURSELF VS. OUTSOURCING
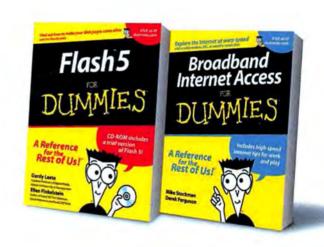
	Doing it yourself (estimated monthly cost)[1]	Outsourced infrastructure provider
20 desktop systems	$700	
DSL connection	$100	
File server	$170	
Proxy server	$80	Provider's flat rate per seat per month=
Exchange server	$150	$250 to $300
Backup device	$150	
Software site licenses	$200	
Network hardware	$80	
IT professional	$6250	
Help desk services	Varies wildly	
Upgrade after three years	Varies wildly	
Total per month	**Over $7880**	**$5000 to $6000**[1]

[1] Hardware and software cost spread over three years, not including finance or setup charges

INFOGRAPHIC: SEAN McDONALD

ering those billable hours offsets the monthly subscription fee.

Where the OIP model begins to falter is in larger offices—and not only those that might need to scrap a big IT setup. For example, Appshop has grown so quickly that Kulasekaran wonders when the vol-

ume discounts his company can demand, along with the opportunity to spread internal IT support costs across many PCs, will outweigh the convenience and economy of CenterBeam's flat-rate plan. "When we grow to 300 people, we'll have to do the cost-benefit [calculation] again" to see if the current deal still makes sense.

Kulasekaran thinks that when the time comes, he can cut a deal with CenterBeam and continue the relationship. In fact, he says, he's already negotiated a better deal than the standard flat rate for smaller customers. And Mike Grimm received a major concession—during the shift from in-house IT to Everdream over the next 18 months, Everdream is supporting his older equipment.

Special deals like these raise troubling questions for would-be OIP customers. If an OIP makes concessions to snag big accounts, can it grow smoothly? Will a sudden jump in PCs from a new big account degrade service? There's no clear answer, though CenterBeam cites its relationship with EDS, which is happy to take on large accounts that CenterBeam can't handle. One thing is certain: If an OIP's service were to falter, the value proposition would quickly evaporate.

Tech Support From the Source

The Pros and Cons of PC Makers' Service Plans

IF YOU LIKE your PC vendor, you might like the idea of handing over all your support headaches to that company. After all, who knows hardware better than its manufacturer? But when it comes to doing business with old-guard computer makers, expect trade-offs.

On the plus side, major PC manufacturers have far broader hardware offerings than the take-it-or-leave-it desktop and laptop configurations provided by outsourced infrastructure providers such as CenterBeam and Everdream. And the PC companies may offer more complete IT services for some customers. Streamlined, easy-to-understand pricing and simple all-in-one support plans, however, are much harder to find.

Dell and IBM, for example, don't themselves offer packages that let you get a PC and service for one monthly service charge. Instead, they work with third-party leasing firms to devise payment plans for PCs and IT services. And leasing companies like Dell Financial Services (partially owned by Dell Computer) don't claim to offer the breadth of help desk services CenterBeam and Everdream provide.

MICRON'S MENU

MICRONPC.COM comes closer to the CenterBeam/Everdream approach. Its Subscription Computing program offers a veritable Chinese restaurant menu of system configurations and levels of IT services to choose from. Unlike CenterBeam and Everdream, which support only the systems they install, Micronpc.com will service any computer. But the company draws the line when it comes to performing complex tasks such as remote network management, data backup, and software distribution.

Gateway, meanwhile, is using its 300

Gateway Country retail outlets as regional support outposts for its business customers. Services include networking, Web and e-mail hosting, firewall protection, Internet connectivity, and application support. And as with Micron, pricing is based on an à la carte suite of options, not a one-package solution.

Will more PC manufacturers offer all-in-one IT outsourcing plans in the manner of startups like CenterBeam and Everdream? "Larger vendors are keeping a close eye on what these companies are doing," says John Madden, an analyst with Summit Strategies, pointing out that Hewlett-Packard and Dell have established relationships with Everdream and CenterBeam, respectively. Madden thinks the heavyweight hardware vendors will jump to capitalize on any success they see—and that it wouldn't take much for a vendor to rejigger its sales pitch to replicate the IT-in-a-box approach to selling PCs and services. For now, however, you might find that it takes several days to get a monthly per-desktop price quote from one of the big guys that matches one of the package deals that CenterBeam or Everdream can put together in an hour.

—Tom Spring

OUTSOURCING THE FUTURE

DAVID TAPPER, a senior analyst with International Data Corporation, firmly believes in what he calls the "utility model" of computing, in which OIPs play a key role. He sees companies like CenterBeam and Everdream as foot soldiers in a long march toward ASP-based computing, where Microsoft.net and thousands of application developers will use OIPs as a pipeline for applications you subscribe to rather than purchase. Already, he notes, both companies have dozens of ASP partners offering such services as e-commerce storefronts and human resources management. But they will embrace new technologies—such as handhelds—only as they become standardized.

Think of OIPs as ultraconservative, outsourced IT departments. If you'd like to stop worrying about the basics and concentrate on technology strategic to your business, an OIP is a compelling option, provided you believe the promises that quality of service will remain high—and provided you're willing to upgrade your current infrastructure in one fell swoop.

Eric Knorr is a San Francisco–based consultant and writer. Tom Spring is a senior reporter for PC World. ▶

The front page of the inform

Manage Your Invoices Over the Internet

BUSINESS-TO-BUSINESS e-commerce evangelists might preach otherwise, but the Internet has yet to alter one of the most basic business processes: how buyers pay suppliers.

Today, fewer than 1 percent of all invoices are delivered, processed, and paid over the Net, according to the Gartner Group.

But manual invoicing methods are long overdue for revision. Typically, before a buyer pays a supplier, the invoice passes through a lengthy approval process during which each line item is matched against shipping documents and original purchase orders. When disputes arise, buyer and supplier generally must work them out by phone and fax. "It's excruciatingly painful," says Jeetu Patel, executive vice president of research for Doculabs (www. doculabs.com), a market research firm.

Electronic invoice presentment and payment (EIPP) promises to speed things up by allowing you to present, reconcile, dispute, and pay invoices over the Net. EIPP applications address the invoice-to-pay part of the process and are a natural supplement to Internet procurement systems, according to Brian Valente, vice president of marketing at Avolent (www.avolent.com), a company that creates EIPP protocols for client businesses. Other companies with EIPP products include Bottomline Technologies, BCE Emergis, and NetDelivery.

By managing the review and dispute adjudication process online and transacting payments electronically, EIPP systems could reduce a typical payment cycle from 55 to 25 days, says Valente. But planners

EIPP systems promise to **reduce the payment cycle** from 55 to 25 days. But there are some **huge hurdles to jump** before that happens, including a lack of a common format for invoices.

must jump some huge hurdles before that happens. For one thing, no standards define a common format for invoices, and without such standards EIPP won't work. Then there's the task of linking EIPP systems to back-end databases.

If you're considering an EIPP solution, here's what you need to know:

Think strategically. "An EIPP is part of a larger business process that is done on the Web," comments Alan Neely, senior vice president for EIPP at BCE Emergis (www.emergis.com).

If you are ready to move your procurement systems to the Internet, take the invoice-to-pay process into account

now—down the road you'll have to link the systems anyway. If you've already begun to implement an e-procurement application, work with your current vendors to integrate invoice payment systems.
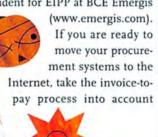
Allocate a budget. The Gartner Group estimates that the cost of buying software and integrating it into the buyer's and supplier's accounting systems—including linking to procurement and inventory systems—will exceed $2 million.

Calculate ROI. Delivering an invoice online costs $1.65, versus $5 for manual delivery, Gartner estimates. Resolving a dispute via e-mail runs about $10, as opposed to $20 over the telephone. Transferring funds over the Net costs about $1.90 per transaction, compared with $4.50 per transaction for a paper check. Another way to save: Some billers spend $20,000-plus annually to ship invoices by Federal Express, just so they have proof that the buyer received the goods.

Pick a partner and get going. Identify your key partner in transaction volume. Analyze how your current invoicing process works with that company, and determine how many days elapse between invoice receipt and payment. How does your partner view automating the process? The answer will help resolve other questions on standards and vendors.

Don't wait for others to dictate. Within three years, buyers will demand that sellers enable them to adjudicate disputes electronically, says Patel. The cost of doing business will otherwise get too high. And standards will emerge when huge buyers that deal with thousands of suppliers move to EIPP, says Patel. "The Chryslers of the world are not going to deal with 1800 different systems," he says.

—Jennifer deJong ▶

ILLUSTRATION: PHILIP ANDERSON

Color Fast: Single-Pass Laser

IF YOU'VE INVESTIGATED buying a color laser printer for your office, you're already aware of the two main obstacles: high prices and low print speeds. New printers from Oki Data and Xerox may change all that.

Oki Data's Okicolor C7000 series and the Xerox Phaser 1235 (both built around Oki Data engines) use LED technology in which an array of lights focuses an image directly onto the drum, thereby dispensing with the laser-beam-and-rotating-mirror engine of traditional laser printers. Thanks to this technology, LED printers complete

OKI C7000

a color print job in one pass, instead of the four passes color lasers require to lay down cyan, magenta, yellow, and black separately. Whereas the print speed of older color lasers maxed out at 4 to 5 ppm, the Phaser 1235 and Okicolor C7000 series single-pass printers attain color print speeds of up to 12 ppm.

But before you run out and buy a single-pass printer, remember that the first iteration of a new technology can usually stand some improvement. "There's room to improve print quality," says Riley McNulty, an IDC research analyst covering the printing market. And at $2700 to $3599, these first-generation single-pass printers cost a few hundred dollars more than similar (albeit slower) color lasers from competing manufacturers such as Hewlett-Packard. But as manufacturing

XEROX PHASER 1235

volume and competition increase, expect pricing to fall in line with color-laser technology. Predicts McNulty, "Single-pass printing should win out over four-pass in the long term."

While IDC wouldn't name any names, keep an eye out for color LED offerings from most major color laser manufacturers in coming months. And then watch the prices come tumbling down.

—*Kristina Blachere*

Hammer Time: AMD's 64-Bit Challenge

SO YOU THINK Intel's oft-delayed Itanium processor is the only 64-bit challenger to Sun, HP, and IBM's domination of the high-end enterprise server market? Think again. AMD has its own 64-bit solution, code-named Hammer, aimed at the middle-tier, Intel-compatible server space where Xeon now rules.

What makes Claw-hammer (for workstations, due in the first quarter of 2002) and Sledgehammer (for servers, due in the second quarter of 2002) unique is that they extend the x86 instruction set—used by all current Intel and AMD processors for PCs—from 32 bits to 64. This means existing x86-compatible apps and operating systems will run on Hammer processors without modification and—thanks to higher clock speeds—should run at a faster clip than on current 32-bit chips.

AMD believes the incremental approach to 64-bit computing will appeal to many

companies. "We're offering CIOs and MIS managers the ability to move up on their own terms and at their own pace," says Bob Mitton, divisional marketing manager of enterprise products at AMD. "They can buy hardware that runs everything they own today. [If they want to upgrade to 64 bits] they can test every application on a case-by-case basis."

Nevertheless, OS and software developers will have to rewrite or recompile their products to take advantage of Hammer's 64-bit capabilities, which causes many industry watchers to wonder: Can AMD muster their support?

The company has tried to entice developers by releasing a software simulator of Hammer. Currently, the Linux community is developing a version of that OS for the processor, and Sun has expressed an interest in making a Solaris OS for it. But industry watchers are skeptical. "AMD is

two years behind Intel in gaining software support for its 64-bit instruction set," says Linley Gwennap, principal analyst for the Linley Group. "Intel's Itanium also is supported by every major server hardware vendor except Sun, whereas AMD does not have any major server design wins. Sledgehammer's market share in large servers is likely to be small unless Itanium suffers additional significant delays."

But there is room in the midsize server space, AMD insists, because the Hammer processors run perfectly well at 32 bits and their success therefore will not depend exclusively on software support. "[With Hammer,] you're essentially getting 64 bits for free," says Mitton.

To an IT department, a gradual migration that employs a known quantity like x86 is attractive. But your company may never get the chance to evaluate Hammer unless a top-tier vendor such as Compaq brings AMD into its server line. And according to AMD, it's still too early to announce anything on this subject.

—*Kristina Blachere* ∎

ILLUSTRATION: PHILIP ANDERSON; PHOTOGRAPHS: MARC SIMON

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SMALL OFFICE•HOME OFFICE

American workers may be able to win friends, influence people, and master Machiavelli at the office, but can they hack it at home? Indeed, while the International Telework Association and Council finds teleworkers are 15 percent more productive at home, many managers continue to insist on eyeballing their employees throughout the day.

But SOHO (small office/home office) professionals can gain the trust of their bosses, colleagues, and clients by creating a truly workable home environment. "It's even more important to be professional at the home office than when you are in a traditional workplace," says Lisa Kanarek, the founder of HomeOfficeLife.com and a home office expert. Screeching kids, busy signals, and slow Internet connections are all red flags for supervisors, as they can signal a home office out of control.

Kanarek is something of a SOHO sensei, counseling remote and home office workers at Texas Instruments, Microsoft, American Airlines, and JC Penney. But even among her top-shelf clientele, Kanarek finds SOHO workers cutting corners at home in ways they would consider unthinkable at the office. A cheap ink-jet printer, for example, may not faithfully reproduce letters and company logos. Nor will a 56K modem support videoconferencing and other real-time collaborative applications.

SOHO workers should instead make balanced technology choices up front, and look for the payoff down the road. "It's easy to get carried away with buying too much or skimping in areas where you shouldn't," she

Opti-UPS' uninterruptible power supplies come with a $25,000 "life insurance policy" for computers that depend on them for power protection.
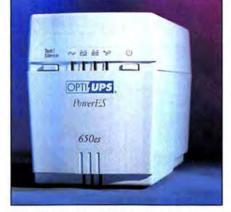
writes. Instead, SOHO workers should take time to find the right product at the right price.

In fact, small-business owners may find that cost-cutting costs more in the long run. Shoddy power supplies, for example, can be especially dangerous. The U.S. Consumer Product Safety Commission has recalled 2 million substandard extension cords, power strips, and surge protectors since 1994. These defective products can damage computer hardware, cause fires, and electrocute their users. Yet some uninterruptible power supply manufacturers do adhere to the highest possible government and industry standards. Opti-UPS, which makes UPS systems for businesses, helps SOHO users protect their assets against blackouts, surges, sags, and other power disturbances.

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CURBING COSTLY TECHNOLUST

The falling costs of many technologies make SOHO gadgetry almost impossible to resist. Still, Kanarek cautions SOHO pros to avoid the temptation to buy PDA modules that surreptitiously record one's lunch dates, or sleek contact managers that will not synchronize with address books on home computers.

Kanarek says SOHO pros should instead ask themselves whether a new technology can pay for itself with time saved. "If not," she writes, "save your money and the time you would spend trying to make the item fit your needs."

Kanarek recommends spending a bit more for more effective and reliable technologies—"Initially you'll spend more, but eventually you'll save time," she

Mail Boxes Etc. (MBE): Everything for the SOHO worker.

writes—especially if it's "something you'll use often." But SOHO pros should also factor training costs into their total cost of ownership (TCO) estimates. If a product is very complicated, a professional trainer may be able to shorten your learning curve from weeks to a day or two.

BUSINESS SERVICE CENTERS: SAVIORS OF THE SOHO WORKER

Even as technology becomes more affordable, many tools remain too expensive or impractical for small offices. Fortunately, SOHO workers can now turn to local service providers for additional support. Mail Boxes Etc. (MBE), for example, backs small businesses with

"Road warriors" and SOHO workers alike use MBE for office and packing supplies as well as online services and mailbox rentals.

34,000 locations nationwide and 800 more scattered throughout the world.

Road warriors and SOHO workers use MBE locations to copy, collate, and laminate color and black-and-white documents; some use their local MBE to send the occasional fax or to pick up office and packing supplies. But MBE also offers its SOHO customers extended services, like mailbox rentals, and packing and shipping via FedEx, UPS, DHL, and the United States Post Office.

MBE also provides online services to SOHO pros at MBEOnline.com, with links to small-business resources and an online print shop, where businesspeople can order business cards, envelopes, and stationery.

Kanarek makes her own recommendations to SOHO pros at HomeOfficeLife.com/resources.html, which offers links to Kanarek's three book titles, as well as those by SOHO experts Sandy Anderson and Terri Lonier. Kanarek also recommends small-business support sites like aahbb.org, for the American Association of Home-Based Businesses; nase.org, for the National Association for the Self-Employed; and soho.org, for SOHO America, which supports SOHO pros in a virtual community.

Kanarek's latest book, *Home Office Life: Making A Space to Work at Home* (Rockport Publishers, 2001), should hit the shelves later this year. Meawhile, SOHO hopefuls can contact her at lisa@HomeOfficeLife.com. But Kanarek warns that she draws the line on thrift when it comes to recommending office furniture. "Don't cheap out on office furniture, especially your chair," she says. "Because whatever you save on the chair, you'll be giving to your chiropractor."

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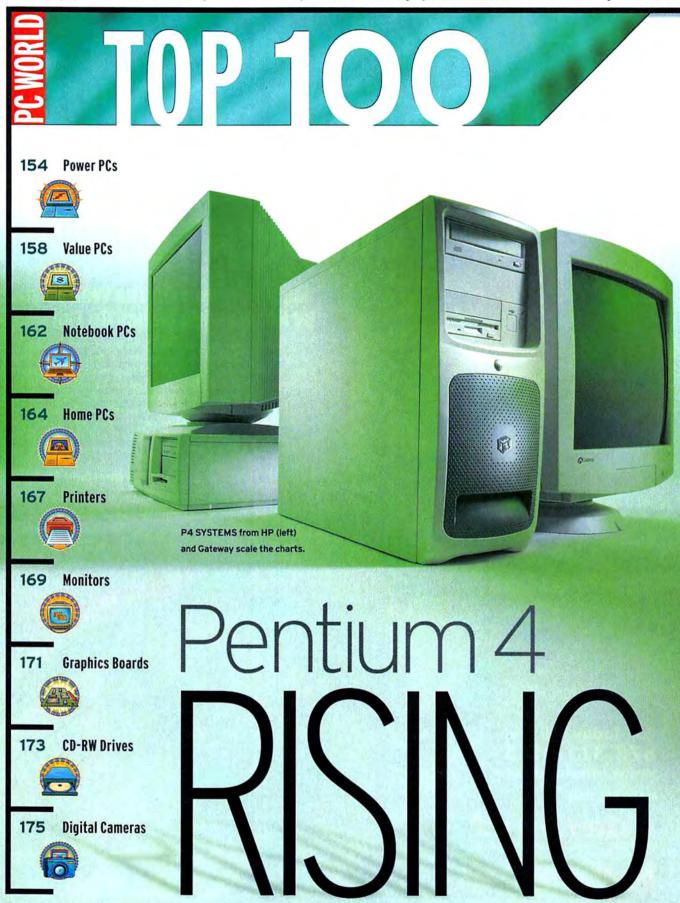
December 1, 1999   September, 1999

PC WORLD
TOP 100

P4 SYSTEMS from HP (left) and Gateway scale the charts.

Pentium 4
RISING
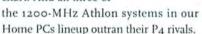
Edited by Seán Captain

SYSTEMS BASED ON Intel's Pentium 4 processor are starting to claim real estate in our desktop lineup. This month's *Top 10 Power PCs* chart features three speedy P4 systems, as two newcomers—Gateway's number one E-4600XL Deluxe and HP's Vectra Vl800—join Dell's

Dimension 8100 in capturing three of the top four spots. The HP and the Gateway are the fastest Windows 2000 machines we've tested. P4 systems do well on our power Home PCs chart, too—the Dell Dimension 8100 retains its number one spot, while new systems from Gateway and IBM seize third and fourth place.

Meanwhile, AMD's Athlon processor continues to give the Pentium 4 a serious run for its money. Systems using the 1100-MHz Athlon, like the ABS Performance Ultra, are posting scores on our PC WorldBench 2000 test suite within striking distance of their P4 rivals on the Power PCs chart. And all three of the 1200-MHz Athlon systems in our Home PCs lineup outran their P4 rivals.

MICRON'S ZIPPY Millennia Max XP has an Athlon-1200 processor and DDR RAM.

DDR DEBUT

ATHLON PROCESSORS may have even more potential when paired with double-data-rate (DDR) memory, as in the scorchingly fast Millennia Max XP home system from Micron. The Millennia Max XP and Polywell's Poly 880KR—both new this month—are the first DDR-equipped systems tested for the Top 100.

A souped-up version of the standard synchronous dynamic RAM found in most PCs, double-data-rate SDRAM executes two actions per clock cycle—compared with one action per cycle for single-data-rate SDRAM—effectively doubling the memory's clock speed. Because DDR RAM is based on the same technology as garden-variety SDRAM, memory vendors can switch to DDR RAM fairly easily.

Linley Gwennap, principal analyst for the Linley Group, says that DDR is a natural progression for the PC industry and offers an economical alternative to costly Rambus DRAM (RDRAM), which runs at speeds of up to 800 MHz and is currently being paired with Pentium 4 and some Pentium III systems. "The mainstream market will move over the course of this year...up to DDR," says Gwennap.

We can't generalize yet about how big a boost DDR RAM will deliver. Outfitted with a 1.2-GHz Athlon processor, Windows Millennium Edition, and 128MB of DDR RAM, the Micron Millennia Max XP earned a score of 172 on PC WorldBench 2000, making it the fastest home system we've tested. But Polywell's Poly 880KR, armed with twice as much memory, a 1.1-GHz processor, and the faster Windows 2000 OS, turned in a disappointing score of 164—32 points below the score of the only similarly configured system with regular SDRAM we've tested. Its uninspired performance kept the Poly off our Power PCs chart.

CD-RW SPINS FASTER

LIKE THE Pentium 4 processor, CD-RW drives with 12X write speeds aren't new, but they now dominate our charts—filling eight of the ten slots this month.

In our review of printers, Sharp makes a splash: Its first ink jet model, the AJ-2000, captures fifth place on our *Top 10 Printers* chart. Speaking of splashes, they won't be a worry with Sony's new Cybershot DSC-P1 digital camera: An optional waterproof case lets you take this small, slick-looking camera scuba diving.

Freelance writers Jon L. Jacobi and Joel Strauch; contributing editors Dan Littman, Kirk Steers, and Carla Thornton; and PC World editors 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. Testing performed by Curt Buehler, Ulrike Diehlmann, Matt Halloran, Robert James, Elliot Kirschling, Jeff Kuta, Danny W. Lam, and Thomas Luong of the PC World Test Center. See page 14 for contact information. ▶

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following information should answer them.

How do the charts work? Each month we test a large number of PCs, printers, monitors, graphics boards, CD-RW drives, and digital cameras, comparing them with previously reviewed products. The Top 10 and Top 15 charts are refreshed monthly. System configurations are shown as tested. Vendors may have since changed components.

What does the overall rating mean? This 100-point scale reflects results from our hands-on evaluations and performance tests. A score in the 90s is exceptional, while one in the 70s is above average.

What does the PC WorldBench 2000 score mean? It's a measure of how fast a PC can run a mix of common business applications as compared with our baseline machine, an HP Pavilion 8380 with a PII-400 CPU, 96MB of RAM, and an 8GB hard drive. For example, a PC that scores 200 is twice as fast as the baseline system.

Where do the scores for reliability, support quality, and support policies come from? Reliability and support quality scores are based on surveys of *PC World* readers and on anonymous support calls made by *PC World* staff. The policies score is based on vendor support policies.

TOP 10 POWER PCs

PC WORLD

	POWER SYSTEM	Month tested	★ Overall rating	Street price (1/5/01)	PC WorldBench 2000 performance score [1]	Base configuration
1	**Gateway E-4600XL Deluxe** 800/428-3929 www.gateway.com	(NEW)	85	Expensive: $2794	Outstanding 207	**Very good:** Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
2	**Dell Dimension 8100** 800/388-8542 www.dell.com	Feb 01	84	Very expensive: $3048	Very good 194	**Very good:** Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
3	Polywell Poly 830K7-1100 800/999-1278 www.polywell.com	Feb 01	84	Average: $2405	Outstanding 240	**Very good:** Athlon-1100, 256MB of SDRAM, 256KB L2 cache, two 30GB hard drives with RAID card, 19-inch monitor, Windows NT 4.0
4	HP Vectra Vl800 800/752-0900 www.hp.com/desktops	(NEW)	84	Very expensive: $4148	Outstanding 208	**Outstanding:** Pentium 4-1500, 256MB of RDRAM, 256KB L2 cache, 40GB hard drive, 21-inch monitor, Windows 2000
5	Sys Performance 1100T 800/613-9963 www.sys.com	Dec 00	83	Inexpensive: $1981	Very good 229	**Good:** Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows NT 4.0
6	Xi Computer 1100K MTower SP 800/432-0486 www.xicomputer.com	Jan 01	83	Average: $2279	Outstanding 180	**Good:** Athlon-1100, 128MB of SDRAM, 256KB L2 cache, two 30GB hard drives with RAID card, 19-inch monitor, Windows 98 SE
7	Tiny Infusion 1100-A 888/818-8469 www.tinydirect.com	(NEW)	82	Very inexpensive: $1799	Outstanding 170	**Very good:** Athlon-1100, 256MB of SDRAM, 256KB L2 cache, 61GB hard drive, 19-inch monitor, Windows Me
8	Tangent Medallion Pro 800/342-9388 www.tangent.com	Jan 01	81	Very inexpensive: $1795	Outstanding 201	**Good:** Pentium III-1000, 256MB of SDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 2000
9	ABS Performance Ultra 800/876-8088 www.abspc.con	Mar 01	80	Average: $2499	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	78	Average: $2499	Good 188	**Good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows 2000

Faster ▶

🟦 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 153.

[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).

PENTIUM 4 SYSTEMS at last assert themselves in our power lineup: Three P4 systems with Windows 2000 make this month's chart. Claiming top honors, the P4-1500–equipped Gateway E-4600XL Deluxe offers plenty of features yet carries a reasonable price of $2794. Despite tipping the price scales at a hefty $4148, HP's new Vectra Vl800 P4 system captures the number four spot; its speed and long list of extras earn high marks. Our last newcomer, the Tiny Infusion 1100-A, demonstrates that Athlon-based machines can hit the sweet spot of performance and price, too.

1 GATEWAY E-4600XL DELUXE

WHAT'S HOT: Sporting a 1.5-GHz CPU and 128MB of RDRAM, this Gateway posted a 207 on PC WorldBench 2000—one of the highest scores we've seen for a Windows 2000 system and within a hair of the fourth-ranked HP Vectra Vl800, which has twice as much RDRAM. The 19-inch Gateway EV910 monitor displayed vibrant colors on our test images and clear, readable text even at its maximum resolution of 1600 by 1200. Upgrading is easy. After sliding two switches, you can easily pop the side panel off to reveal a roomy interior with three open PCI slots and four open drive bays. Sliding clips hold the drives in place, and a single thumbscrew

on the rear of the case releases a clip that anchors all the expansion cards. A swing-out power supply and chassis intrusion detection complete the case ensemble's amenities. A network card and LANDesk Client Manager prepare the E-4600XL Deluxe to join your corporate network.

WHAT'S NOT: Since this PC uses RDRAM, any memory upgrades you make will be expensive. You'll also have to spring for your own business applications suite; this $2794 system doesn't include one. Instead of packing a CD-RW or DVD-ROM drive, the E-4600XL Deluxe has a garden-variety 20X–48X CD-ROM drive.

WHAT ELSE: With 12 hot keys for quick multimedia and Internet access, the well-constructed Gateway keyboard allows smooth and nearly silent typing. The ATI Radeon graphics card gives you multiple connection options: a VGA output for an analog CRT, a DVI output for a digital LCD monitor, and an S-Video output for a

Extra features	Design and expandability [2]	Vendor's system reliability	Tech support quality/policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Good: ATI Radeon SDR graphics card (32MB SDRAM), 20X-48X CD-ROM drive, network adapter	**Very good:** tool-less slots and bays; mid-size tower; 4 open drive bays, 3 open slots	Good	Fair/Outstanding	24/7, toll-free	3/3
Very good: Dell NVidia GeForce2 GTS Ultra graphics card (64MB DDR SDRAM), 12X DVD-ROM drive, 12X/8X/32X CD-RW drive, V.90 modem, network adapter, 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
Very good: Creative Labs Tech GB0040 graphics card (64MB SDRAM), 4X DVD-ROM and 4X/4X/24X CD-RW combo drive, network adapter, Lotus Smart Suite Millennium Edition	**Good:** roomy interior; midsize tower; 3 open drive bays, 3 open slots	[1]	Fair [3]/Good	24/7, toll-free	3/5
Very good: NVidia GeForce2 GTS graphics card (32MB SGRAM), 12X DVD-ROM drive, network card, HP's EDiagtools, 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
Good: Matrox Millennium G450 Dual Head graphics card (32MB SGRAM), 8X/4X/32X CD-RW drive, network adapter	**Very good:** cluttered but roomy case; mid-size tower; 5 open drive bays, 3 open slots	[1]	Good [3]/Good	24/7, [4] toll-free	Varies [5]/5
Good: Hercules 3D Prophet II GTS graphics card (64MB DDR SDRAM), 16X-40X CD-ROM drive, V.90 modem, Microsoft Office 2000 Professional	**Good:** spacious interior; midsize tower; 3 open drive bays, 4 open slots	[1]	Fair [3]/Outstanding	24/7, toll-free	3/3
Outstanding: Micro Star MS-8818 graphics card (32MB SDRAM), 12X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem, network adapter, Microsoft Office 2000 SBE	**Satisfactory:** limited expansion; mini-tower; 1 open drive bay, 1 open slot	[1]	Good [3]/Good	24/7, toll-free	3/1
Good: Gainward 3D AGP NVidia GeForce2 MX graphics card (32MB SDRAM), 12X DVD-ROM drive, network adapter	**Good:** difficult to access interior; midsize tower; 5 open drive bays, 5 open slots	[1]	Fair [3]/Outstanding	24/7, toll-free	3/3
Very good: 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	[1]	Fair [3]/Fair	9/5, toll-free	3/lifetime
Good: Matrox Millennium G400 graphics card (16MB SGRAM), 4X/4X/32X CD-RW drive, network adapter, HP's ProtectTools 2000, EDiagTools, TopTools management software	**Good:** easy to access memory; 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		

[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.

television. The thick manual consists of generic information for all Gateway systems, but it nicely explains upgrading and how to operate the tool-less components. **BEST USE:** This Gateway's blazing speed, easy upgrade access, and full management features will appeal to power users who demand top performance and to IS staff who want ease of maintenance.

2 DELL DIMENSION 8100

WHAT'S HOT: Dell has assembled a fine supporting cast to complement the 1.5-GHz Pentium 4 star of this ensemble, and a price drop of nearly $600 this month makes it all the more appealing. The cutting-edge 12X/8X/32X CD-RW drive lets you burn discs in a flash. A made-for-Dell NVidia GeForce2 GTS Ultra graphics card with 64MB of DDR SDRAM handles high-resolution graphics and provides digital output for connecting to some flat-panel monitors.

This PC ships with the exceptional Dell UltraScan P991 monitor, a 19-incher that displays vibrant colors and crisp text at all resolutions, including the maximum 1600 by 1200. In our most recent reader survey, Dell earned the highest service and reliability scores (Good and Outstanding, respectively) of all vendors. **WHAT'S NOT:** Even after a massive price cut, this Dimension 8100 costs a hefty $3048. Upgraders should note that the system uses costly Rambus memory.

WHAT ELSE: Running Windows 2000, this PC earned a score of 194 on our PC WorldBench 2000 tests—13 points below the number one Gateway E-4600XL Deluxe. The wide gray-and-black midsize tower with matching keyboard and mouse is more aesthetically pleasing than Dell's earlier generic, putty-colored boxes. Tool-

DELL'S DIMENSION 8100 falls a notch this month but still wins kudos for its generous features.

less access to the drive bays, a swing-out power supply, and tool-less case opening make working on this system easy (though replacing the case's side takes a lot of pressure). The neat interior has three open PCI slots and three open drive bays to accommodate upgrades. **BEST USE:** This solid Dell computer, ▶
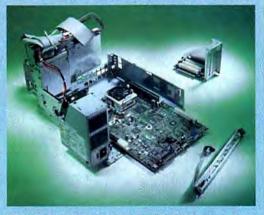
Compaq Deskpro EN SFF: An All-Access Pass

TECH TREND MAJOR PC vendors are coming up with new ways to make their systems easier to upgrade and maintain. Compaq, for one, hopes its Deskpro EN SFF will persuade you to put away your toolbox. The system offers tool-less access to all components, and the case's top slides off after you press two buttons. Inside, drive bays tilt up and slip out; the power supply swings up and outward; and the PCI card cage pops out, letting you add cards without twisting a screwdriver or your neck. Finally, the rear port panel snaps off so you can slide out the motherboard.

"Our customers wanted easy access to the [mother]board," says Tate Davis, product manager for the Deskpro EN line. "IT managers really appreciate the fact that they spend less time working on a unit."

OPEN TO THE WORLD: The Deskpro EN SFF is among the new corporate PCs that offer quick, tool-less access.

with top-of-the-line components, has the goods for any power user willing to pay a high price for the latest technology.

New on the Chart

4 HP VECTRA VI800

NEW **WHAT'S HOT:** With 256MB of RDRAM, the 1.5-GHz P4-powered Vectra Vl800 soared to a 208 on our PC WorldBench 2000 tests—the highest score we've seen for a Windows 2000 system. Its huge 21-inch HP P1120 monitor displayed rich, vivid colors in our test images and produced crisp text even at the maximum resolution of 1600 by 1200. The Vl800 offers a slew of corporate features, including SMART Drive hard drive monitoring software, chassis intrusion detection, and a server-style, front-mounted case lock. HP's bundled management software—TopTools and EDiagtools—lets

- ◆ Compaq Deskpro EN SFF
- ◆ IBM NetVista X40 664324U
- ◆ NEC PowerMate ES SlimLine
- ◆ Polywell Poly 880KR

administrators remotely boot up systems, troubleshoot them, and update software.

WHAT'S NOT: Beware of sticker shock—the huge monitor and abundant RDRAM help drive the Vl800's price up to used-car territory at $4148. Yet that tab covers only weak-sounding integrated speakers. HP earned a score of Good for reliability in our latest reader survey, but its rating for customer support was just Fair.

WHAT ELSE: The keyboard—featuring 13 hot keys for Web and multimedia access—supported smooth but rather noisy typing. The monitor has dual inputs for sharing the display between two PCs. The case's spacious, neatly arranged interior permits easy access to the four open PCI slots and two open drive bays.

BEST USE: The Vl800 offers blazing speed and excellent display quality for the corner office in a well-heeled corporation.

7 TINY INFUSION 1100-A

NEW **WHAT'S HOT:** Tiny's Infusion 1100-A owes its fire to a 1.1-GHz Athlon processor and a hefty 256MB of SDRAM. Running Windows Millennium Edition, it raced to a score of 170 on our PC WorldBench 2000 tests—an impressive 9 points higher

than the average for 1.1-GHz Athlon systems we've tested with Windows Me. The 19-inch Tiny 19c monitor produced brilliant colors and sharp text that remained very readable at the maximum resolution of 1600 by 1200. A Micro Star MS-8818 graphics board (based on the NVidia GeForce2 MX chip set) drives graphics handily, and an S-Video port lets you output images to a television.

WHAT'S NOT: The crowded interior affords little expansion room, with a single open internal bay and one available PCI slot. The memory slots are particularly difficult to reach, almost requiring you to remove the hard drive to gain access. The power and reset buttons atop this squat gray and beige minitower are easy to bump accidentally. And a deeply recessed slot for the floppy drive makes inserting disks unduly difficult.
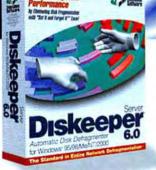
WHAT ELSE: Storage abounds, thanks to a copious 61GB hard drive and an 8X/4X/32X CD-RW drive (which augments the 12X DVD-ROM drive). A box neatly stores software—most notably Microsoft Office 2000 Small Business Edition—and documentation, including a helpful color setup poster and a thick (albeit generic) color system manual with lots of detailed information. A modem and a network adapter give you two connectivity options. The sturdy Tiny keyboard allows smooth input and provides 14 hot keys for quick multimedia and Net access.

BEST USE: With its great display and speedy performance, the Infusion 1100-A would make a powerful small-office PC, but don't plan on upgrading it much. ▶

WORTHY OF ITS NAME, Tiny squeezes hefty processing power and loads of extras into the small Infusion 1100-A.

TOP 10 VALUE PCs

	VALUE SYSTEM	Month tested	★ Overall rating	Street price (1/5/01)	PC WorldBench 2000 performance score [1] Faster ➤	Base configuration
1	**Dell Dimension 4100** 800/388-8542 www.dell.com	Feb 01	86	**Expensive:** $1749	Outstanding 186	**Very good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 2000
2	**Gateway E-3400XL Deluxe** 800/428-3929 www.gateway.com	Mar 01	84	**Very expensive:** $1905	Outstanding 190	**Good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 40GB hard drive, 17-inch monitor, Windows 2000
3	**Micro Express MicroFlex 11B** 800/846-2000 www.microexpress.net	Mar 01	84	**Inexpensive:** $1099	Outstanding 175	**Very good:** Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 98 SE
4	**Sys TaskMaster 800D** 800/613-9963 www.sys.com	Mar 01	82	**Inexpensive:** $1079	Very good 172	**Good:** Duron-800, 128MB of SDRAM, 64KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 2000
5	**ABS Conquest GL** 800/876-8088 www.abspc.com	(NEW)	82	**Average:** $1299	Very good 160	**Outstanding:** Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows Millennium Edition
6	**Micron ClientPro Cn** 800/642-7667 www.micronpc.com	Oct 00	82	**Expensive:** $1739	Very good 158	**Good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 98 SE
7	**NuTrend Athlon Mega 2** 888/482-6678 www.nutrend.com	(NEW)	82	**Average:** $1289	Good 154	**Outstanding:** Athlon-950, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows Me
8	**ABS Conquest SB** 800/876-8088 www.abspc.com	Mar 01	81	**Average:** $1429	Very good 176	**Very good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 2000
9	**Compaq Deskpro EX** 800/345-1518 www.compaq.com	Nov 00	80	**Average:** $1480	Good 193	**Very good:** Pentium III-733, 128MB of SDRAM, 256KB L2 cache, 15GB hard drive, 19-inch monitor, Windows NT 4.0
10	**Tiny T-Bird Business Edition** 888/818-8469 www.tinydirect.com	Mar 01	79	**Average:** $1599	Very good 160	**Outstanding:** Athlon-1000, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows Me
	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 153.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

OUR VALUE CHART in April welcomes only two newly tested PCs. The Gateway E-3400XL Deluxe remains a Best Buy but slips to number two following a $344 price increase (that high price does buy a larger hard drive and faster CD-RW drive). Dell's number one Dimension 4100 takes the torch from the discontinued 800-MHz Dimension L800r. Farther down the list, new ABS and NuTrend PCs supplant their brandmates from last month's chart.

1 DELL DIMENSION 4100

WHAT'S HOT: Powered by a PIII-933 processor and running Windows 2000, the Dimension 4100 posted a score of 186 on our PC WorldBench 2000 tests—about 8 points above the average for similarly configured systems. The 17-inch Dell M781 monitor displayed vibrant colors, and text remained crisp at all resolutions except the maximum 1600 by 1200, where it blurred slightly. The system manual offers plenty of helpful illustrations, and the setup guide and color-coded rear ports make assembly worry-free. Dell is the top-ranked vendor of business PCs in our latest reader survey of reliability and service, earning an overall score of Outstanding. **WHAT'S NOT:** You can remove this midsize tower's side panel without tools, but replacing the panel takes some work. **WHAT ELSE:** The cables that crisscross the system's interior could impede access. Once you get them out of the way, however, you'll find plenty of expansion room, thanks to four open PCI slots and four open drive bays. Our test system came bundled with Microsoft Office 2000 SBE and both a network card and a modem. The sturdy Dell QuietKey keyboard allows smooth typing, but it isn't especially quiet. **BEST USE:** The Dimension 4100 would suit any business looking for great performance at a moderate price.

2 GATEWAY E-3400XL DELUXE

WHAT'S HOT: This PIII-933–based model blazed to a score of 190 on our PC WorldBench 2000 tests— 13 points higher than the average for similarly configured Windows 2000 systems. The E-3400XL Deluxe is loaded with such corporate features as a network adapter (with Wake-on-LAN), Intel LANDesk Client Manager remote administration software, and chassis intrusion detection. A sensor on the motherboard enables you

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: Dell NVidia GeForce2 GTS graphics card (32MB DDR SGRAM), 12X DVD-ROM drive, V.90 modem, network adapter, Microsoft Office 2000 Small Business Edition	**Good:** easily expandable; midsize tower; 4 open drive bays, 4 open slots	Outstanding	Good/ Good	24/7, toll-free	3/1
Very good: ATI Rage Fury Pro 2000 graphics card (16MB SDRAM), 12X/8X/32X CD-RW, network adapter, Zip 250 drive, LANDesk Client Manager, Wake-on-LAN, 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
Outstanding: ELSA Gladiac 32 graphics card (32MB SGRAM), 12X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem, network adapter	**Good:** loads of expansion room; midsize tower; 3 open drive bays, 4 open slots	[3]	Fair [3]/ Outstanding	24/7, toll-free	4/4
Good: integrated NVidia TNT2 M64 graphics (32MB SDRAM), 22X-50X CD-ROM drive, network adapter	**Good:** limited expansion possibilities; mini-tower; 2 open drive bays, 2 open slots	[3]	Good [3]/ Good	24/7, [4] toll-free	Varies [5]/5
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	[3]	Fair [3]/ Fair	9/5, toll-free	3/lifetime
Good: VisionTek NVidia TNT2 M64 graphics card (32MB SDRAM), 20X-48X CD-ROM drive, network adapter, Microsoft Office 2000 SBE, Norton AntiVirus, LANDesk Client Manager	**Good:** tool-less case removal; midsize tower; 5 open drive bays, 5 open slots	Good	Good/ Outstanding	24/7, toll-free	Varies [4]/1
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; mini-tower; 4 open drive bays, 2 open slots	[3]	Fair [3]/ Good	24/7, toll-free	3/lifetime
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	[3]	Fair [3]/ Fair	9/5, toll-free	3/lifetime
Good: Mitac NVidia M64 Pro graphics card (16MB SDRAM), 20X-48X CD-ROM drive, network adapter, Compaq Intelligent Manageability	**Satisfactory:** roomy interior; midsize tower; 2 open drive bays, 2 open slots	Good	Fair/ Good	24/7, toll-free	3/1
Very good: PMC PixelView GeForce2 MX graphics card (32MB SDRAM), 8X DVD-ROM drive, 4X/4X/24X CD-RW drive, V.90 modem, network adapter, Microsoft Office 2000 SBE	**Satisfactory:** crowded interior; minitower; 1 open drive bay, 1 open slot	[3]	Good [3]/ Good	24/7, toll-free	3/1
Extra features: 10 percent	**Design and expandability: 15 percent**	**Reliability: 15 percent**	**Support and warranty: 15 percent**		

[3] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

[4] Support hours drop to 9 hours Monday–Friday after one year.

[5] Six years on CPU and main RAM, three years on other parts.

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

to monitor CPU temperature and fan speeds. You can remove the hard drive without tools—it pops out of the case after you pull a ring on the side, and it snaps back in just as smoothly. The system also features a quick-release motherboard.

WHAT'S NOT: Though the 17-inch Gateway EV700 monitor rendered vivid colors, text looked blurry at 1024 by 768 resolution and nearly illegible at the maximum resolution of 1280 by 1024. The cover over the side-mounted expansion slots is supposed to be removable without tools, but it was wedged in so tightly that we had to use a screwdriver to prise it off. The case side comes off after you loosen a single thumbscrew, but reattaching it takes fiddling. In our latest survey, *PC World* readers rated Gateway's business machines Good for reliability but just Fair for service.

WHAT ELSE: The E-3400 packs Iomega's Zip 250 drive for backing up data, but that drive sits next to the nearly identical flop-py drive, inviting disk mixups. A 12X/8X/32X CD-RW drive gives you another backup option. The hefty system manual contains useful color illustrations, as well as a flood of information not specific to the E-3400. Typing on the slightly sluggish Gateway keyboard was quiet and smooth. The keyboard has 12 programmable hot keys for Internet access and for launching applications.

BEST USE: The E-3400XL Deluxe makes a good match for any medium-size to large business seeking a powerful PC with management options.

A LOT FOR THE PRICE: Dell's 933-MHz Dimension 4100 offers plenty of speed and a sharp monitor.

New on the Chart

5 ABS CONQUEST GL

NEW **WHAT'S HOT:** This $1299 ABS is inexpensive for a system powered by a 1.1-GHz Athlon processor. Colors on the 19-inch ADI E66 monitor looked rich, while text rendered cleanly, blurring only slightly at the top resolution of 1600 by 1200. Multimedia accessories include a powerful three-speaker Cambridge SoundWorks Digital set and a 16X DVD-ROM drive. In case anything goes wrong with the system, ABS offers a lifetime labor war- ▶

PHOTOGRAPH: RICK RIZNER; COMPUTER SCREEN GRAPHICS: JOHN GODDARD

Video Out: Putting Your PC on Television

TECH TREND VIDEO-OUT PORTS on graphics cards let you send images from your PC to a compatible television or VCR (most newer models have the appropriate input ports). A few years ago, you could find video-out ports only on specialty cards such as ATI's All-in-Wonder line. But these ports are becoming standard on many new graphics cards.

This development reflects customers' wishes, says Derek Perez, a spokesperson for graphics chip set manufacturer NVidia. "More people are demanding that the PC platform include entertainment features"—such as the ability to port DVD movies to a television—he says. "As the PC continues to evolve into a digital appliance, these technologies are going to become the heart and soul of that box."

Home users' demand for video-out is understandable, but Perez says the technology is also gaining popularity among businesses as a way to deliver 3D and multimedia presentations. "Currently, DVD playback and [displaying] presentations [on a television] are the most popular applications for corporate users," he says.

But Alex Ishimi, product manager for small-business desktops at Gateway, feels TV-out still lacks mainstream appeal. "Most business users are satisfied with basic 2D graphics and standard connectors," Ishimi says. TV-out appeals to high-end users and companies distributing their content on television or videotape.

Carlos Pan, video graphics manager for Dell's OptiPlex line, agrees that video-out has relatively few business applications today, and he says people who need to output video in their work usually opt for a dedicated board, rather than looking for that feature on their main graphics board.

Despite the paucity of business applications so far, Gateway's Ishimi predicts that the emergence of more graphics- and video-intensive applications will make video-out an increasingly attractive technology for business users. When more people start looking for video-out ports, will they be able to find them? Though he won't predict exactly when it will happen, NVidia's Perez says that video output will one day be an integrated feature in every graphics board's chip set.

ranty to complement a three-year warranty on parts.

WHAT'S NOT: Customer support is not stellar: ABS's tech support quality rates only Fair in our anonymous service calls.

WHAT ELSE: Running Windows Me, the Conquest GL earned a score of 160 on our PC WorldBench 2000 tests—about equal to the average performance of a similarly equipped Athlon-1000, Pentium III-1000, or Pentium 4-1500 system. Microsoft's Internet keyboard provides smooth, quiet typing and ten hot keys for Web access. A large binder houses all software and documentation, including Corel's WordPerfect Office 2000 and a system manual with a thorough, well-illustrated troubleshooting section. Color-coded ports and a large color poster of directions make setup a snap. Two open PCI slots and four open drive bays (three externally accessible ones) are available for expansion, with some wires cluttering the otherwise spacious interior. The system packs both a modem and a network adapter.

BEST USE: An impressive PC for the money, this ABS would make a solid small-office system for buyers on a tight budget.

7 NUTREND ATHLON MEGA 2

NEW **WHAT'S HOT:** Though you can get a 1.1-GHz Athlon CPU in the very similar ABS Conquest GL system, this NuTrend squeezes nearly the same performance from an Athlon-950 processor: The Mega 2 earned a score of 154 on our PC WorldBench 2000 tests running Windows Me. The 19-inch ADI E66 monitor displayed sharp text up to its maximum resolution of 1600 by 1200, with a slight flicker at that high resolution. The Altec Lansing ACS54 five-speaker set delivered powerful surround sound.

WHAT'S NOT: Test image colors looked somewhat washed out on the monitor. In our anonymous service calls, NuTrend received only a Fair rating. You'll need a screwdriver to remove the side panel of this basic beige midsize tower.

ALL GROWN UP: The ABS Conquest GL offers a hefty processor and a large monitor for a small price.
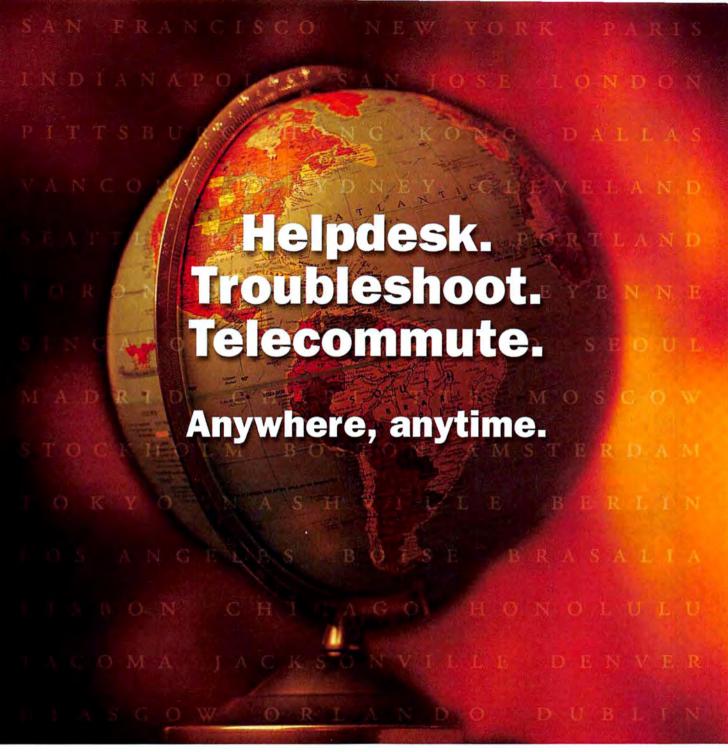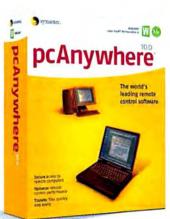
WHAT ELSE: Thorough documentation and software CDs—including Corel's WordPerfect Office 2000—fit neatly into a handy spiral binder. The roomy, somewhat messy interior offers two open PCI slots and four open bays (three externally accessible) for expansion. Typing is smooth and nearly silent on the Microsoft Internet keyboard, which has ten hot keys for Internet access. And you can get to the Net via either the V.90 modem or the network adapter included with this system.

BEST USE: Small-office users will appreciate the low price and respectable performance of the Athlon Mega 2. ▶

PHOTOGRAPH ABOVE: MARC SIMON; PHOTOGRAPH BELOW: RICK RIZNER

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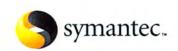
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TOP 15 NOTEBOOK PCs

PC WORLD

POWER NOTEBOOK: $2700 AND OVER	Month tested	★ Overall rating	Street price (1/05/01)	PC WorldBench 2000 performance score [1] Faster ▶	Base configuration
1 IBM ThinkPad A21p 888/746-7426 www.ibm.com/thinkpad	Feb 01	89	Very expensive: $4019	Outstanding 182	Very good: Pentium III-850/700, 15-inch active screen, trackpoint, 256MB of SDRAM, 32GB hard drive, Windows 2000
2 Dell Inspiron 8000 800/388-8542 www.dell.com	Mar 01	87	Expensive: $3555	Good 159	Outstanding: Pentium III-850/700, 15-inch active screen, touchpad, eraserhead, 128MB of SDRAM, 20GB hard drive, Win 2000
3 Fujitsu PC E-6571 877/372-3473 www.fujitsupc.com	(NEW)	85	Inexpensive: $2899	Good 157	Good: Pentium III-750/600, 14.1-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 2000
4 Acer TravelMate 739TLV 800/733-2237 www.acer.com/aac	(NEW)	84	Expensive: $3499	Good 157	Good: Pentium III-850/700, 15-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 2000
5 HP Omnibook 500 800/752-0900 www.hp.com	Mar 01	83	Average: $3149	Satisfactory 149	Satisfactory: Pentium III-600/500, 12.1-inch active screen, eraserhead, 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 Inspiron 4000 800/388-8542 www.dell.com	Mar 01	89	Inexpensive: $2098	Good 131	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	88	Inexpensive: $2074	Good 147	Good: Pentium III-650/500, 14.1-inch active screen, touchpad, 128MB of SDRAM, 10GB hard drive, Windows 2000
3 HP Omnibook XE3 800/752-0900 www.hp.com	Jan 01	82	Average: $2249	Satisfactory 133	Very good: Pentium III-700/550, 15-inch active screen, touchpad, 64MB of SDRAM, 10GB hard drive, Windows 2000
4 Compaq Armada E500S 800/345-1518 www.compaq.com	(NEW)	82	Expensive: $2604	Good 134	Good: Pentium III-800/650, 14.1-inch active screen, touchpad, 128MB of SDRAM, 10GB hard drive, Windows 98 SE
5 NEC Versa VXi 888/632-8701 www.neccomp.com	Mar 01	81	Average: $2348	Satisfactory 121	Satisfactory: Pentium III-600/500, 14.1-inch active screen, touchpad, 128MB of SDRAM, 6GB hard drive, Windows 98 SE
BUDGET NOTEBOOK: UNDER $2000	Percent of overall rating ▶		Price: 17 percent	Performance: 17 percent	Base configuration: 5 percent
1 Dell Inspiron 3800 800/388-8542 www.dell.com	Jan 01	93	Inexpensive: $1299	Good 113	Satisfactory: Celeron-600, 12.1-inch active screen, touchpad, eraserhead, 64MB of SDRAM, 5GB hard drive, Windows 98 SE
2 WinBook Si 800 CD 800/965-9349 www.winbook.com	(NEW)	87	Inexpensive: $1299	Very good 128	Satisfactory: Pentium III-800, 12.1-inch active screen, touchpad, 64MB of SDRAM, 6GB hard drive, Windows Me
3 Micro Express NP4800C 800/989-9900 www.microexpress.net	Mar 01	85	Average: $1699	Outstanding 139	Very good: Pentium III-800/650, 14.1-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 98 SE
4 Fujitsu PC I-4187 877/372-3473 www.fujitsupc.com	(NEW)	84	Inexpensive: $1399	Satisfactory 107	Satisfactory: Celeron-550, 12.1-inch active screen, touchpad, 64MB of SDRAM, 10GB hard drive, Windows 98 SE
5 Gateway Solo 1150cl 800/846-2000 www.gateway.com	Dec 00	83	Inexpensive: $1299	Satisfactory 96	Satisfactory: Celeron-550, 12.1-inch active screen, touchpad, 64MB of SDRAM, 6GB 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 153.   [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.

BIOMETRICS, THE futuristic-sounding technique of using physical characteristics like your retina or fingerprint to verify your identity, has long been touted as the next big thing in PC security. A system that uses biometrics doesn't require you to recall a password or punch in a code. *You* are the password. Well, the future has finally arrived. Acer's TravelMate 739TLV, the first laptop we've seen that has a built-in fingerprint reader, snags the fourth spot on our power chart this month.

The reader, a postage stamp–size window in the wrist rest, worked like a charm. Though pricey at $3499, the 739TLV would be a good (and a very cool) choice for any company looking for a way to put tougher locks on its vital data.

Several other new notebooks also made the cut this month. On the power list, Fujitsu's lightweight PC E-6571 offers a

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	Average/ 8.3	Good	Good/ Fair	24/7, toll-free	3/3
Very good: two multipurpose bays, 8X DVD-ROM drive, built-in modem, Microsoft Office 2000 SBE	**Excellent:** customizable color accent panels and headphones that simulate surround sound	Satisfactory/ 2:42	Heavy/ 9.1	Good	Good/ Good	24/7, toll-free	3/3
Good: single multipurpose bay, 8X DVD-ROM drive, built-in modem	**Very good:** infrared for wireless mouse; extra buttons double as password security system	Satisfactory/ 2:47	Average/ 7.3	Fair	Poor/ Fair	24/7, toll-free	1/1
Very good: single multipurpose bay, 8X DVD-ROM drive, built-in modem and network interface, Works 2000	**Very good:** built-in fingerprint reader helps foil data thieves	Very good/ 4:23	Average/ 8.1	Good	Good [4]/ Fair	24/7, toll-free	1/1
Very good: two multipurpose bays, 12X-24X CD-ROM drive, built-in modem and network interface	**Excellent:** legacy-light ultraportable with steady keyboard and full-featured media slice	Good/ 3:09	Average/ 7.5	Good	Fair [4]/ Fair	24/7, toll call	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 Works 2000	**Very good:** accommodates many add-ins; dual pointing devices, optional color palm rests	Good/ 3:40	Average/ 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: 8X DVD-ROM drive, built-in modem and network interface	**Average:** business laptop has improved CD player controls, cursor lock; Bluetooth-ready	Good/ 3:26	Average/ 8.2	Good	Fair [4]/ Poor	24/7, toll call	1/1
Very good: two multipurpose bays, 12X-24X CD-ROM drive, built-in modem and network interface, Works 2000	**Excellent:** holds up to three batteries at once; plain but comfy and shortcut-rich keyboard	Very good/ 3:59	Average/ 8.1	Fair	Fair/ Fair	24/7, toll-free	1/1
Satisfactory: 12X-24X CD-ROM drive, built-in modem, Intel LANDesk Client Manager	**Average:** boxy, but good keyboard, two USB ports, removable hard drive and TV-out jack	Good/ 3:09	Average/ 7.4	Good	Good [4]/ 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**		
Satisfactory: multipurpose bay, 10X-24X CD-ROM drive, Microsoft Works 2000	**Excellent:** thinnish, adaptable business laptop comes in different colors	Good/ 3:17	Average/ 8.3	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	3/3
Good: two multipurpose bays, 6X DVD-ROM drive, built-in modem	**Average:** built-in tilt feet; too-small command keys mar keyboard	Satisfactory/ 2:27	Average/ 8.3	[5]	Fair [4]/ Fair	24/7, toll-free	2/2
Satisfactory: multipurpose bay, 8X DVD-ROM drive, built-in modem, Microsoft Works 2000	**Very good:** boxy, lacks legacy ports; multimedia-rich with DVD-ROM drive	Satisfactory/ 2:17	Average/ 7.7	Fair	Poor/ Fair	24/7, toll-free	1/1
Limited: 10X-24X CD-ROM drive, built-in modem	**Satisfactory:** sleek iBook-reminiscent design; built-in speakers offer boom-box sound	Satisfactory/ 2:27	Average/ 7.8	Fair	Fair/ Good	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**		

[4] Due to insufficient data from survey, score is based on responses to anonymous calls for tech support. [5] Insufficient data to give a rating.

set of shortcut buttons that can double as a password system. On the budget side, Fujitsu's PC I-4187 appeals to those who want a multimedia-savvy laptop for under

$1400. The WinBook Si 800 CD offers raw performance at a low price of $1299, but its Pentium III-800 CPU is a desktop processor. If you need to work on the go, consider Compaq's corporate-minded Armada E500S, on our midrange list. It can hold three batteries at once.

Contributing Editor Carla Thornton covers notebooks for PC World.

BEWARE: ACER'S TravelMate 739TLV reads fingerprints.

FULL REVIEWS ONLINE

FOR DETAILED write-ups of all the new notebooks that we tested this month, visit PCWorld.com (www.pcworld.com/top400).

TOP 15 HOME PCs

	POWER SYSTEM: $2000 AND OVER	Month tested	★ Overall rating	Street price (1/05/01)	PC WorldBench 2000 performance score [1] `Faster`	Base configuration [2]
1	**Dell Dimension 8100** 800/388-8542 www.dell.com	Mar 01	91	Expensive: $3149	Good 157	**Good:** Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 40GB hard drive, midsize tower, 19-inch monitor, Windows Me
2	Gateway Select 1200 800/428-3929 www.gateway.com	Mar 01	86	Average: $2609	Outstanding 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 800/428-3929 www.gateway.com	(NEW)	84	Very expensive: $3498	Very 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 6848-40U 800/426-2968 www.ibm.com/netvista	(NEW)	83	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	HP Pavilion 9720 800/752-0900 www.hp.com	Feb 01	81	Inexpensive: $2185	Very good 162	**Satisfactory:** Athlon-1200, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, tower, 17-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 PIII-933** 800/388-8542 www.dell.com	Feb 01	94	Average: $1749	Good 154	**Satisfactory:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 20.4GB hard drive, midsize tower, 17-inch monitor, Windows Me
2	Tiny Computers T-Bird 1000 888/818-8469 www.tinydirect.com	Feb 01	90	Average: $1549	Very good 160	**Very good:** Athlon-1000, 128MB of SDRAM, 256KB L2 cache, 40.9GB hard drive, minitower, 19-inch monitor, Windows Me
3	Micron Millennia Max XP 800/642-7667 www.micronpc.com	(NEW)	89	Expensive: $1999	Outstanding 172	**Good:** Athlon-1200, 128MB of DDR SDRAM, 256KB L2 cache, 40GB hard drive, midsize tower, 17-inch monitor, Windows Me
4	ABS Multimedia System 2 800/876-8088 www.abspc.com	(NEW)	87	Inexpensive: $1379	Very good 161	**Very good:** Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, midsize tower, 19-inch monitor, Windows Me
5	IBM NetVista A40i 2284-55U 800/426-2968 www.ibm.com/netvista	(NEW)	86	Expensive: $1899	Very good 160	**Satisfactory:** Athlon-1000, 128MB of SDRAM, 256KB L2 cache, 30GB 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	**Dell Dimension L866r** 800/388-8542 www.dell.com	Feb 01	97	Inexpensive: $829	Very good 144	**Very good:** Pentium III-866, 128MB of SDRAM, 256KB L2 cache, 10.2GB hard drive, minitower, 17-inch monitor, Windows Me
2	Tiny Computers Value 900A 888/818-8469 www.tinydirect.com	(NEW)	84	Average: $999	Very good 145	**Very good:** Athlon-900, 64MB of SDRAM, 256KB L2 cache, 20GB hard drive, minitower, 17-inch monitor, Windows Me
3	NuTrend Athlon Force2 888/482-6678 www.nutrend.com	Feb 01	80	Average: $1049	Outstanding 161	**Outstanding:** Athlon-900, 128MB of SDRAM, 256KB L2 cache, 20.5GB hard drive, midsize tower, 17-inch monitor, Windows Me
4	Polywell Poly 700KD 800/999-1278 www.polywell.com	Oct 00	80	Average: $999	Good 131	**Very good:** Duron-700, 128MB of SDRAM, 64KB L2 cache, 20GB hard drive, midsize tower, 17-inch monitor, Windows 98 SE
5	IBM NetVista A20i 2276-10U 800/426-2968 www.ibm.com/netvista	Feb 01	76	Inexpensive: $838	Satisfactory 104	**Satisfactory:** Celeron-600, 64MB of SDRAM, 128KB L2 cache, 10GB 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 153.
[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).

NEW PENTIUM 4 systems from Gateway and IBM grab slots on our power chart, despite the fact that PCs using the 1.2-GHz Athlon processor—and even some with 1-GHz Athlons—turned in better PC WorldBench 2000 scores. All other performance features being equal, buyers of the new P4 will pay a large premium over existing Athlons and Pentium IIIs—for little (if any) speed gain.

To be fair, though, the power chart's new Gateway Performance 1500 and IBM NetVista A60i displayed some of the highest frame rates we've seen in our gaming tests. And both PCs bundle TV tuners and top-notch graphics cards with their systems, as well as plenty of storage options to satisfy home enthusiasts.

In the midrange section, three new Athlon-based machines displace older contenders. Of these, the $1999 Micron Millennia Max XP turned in the highest

Extra features [3]	Setup/ease of use	Graphics	Reliability/support	Comments
Outstanding: 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. **CON:** Disappointing WorldBench performance, given expensive P4 processor; $101 price increase.
Good: NVidia GeForce2 Ultra graphics board (64MB DDR SDRAM), 16X DVD-ROM drive	Good/Good	Good	Fair/Fair	**PRO:** Easy to access drive bays, excellent frame rates. **CON:** No CD-RW drive or network card.
Outstanding: 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:** First-rate monitor; good graphics plus a TV-tuner card, three IEEE 1394 ports, and lots of storage. **CON:** Performance below that of Athlon-1200 PCs.
Outstanding: ATI All-In-Wonder Radeon 256 graphics board (32MB SGRAM), 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 for the price, slow for a P4-1500.
Outstanding: NVidia GeForce2 GTS Pro graphics board (64MB DDR SDRAM), 16X DVD-ROM drive, 8X/4X/32X CD-RW drive, network adapter	Satisfactory/Good	Good	Fair/Fair	**PRO:** Loads of extra features and room for expansion; $84 price cut. **CON:** Gigantic case could be a tight fit for home offices.
Extra features: 10 percent	Setup/ease of use: 5 percent	Graphics: 15 percent	R & S: 30 percent	
Outstanding: NVidia GeForce2 GTS graphics board (64MB DDR SDRAM), 12X DVD-ROM drive	Outstanding/Good	Very good	Outstanding/Outstanding	**PRO:** Solid graphics performer from a vendor with the highest reliability and service ratings. **CON:** Sound system is uninspiring.
Very good: NVidia Geforce2 MX graphics board (32MB SDRAM), 8X DVD-ROM drive, 8X/4X/32X CD-RW drive, scanner, printer	Satisfactory/Good	Good	*/Good [5]	**PRO:** Fast family PC with extra peripherals and software. **CON:** Dark DVD movie playback; limited expansion room; comes with low-end printer and scanner.
Good: Creative 3D Blaster GForce2 Ultra graphics board (64MB DDR SDRAM), 12X DVD-ROM, 8X/4X/32X CD-RW drive, printer	Satisfactory/Satisfactory	Good	Good/Good	**PRO:** Fastest WorldBench score of any home PC; killer graphics performance. **CON:** Dark DVD movie playback; access to PCI slots somewhat difficult.
Outstanding: Leadtek WinFast GeForce2 MX graphics board (32MB SDRAM), 16X DVD-ROM drive	Good/Satisfactory	Good	*/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.
Very 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.
Extra features: 10 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 30 percent	
Good: integrated Intel 810 graphics with UMA, 22X-48X CD-ROM drive, network adapter	Outstanding/Good	Limited	Outstanding/Outstanding	**PRO:** $140 price cut on PC with rich, clear display quality and sound. **CON:** Noisy hard drive; lacks a reset button; design is anything but stylish.
Very good: NVidia GeForce2 MX graphics board (32MB SDRAM), 8X DVD-ROM drive	Outstanding/Good	Good	*/Good [5]	**PRO:** Thorough documentation; above-average speakers. **CON:** Tightly packed PC interior limits expandability; labor warranty limited to one year.
Outstanding: Leadtek WinFast 3D S325 graphics board (32MB SDRAM), 12X DVD-ROM drive, network adapter, multimedia keyboard	Satisfactory/Satisfactory	Satisfactory	*/Fair [5]	**PRO:** PC's speed redefines budget performance; handsome multimedia keyboard; price drops by $100. **CON:** Lackluster frame rates in gaming tests.
Very good: Micro-Star MS-8808 graphics board (32MB SDRAM), 10X DVD-ROM drive	Very good/Satisfactory	Good	*/Fair [5]	**PRO:** Solid performer; ample expansion room. **CON:** Speakers sound a bit muddy; game play is somewhat choppy at high resolution.
Satisfactory: integrated Intel 810 graphics with UMA, 22X-48X CD-ROM drive	Satisfactory/Good	Limited	Good/Fair	**PRO:** Better-than-average monitor and upgrade options for a budget system. **CON:** Weak graphics performance.
Extra features: 10 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 30 percent	

[3] Unless otherwise noted, all home PCs come with a V.90 modem.
* Insufficient data to give a rating.
[5] Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.

PC WorldBench 2000 score we've seen yet from a Windows Me system. However, it was still bested by the Dell Dimension 4100 PIII-933, whose superior graphics performance and exceptional reliability and service ratings keep it at the top of the midrange category.

The budget chart features a new value-laden unit, too—the Tiny Value 900A. For $999, this 900-MHz Athlon system comes with a dedicated graphics card that helps it outperform most other PCs in this category. It also has excellent documentation that makes setup a breeze. ▶

FULL REVIEWS ONLINE

FOR WRITE-UPS on all the systems we reviewed this month, visit PCWorld.com (www.pcworld.com/top400/newhomepcs).

IBM'S
$3099 NETVISTA
A60i: an all-around graphics pro.

TOP 10 PRINTERS

	INK JET PRINTER	Street price (1/12/01)	Overall rating	Speed for plain text/full-page graphics (ppm)	Print quality for text/color graphics	Cost per page for monochrome/color (cents)	Comments
1	Lexmark Z42 Color Jetprinter 888/539-6275 www.lexmark.com	$99	89	4.5/0.5	Good/ Good	5.2/19.1	**FEATURES:** Rated 10 ppm monochrome/5 ppm color. 2400-by-1200-dpi maximum resolution, 100 sheets input, 50 output. **SUMMARY:** The Z42 is one of the faster models on the chart for text, and it prints both text and color graphics smoothly and evenly. A $30 price drop sweetens the deal.
2	HP DeskJet 932C 800/752-0900 www.hp.com	$199	89	4.1/0.7	Good/ Good	3.6/11.1	**FEATURES:** Rated 4.5 ppm monochrome/2 ppm color. 2400-by-1200-dpi maximum resolution, 100 sheets input, 50 output. **SUMMARY:** The 932C has reasonably fast text speed and is easy to set up and use. Print quality is strong, with sharp text, smooth grays, and detailed—if somewhat light—color graphics.
3	Lexmark Z52 Color Jetprinter 888/539-6275 www.lexmark.com	$139	88	5.4/0.6	Very good/ Very good	5.2/19	**FEATURES:** Rated 15 ppm monochrome/7 ppm color. 2400-by-1200-dpi maximum resolution, 100 sheets input, 50 output. **SUMMARY:** The higher-end model in Lexmark's Z line of ink jets, the Z52 produces sharp text and smooth images for a reasonable price. It also prints text quickly.
4	Xerox DocuPrint M750 800/832-6979 www.xerox.com	$100	87	4.2/0.8	Very good/ Good	5.9/17	**FEATURES:** Rated 10 ppm monochrome/6 ppm color. 1200-by-1200-dpi maximum resolution, 150 sheets input, 50 output. **SUMMARY:** Xerox's M750 sheds $49 this month and delivers high text speed and crisp text quality. Features such as a large input tray and a straight paper path make it an even better bargain.
5	Sharp AJ-2000 (NEW) 800/237-4277 www.sharp-usa.com	$179	86	4.6/0.9	Good/ Good	4.0/13.7	**FEATURES:** Rated 6 ppm monochrome/3 ppm color. 1200-by-1200-dpi maximum resolution, 150 sheets input, 50 output. **SUMMARY:** Sharp's entry into the ink jet market resembles the Xerox DocuPrint M750. It performs slightly better than the M750 and shows similar print quality, but it costs quite a bit more.
6	Epson Stylus Color 980 800/463-7766 www.epson.com	$249	85	6.6/2.0	Adequate/ Adequate	3.5/9.8	**FEATURES:** Rated 13 ppm monochrome/10.5 ppm color. 2880-by-720-dpi maximum resolution, 100 sheets input, 30 output. **SUMMARY:** Speediest on the chart, this unit is almost as fast as a monochrome laser. But its smudged, jagged text and filmy, dotted graphics fall short. Has a good software bundle.
7	Epson Stylus Color 880 800/463-7766 www.epson.com	$149	83	4.5/1.2	Good/ Good	3.3/11.6	**FEATURES:** Rated 12 ppm monochrome/9 ppm color. 2880-by-720-dpi maximum resolution, 100 sheets input, 30 output. **SUMMARY:** Quick performance and good text and color graphics mark the Stylus Color 880. Like most Epson printers, it produces significantly better print quality on glossy paper.
8	HP DeskJet 842C 800/752-0900 www.hp.com	$149	81	2.6/0.5	Good/ Good	7.2/14.6	**FEATURES:** Rated 4.6 ppm monochrome/3.1 ppm color. 600-by-1200-dpi maximum resolution, 100 sheets input, 50 output. **SUMMARY:** The DeskJet 842C has a good price, but its performance is rather slow. Output quality is a mixed bag: dark, crisp text and smooth but foggy graphics. Documentation is outstanding.
9	HP DeskJet 952C 800/752-0900 www.hp.com	$299	81	3.9/0.7	Good/ Good	3.6/11.1	**FEATURES:** Rated 5.1 ppm monochrome/3.6 ppm color. 2400-by-1200-dpi maximum resolution, 100 sheets input, 50 output. **SUMMARY:** With reasonable print quality and speed, the DeskJet 952C fits well in a small or home office. But the 932C, for $100 less and with even better text speed, is a much better choice.
10	Compaq IJ1200 800/345-1518 www.compaq.com	$149	80	4.5/1.0	Good/ Very good	5.2/19.1	**FEATURES:** Rated 10 ppm monochrome/5 ppm color. 2400-by-1200-dpi maximum resolution, 100 sheets input, 50 output. **SUMMARY:** Carrying the same print engine as the Lexmark Z42, this Compaq performed very similarly to the Lexmark, but a higher price and less-impressive support pull it down.

Best Buy   **Recommended for home**   **Recommended for printing photos**   **For reviews of printers we tested this month, visit www.pcworld.com/t10printers.**

TEST PC WORLD CENTER HOW WE TEST The overall rating we assign to each ink jet printer is based on a combination of seven measures, given the following weightings: price (25 percent), print quality (20 percent), features (15 percent), ease of use (15 percent), speed (10 percent), service and support (10 percent), and cost of consumables (5 percent). Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

SHARP DEBUTS its $179 AJ-2000, which captures the number five spot with above-average print speed and a moderate price. HP's new Photosmart 1218 just misses the chart, though we recommend it for photography buffs willing to spend $499 for its strong features and print quality. Xerox's $149 DocuPrint M760 falls short of the chart with print quality and speed almost identical to its less expensive, fourth-ranked DocuPrint M750. ▶

THERE ARE LOTS OF GREAT REASONS TO WORK AT HOME.

COLLATING ISN'T ONE OF THEM.

TOP 10 MONITORS

	17-INCH MONITOR	Month tested	Street price (1/18/01)	Overall rating	Quality of text/ graphics	Comments
1	**ViewSonic EF70** 800/888-8583 www.viewsonic.com	Sept 00	$255	86	Very good/ Excellent	**FEATURES:** 16.1-inch viewable area, .25mm stripe-pitch Diamondtron NF tube,[1] up to 87-Hz refresh rate,[2] Plug and Play ready, three-year warranty, 24-hour daily toll-free support. **SUMMARY:** Deep, saturated color in graphics keeps this model at the top. Sophisticated on-screen control menu is easy to navigate with standard buttons on the front bezel.
2	**Samsung SyncMaster 700NF** 800/726-7864 www.samsungmonitor.com	July 00	$284	85	Very good/ Very good	**FEATURES:** 16-inch viewable area, .25mm stripe-pitch Diamondtron NF tube,[1] up to 85-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 24-hour daily toll-free support. **SUMMARY:** Radiant colors and fine detail make this monitor a good choice for graphics work. Easy-to-use on-screen controls are set on a retracting panel.
3	CTX International PR705F 800/266-1491 www.ctxintl.com	Jan 01	$259	85	Very good/ Excellent	**FEATURES:** 15.8-inch viewable area, .24mm stripe-pitch FD Trinitron tube,[1] up to 105-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Produces smooth text and graphics; a $10 price drop makes the PR705F an even better bargain. On-screen menus are especially easy to use, with well-labeled icons.
4	Hansol 710D 888/426-7651 www.hansol.com	(NEW)	$250	85	Excellent/ Good	**FEATURES:** 16.1-inch viewable area, .25mm dot-pitch tube, up to 85-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 8-hour weekday toll-free support. **SUMMARY:** Razor-sharp text makes this model a good choice for word-processing tasks. Colors could be brighter; limited support hours compared to others.
5	DecaView GF385 888/707-6688 www.decaview.com	Feb 01	$259	84	Very good/ Very good	**FEATURES:** 16-inch viewable area, .24mm stripe-pitch FD Trinitron tube,[1] up to 100-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 10-hour daily toll-free support. **SUMMARY:** DecaView's chart maker displays clean text and graphics for a reasonable price. The control panel is easy to use, with well-marked word descriptions and pictures on menu options.
6	LG Flatron 795FT-Plus 800/243-0000 www.lgeus.com	Sept 00	$310	83	Very good/ Very good	**FEATURES:** 15.9-inch viewable area, .24mm stripe-pitch LG Flatron tube,[1] up to 120-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 12-hour daily toll-free support. **SUMMARY:** Bright, saturated color makes this model a good choice for graphics work. The small, sophisticated on-screen controls on the front bezel are simple to use and navigate.
7	Iiyama i70A 800/394-4335 www.iiyamadirect.com	Jan 01	$295	82	Very good/ Excellent	**FEATURES:** 16.1-inch viewable area, .25mm stripe-pitch Diamondtron NF tube,[1] up to 85-Hz refresh rate,[2] Plug and Play ready, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Moves up three spots on the chart, despite a $26 price increase. Displays rich graphics and fine text. Easy-to-use controls include a zoom feature and well-marked menus.
8	Eizo Nanao FlexScan T561 800/800-5202 www.eizo.com	Nov 00	$489	82	Excellent/ Excellent	**FEATURES:** 15.9-inch viewable area, .25mm stripe-pitch Diamondtron NF tube,[1] up to 118-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, three-year warranty, 8-hour weekday toll-free support. **SUMMARY:** Superb image quality sets this model apart from the others—but for a pretty penny. Meager support hours; confusing on-screen controls make using the manual essential.
9	Sony HMD-A200/L 800/352-7669 www.sony.com	(NEW)	$349	82	Excellent/ Very good	**FEATURES:** 16.1-inch viewable area, .24mm stripe-pitch FD Trinitron tube,[1] up to 85-Hz refresh rate,[2] Plug and Play ready, three-year warranty, 24-hour daily toll-free support. **SUMMARY:** The second-priciest display on the chart renders crisp, dark text on word-processing documents and spreadsheets, especially with smaller fonts. Colors look rich.
10	Hitachi CM615U 800/441-4832 www.hitachi.com	(NEW)	$209	81	Very good/ Satisfactory	**FEATURES:** 15.9-inch viewable area, .25mm dot-pitch tube, up to 85-Hz refresh rate,[2] Plug and Play ready, TCO'99 compliant, five-year warranty, 11.5-hour weekday toll-free support. **SUMMARY:** Display solid text for at a rock-bottom price, though colors are not as lively as on other models in our chart. The generous warranty offsets somewhat stingy support hours.

Best Buy · For reviews of products that didn't make the chart, visit www.pcworld.com/t10monitors.

TEST PC WORLD CENTER — **HOW WE TEST** Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on text and graphics quality (25 percent each), price (25 percent), features and ease of use (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by PC World Test Center. All rights reserved. [1] Uses an aperture grille in which parallel wires near the sides of the screen are strung farther apart than those at the middle. [2] Maximum refresh rate at 1024 by 768 resolution.

THREE NEWCOMERS grace the chart this month, with the number four Hansol 710D climbing highest. The 710D's sharp text makes it a good choice for word processing and spreadsheet use.

Similarly, Sony's HMD-A200/L, at number nine, offers crisp lettering and fine detail. The relatively inexpensive, tenth-place Hitachi CM615U displays text well, but its graphics quality is merely adequate. Next month we tackle 19-inch displays. ▶

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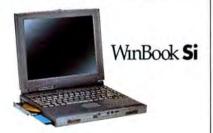
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TOP 10 GRAPHICS BOARDS

	AGP BOARD	Month tested	Street price (1/23/01)	Overall rating	Image quality	Overall speed	Features rating	Comments
1	ATI Radeon All-in-Wonder 905/882-2600 www.ati.com	Feb 01	$299	92	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:** Improved DirectX 8 support helps bump this card up to first place. ATI's video features and bundled software make it great for video editing enthusiasts.
2	CardExpert GeForce2 MX 800/539-2273 www.gainward.com	Feb 01	$119	90	Very good	Good	Very good	**FEATURES:** 4X AGP, NVidia GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; DVI-out. **SUMMARY:** CardExpert's budget MX board delivered respectable performance in our tests and includes a 3D games bundle and DVD software. This card also has DVI-out, a nice add-on for most digital monitors.
3	ATI Radeon 64MB DDR 905/882-2600 www.ati.com	(NEW)	$229	89	Very good	Very good	Very good	**FEATURES:** 4X AGP, ATI Radeon chip, 64MB of DDR SDRAM, 350-MHz RAMDAC; DVI-out, hardware DVD support; graphics editing software. **SUMMARY:** Another ATI card earns high honors due to strong DirectX 8 support and solid performance at higher resolutions. 64MB of fast DDR SDRAM packs an extra punch.
4	Hercules 3D Prophet II MX 877/484-5536 www.hercules.com	Mar 01	$150	89	Excellent	Good	Good	**FEATURES:** 4X AGP, NVidia GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; E-Color 3Deep color-calibration utility, five game demos. **SUMMARY:** This board lacks the features and software of the top two cards, but its stellar image quality and performance help it take fourth place.
5	ATI Radeon 32MB SDR 905/882-2600 www.ati.com	Feb 01	$99	88	Very good	Good	Good	**FEATURES:** 4X AGP, ATI Radeon chip, 32MB of SDRAM, 350-MHz RAMDAC; no software. **SUMMARY:** After a $30 price cut, the ATI Radeon 32MB SDR is a steal, though it's available only at smaller shops and online. There's no bundled software, but on the other hand, it's the least-expensive model here with DirectX 8 support.
6	Hercules 3D Prophet Pro 877/484-5536 www.hercules.com	Mar 01	$370	87	Very good	Very good	Good	**FEATURES:** 4X AGP, NVidia GeForce2 Pro chip, 64MB of DDR SDRAM, 350-MHz RAMDAC; PowerDVD, Hercules 3D Tweaker, and E-Color 3Deep color-calibration software. **SUMMARY:** This card generated impressive image quality in Quake III and Unreal Tournament. It also posted speeds comparable to the Ultra boards'.
7	ELSA Gladiac GeForce2 GTS 800/272-3572 www.elsa.com	Feb 01	$229	83	Satisfactory	Very good	Good	**FEATURES:** 4X AGP, NVidia GeForce2 GTS chip, 32MB of DDR SGRAM, 350-MHz RAMDAC; DVI port, TV-out, no applications. **SUMMARY:** A great value for a speedy GeForce2 GTS card. A lower price lets it tie the two Ultras on the chart in overall rating, but the ELSA is slower, and image quality pales in comparison.
8	Hercules 3D Prophet II Ultra 877/484-5536 www.hercules.com	Mar 01	$499	83	Very good	Excellent	Very good	**FEATURES:** 4X AGP, NVidia GeForce2 Ultra chip, 64MB of DDR SDRAM, 350-MHz RAMDAC; DVI-out, PowerDVD, Hercules 3D Tweaker, and E-Color 3Deep color-calibration software. **SUMMARY:** A DVI-out port lets this card support some digital monitors. It also supports S-Video and composite video.
9	Creative Labs 3D Blaster Annihilator 2 Ultra 800/998-1000 www.creative.com	Feb 01	$499	83	Excellent	Excellent	Good	**FEATURES:** 4X AGP, NVidia GeForce2 Ultra chip, 64MB of DDR SDRAM, 350-MHz RAMDAC; color-calibration software. **SUMMARY:** This 3D powerhouse packs quite a punch. It soared on both speed and image-quality tests, but it placed low on our chart because of its high price and lack of hardware and software.
10	Creative Labs 3D Blaster Annihilator 2 800/998-1000 www.creative.com	Feb 01	$300	82	Good	Very good	Good	**FEATURES:** 4X AGP, NVidia GeForce2 GTS chip, 32MB of DDR SGRAM, 350-MHz RAMDAC; Enhanced BlasterControl 4.0, Lava Music Video Player, and color-calibration utilities. **SUMMARY:** This fast performer had a slight edge on our image-quality tests over the ELSA Gladiac, but its price hurts its overall score.

Best Buy   online   For reviews of other new graphics boards that we tested this month, visit www.pcworld.com/t10graphics.

TEST PC WORLD CENTER **HOW WE TEST** We test 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).

ATI'S RADEON All-in-Wonder slides into first place this month, displacing the CardExpert GeForce2 MX. ATI's boards are the only ones to date offering hardware support for Microsoft's DirectX 8, which permits richer, more realistic games. At press time, NVidia had just announced its newest processor, the NV20, which will support DirectX 8 and will outperform the GeForce2 Ultra, the company's current top-of-the-line chip. ▶

TOP 10 CD-RW DRIVES

	CD-RW DRIVE	Street price (1/15/01)	Overall rating	Performance/ support policies	CD-R write speed for 430MB/CD-RW write speed for 100MB (min:sec)	Comments
1	**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 technology, Adaptec Easy CD Creator 4.02, and DirectCD 3.01, one-year warranty, 11-hour weekday toll-free support. **SUMMARY:** Price drops by $29. Top-notch CD-R and CD-RW write speeds, plus excellent CD-ROM read speeds, make this drive our top pick overall.
2	**Ricoh MediaMaster MP9120A** 877/742-6479 www.ricohdms.com	$299	85	Very good/ Excellent	4:46/1:27	**FEATURES:** 12X/10X/32X,¹ and 8X DVD-ROM, IDE, internal, 2MB buffer, buffer underrun technology, Prassi AbCD 1.3 and PrimoCD, one-year warranty, 15-hour weekday toll-free support. **SUMMARY:** At $50 less than last time, this drive has exceptional CD writing performance and DVD playback. We'd like to see an easier software installation scheme.
3	Ricoh MediaMaster MP7120A 877/742-6479 www.ricohdms.com	$199	84	Very good/ Excellent	4:43/1:28	**FEATURES:** 12X/10X/32X,¹ IDE, internal, 4MB buffer, Prassi AbCD 1.3 and PrimoCD, one-year warranty, 15-hour weekday toll-free support. **SUMMARY:** This drive, which sheds $50 from its price tag this month, breezed through writing our CD-R image, but it lacks the buffer underrun technology of its pricier 9120A sibling.
4	LG Electronics CED-8120B (NEW) 800/243-0000 www.lgeus.com	$199	83	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, 12-hour weekday toll-free support. **SUMMARY:** Excellent read performance and good write performance—plus a large buffer and a sturdy tray mechanism—make this quiet drive a bargain.
5	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, 12-hour weekday and Saturday toll-free support. **SUMMARY:** If your needs can be satisfied by 8X CD-R and 4X CD-RW write speeds, this is the fastest drive we've tested in that class; model has dropped $30 since February.
6	TDK 12/10/32 800/835-8273 www.tdk.com	$249	81	Very good/ Very good	5:25/2:00	**FEATURES:** 12X/10X/32X,¹ IDE, internal, 2MB buffer, buffer underrun technology, 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 and a price drop help this drive make our chart despite slow CD-RW performance for its speed class.
7	Acer CRW1032A 888/723-2238 www.acercm.com	$179	81	Good/ Excellent	6:08/3:25	**FEATURES:** 10X/4X/32X,¹ IDE, internal, 4MB buffer, Adaptec Easy CD Creator 4.02c and DirectCD 3.01d, one-year warranty, 24-hour weekday and weekend toll-free support. **SUMMARY:** This drive's CD-R speed is a bit slower than that of other 10X drives, but its 4X CD-RW performance is on target. Acer offers unmatched tech support hours.
8	Creative Labs CD-RW Blaster 12-10-32 800/998-1000 www.creative.com	$250	80	Very good/ Very good	5:23/1:50	**FEATURES:** 12X/10X/32X,¹ IDE, internal, 2MB buffer, buffer underrun technology, Nero Burning ROM 4.0, one-year warranty, 14-hour weekday toll support. **SUMMARY:** General-purpose drive uses Sanyo Electric's Burn-Proof technology to help prevent buffer underruns from occurring while you're burning CDs.
9	AOpen CD-RW 12/10/32 888/852-6736 www.aopen.com	$199	80	Very good/ Satisfactory	5:16/1:32	**FEATURES:** 12X/10X/32X,¹ IDE, internal, 4MB buffer, NTI CD-Maker 2000 and FileCD, one-year warranty, 12-hour weekday toll support. **SUMMARY:** This good all-around performer includes Symantec's Norton Ghost software, which allows you to generate perfect backup copies of your hard disk partitions with ease.
10	Iomega CD-RW 12x10x32x 888/926-2426 www.iomega.com	$279	79	Very good/ Very good	5:17/1:40	**FEATURES:** 12X/10X/32X,¹ IDE, internal, 2MB buffer, buffer underrun compensation, Adaptec Easy CD Creator 4.02 and DirectCD 3.01, one-year warranty, 15-hour weekday and 7-hour Saturdays toll-free support. **SUMMARY:** Easy software installation, a well-rounded software bundle, and great support make this drive a solid deal.

Best Buy   For capsule reviews of this month's new CD-RW drives, visit www.pcworld.com/reviews/cd-rws.

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 on the fly from an image file. 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. We measure CD-RW packet-writing performance by copying 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.

WHAT A DIFFERENCE two months can make. The last time we looked at CD-RWs, drives with 8X CD-R write speeds dominated our chart. Now 12X-generation drives have taken over. Eight of the ten drives—including the sole newcomer, LG Electronics' CED-8120B—feature speeds of 12X/8X/32X or greater. The only 8X/4X/32X drive to make the chart this month is Sony's CRX140E/CH2, which now sells at a rock-bottom price. ▶

TOP 10 DIGITAL CAMERAS

	CAMERA: $500 AND OVER	Street price (1/9/01)	Overall rating	Image quality	Ease of use	Battery life/ shots	Comments
1	**Epson PhotoPC 3000Z** 800/463-7766 www.epson.com	$899	89	Very good	Excellent	Excellent/ 299	**FEATURES:** 3.3-megapixel resolution, 16MB CompactFlash media, 34-102mm focal range ¹; serial, USB, and video output; 16.1 ounces. **SUMMARY:** Easy to use, produces impressive images, has manual exposure controls, records video clips and audio, has longest battery life on the chart; 24/7 tech support.
2	Nikon Coolpix 880 800/645-6689 www.nikonusa.com	$699	86	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.
3	Sony Cyber-shot DSC-P1 (NEW) 800/222-7669 www.sony.com/di	$799	82	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.
4	HP PhotoSmart 618 800/752-0900 www.photosmart.com	$599	82	Good	Good	Good/ 199	**FEATURES:** 2.1-megapixel resolution, 16MB CompactFlash media, 34-108mm focal range ¹; USB, IRDA, and video output; 10.6 ounces. **SUMMARY:** Can group pictures into categories inside camera and add audio memos, has manual exposure controls, can send images directly to some HP printers with infrared.
5	Kodak DC4800 800/235-6325 www.kodak.com/go/dc4800	$699	82	Very good	Adequate	Good/ 171	**FEATURES:** 3.1-megapixel resolution, 16MB CompactFlash media, 28-84mm focal range ¹; serial, USB, and video output; 11.4 ounces. **SUMMARY:** Superlative images and versatile exposure settings, but no manual focus, audio recording, or video recording. Substantial $100 price drop this month.
	CAMERA: UNDER $500						
1	**Olympus Camedia D-360L** 888/553-4448 www.olympus.com/digital	$289	78	Adequate	Good	Limited/ 44	**FEATURES:** 1.3-megapixel resolution, 8MB SmartMedia card, 36mm focal length ¹; serial and video output; 9.1 ounces. **SUMMARY:** Feature-rich with extensive exposure controls, zoom lens, manual focus option, and panorama mode, but battery life is much too brief, and image quality settings are confusing.
2	Fujifilm FinePix 2400 Zoom 800/800-3854 www.fujifilm.com	$379	77	Good	Adequate	Very good/ 259	**FEATURES:** 2.1-megapixel resolution, 8MB SmartMedia card, 39-114mm focal range ¹; USB output; 12.1 ounces. **SUMMARY:** Relatively inexpensive for a camera with zoom, compact point-and-shoot case, and above-average image quality; menu controls could be better; support limited to 12 hours per day.
3	Epson PhotoPC 650 800/463-7766 www.epson.com	$299	76	Adequate	Very good	Adequate/ 142	**FEATURES:** 1.1-megapixel resolution, 8MB CompactFlash media, 39mm focal length ¹; serial, USB, and video output; 14.7 ounces. **SUMMARY:** Inexpensive point-and-shoot model short on extras, but includes cable for camera-free uploads and 24/7 toll-free support; relatively heavy at nearly 1 pound.
4	HP Photosmart 315 800/752-0900 www.photosmart.com	$299	76	Adequate	Good	Adequate/ 148	**FEATURES:** 2.1-megapixel resolution, 8MB CompactFlash media, 38mm focal length ¹; USB and IRDA output; 11.4 ounces. **SUMMARY:** Inexpensive for a 2.1-megapixel camera; solid and easy-to-use unit with few extras; infrared port for sending images directly to some HP printers; support calls not toll-free.
5	Olympus Camedia D-490 Zoom 888/553-4448 www.olympus.com/digital	$499	75	Good	Good	Adequate/ 127	**FEATURES:** 2.1-megapixel resolution, 8MB SmartMedia card, 35-105mm focal range ¹; serial and video output; 9.5 ounces. **SUMMARY:** Compact point-and-shoot design and above-average image quality; nice extras include zoom, panorama, and video capabilities; image quality settings are confusing.

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 to see how well each camera captures color and image details, and of a mannequin to see how well it captures subtle coloring and skin tones. A panel of judges reviews the on-screen and printed photos and assigns image quality scores; we then average the judges' scores. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.   ¹ 35mm film equivalent.

"HAVE CAMERA, WILL TRAVEL" might best describe the two additions to our chart of digital cameras costing $500 and more. Compact and flexible, Nikon's Coolpix 880 produces great images. Close behind, Sony's pocket-size Cyber-shot DSC-P1 looks elegant and fits into an optional underwater case. Hewlett-Packard's new $799 Photosmart 912 just missed the chart, but it's easy to use and sports a retro single-lens-reflex design. ∎

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 depart-ment," 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 restau-rant. "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 trans-actions with CRE 2000 and PC America's Restaurant Pro Express (RPE 2000) since October 1999. And Edelmann pre-dicts 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 dis-counts on overstock items (e.g., "Get a Free Six-Pack of Pepsi on Your Next Visit").

CRE 2000's couponing feature promises retailers an excel-lent route to a crucial dimension in retail sales. "Repeat business is the most important aspect of any business," says PC America's president, Howard Gosman. "With this addition to our POS package, we are giving our customers a quick and easy-to-use method for creating it."

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ALIENWARE

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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-CNET Editor's Choice Award

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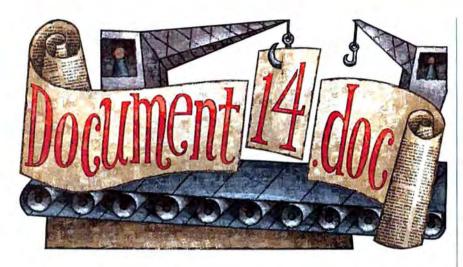
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HERE'S HOW

WINDOWS TIPS — SCOTT DUNN

Safer Backups: The Long and Short of It

IN THE ONLINE VERSION of October's *Windows Tips*, I described a simple way to back up data files using xcopy32 in the command line (www.pcworld.com/oct2000/xcopy). But as reader Jim Barr of Salinas, California, notes, backing up data by using xcopy, xcopy32, Windows Explorer, or even many commercial programs can cause problems due to the way Windows handles long file names.

Here's the scoop: Every time you give a file a name longer than 11 characters (8 characters to the left of the period and the 3-character file-type extension to the right), Windows generates a short 8.3 version of the file name (8 characters plus the 3-letter extension) so that the name will remain compatible with older applications. Windows removes spaces and other illegal characters, and if the original name has more than 8 characters to the left of the dot, Windows replaces all the characters after the first six with a tilde (˜) and a number. For example, a file named 'Florida Polling Data.xls' also has a short file name: 'FLORID˜1.XLS'. You can see

these short names by opening the DOS prompt, navigating to a folder, typing **dir**, and pressing **<Enter>** to view a list of folder contents. The short DOS-like names are on the left, and the normal, long Windows names are on the right.

Unfortunately, when many applications make copies of files, they create these short names anew rather than copying the existing short names. So if, for example, you have a folder containing three files named document1.doc, document2.doc, and document3.doc, the short names stored for these files are DOCUME˜1.DOC, DOCUME˜2.DOC, and DOCUME˜3.DOC. But if you delete document1.doc and use Explorer or xcopy to back up document2.doc and document3.doc to another folder, the new name generated for document3.doc is DOCUME˜1.DOC. This means the short name DOCUME˜1.DOC could point to document1.doc in one folder and to document3.doc in another folder.

If you back up only data files and you always use Windows programs that are savvy about long file names, chances are you won't have a problem, since those applications won't ever refer to the potentially mixed-up short names. But system files are another story. In many cases, Windows' Registry stores the path to files using their short names. To see this, choose *Start•Run*, type **regedit**, and press **<Enter>**. In the Registry Editor, select *Edit•Find*, type ˜, and press **<Enter>**. You'll have no trouble finding files and folders that use short names. As a result, it's possible for program and system file names that have been copied and restored to stop functioning because the Registry is using the wrong short form.

The best solution is to make sure you use a backup program that copies the existing short file name along with the long file name; Symantec's Norton Ghost

FIGURE 1: WINDOWS ME'S Image Preview template has a preview pane and lets you display a slide show.

and Norton Ghost 2001 both do this (see www.ghost.com for more information). For batch-file or simple command-line copying, I like Pixelab's Xxcopy, which at the time of this writing is still freeware. Xxcopy uses the same DOS commands that xcopy does. It preserves short file names, and it has a few other bells and whistles that make it a convenient backup utility. You can download it from PCWorld.com's Downloads, or contact its creators at www.datman.com/xxcopy.

WINDOWS ME SLIDE SHOWS

MAYBE YOU WANT your office computer to display a continuous series of promotional screens, or your home PC to run a slide show of the family vacation pictures you took with your digital camera; or maybe you simply want to browse the images in a folder in Explorer's thumbnail preview mode—but

FIGURE 2: SLIDE SHOWS ARE JUST a click away once you have created your custom folder of slides.

you don't want to buy and learn presentation or graphics-management software. Use Windows Me's slide-show feature instead.

If you're planning a presentation, first assemble your slides. (Skip this step if you plan only to browse images currently on your hard disk.) The images must be in a bitmap-based file format—such as .gif, .jpg, .bmp, or .tif—that Windows Explorer's Image Preview supports. If you use a digital camera to create your slides, they are probably already in one of those formats. (Unlike the miniature preview that Web View provides, Image Preview will not display .xls, .htm, and other files that are not bitmap based.) Open a new folder for all the images in your slide show (and only for those images). To control the order in which they'll appear, rename the images from first to last in alphabetical or numeric order: Select a file in the folder window, press <F2>, and add a letter or number (such as **00**, **01**, **02**, and so on) to the beginning of each file name.

To customize your slide folder with the proper template, right-click an empty area of the folder and choose *Customize This Folder* (or highlight the folder and select *View•Customize This Folder*). Click *Next* in the Customize This Folder Wizard, select *Customize*, check *Choose or edit an HTML template for this folder*, click *Next* again, and select *Image Preview* (see **FIGURE 1**). Click *Next* once more and then *Finish*.

To launch a slide show, open this folder and click the underlined *slideshow* text in the upper-left corner of Explorer's left pane (see **FIGURE 2**). If you don't see the slideshow option, drag an edge of the window to widen your view. If you do nothing, the slides will advance on their own (one every 10 or 15 seconds). To advance the slides manually, click anywhere on your screen. To go backward, move the mouse or press any key except <Alt> or <Esc> to display a set of VCR-like controls in the upper-right corner of the screen (see **FIGURE 3**). To run the slide show from your keyboard,

CONTENTS

How It Works—MP3 Player Hardware: How do MP3 players generate music from bytes? Find out here (www.pcworld.com/how_it_works/mp3).

Dial-Up Networking: Every whine, screech, and whistle your modem utters happens for a reason (www.pcworld.com/how_it_works/dun).

press any key to make the VCR controls appear, use the arrow keys to highlight a button, then press <Space> or <Enter> to activate it. Press <Esc> to end the slide show. **Bonus tip:** If you have a scroll-wheel mouse, you can use it to zoom in (magnify) or out (return to the normal view) as slides appear on screen.

FIGURE 3: USE these VCR-like controls to run a slide show.

THE INSECURE ADMINISTRATOR

YOU MAY BE the only person using a Windows 2000 workstation that's tucked away in a secure location, but if you routinely boot up to your Administrator account, you're taking unnecessary risks. Because you can run any program when logged on as an administrator, you could, while visiting a Web site, launch an application that looks harmless but is actually very damaging (a so-called Trojan horse). To close this potential security breach, configure your account as a member of the Power ▶

Users group or—better yet—the Users group. You'll still be able to run most programs and surf the Web, but a Web site won't be able to install applications that modify system files or that allow other people to launch such applications.

Step 1: Create a new identity. Choose *Start•Settings•Control Panel•Administrative Tools•Computer Management*. In the left pane, double-click *Local Users and Groups*, or click that branch's plus sign (+). Then select the *Users* folder. If you already log on to Windows using an account that belongs to the Administrator Group but isn't the default Administrator account, you need not make any changes. But if you're using the default Administrator account, create a new account for yourself by right-clicking the right pane and choosing *New User*. In the New User dialog box, enter the name and password you'll use to log on, and select other options as desired. Click *Create* and then *Close*.

Step 2: Join the safe group. To determine the group that your everyday identity belongs to, double-click your user account in the right pane, then click the *Member Of* tab. If the only group listed in the 'Member of' list is Users, click *OK*; if this everyday account is listed as belonging to the Administrators group, select *Administrators* and click *Remove*. Repeat the procedure to remove other potentially risky groups, such as Power Users. If the Users group is not listed, click the *Add* button, select *Users*, click *Add* again, then *OK*

FIGURE 4: TRANSFER CUSTOM settings between your Windows 2000 identities by using Copy To.

twice to close the Properties dialog box for your everyday log-on identity, and close Computer Management.

Step 3: Try it out. Choose *Start•Log Off Administrator* (or whatever identity is logged on) and click *Yes*. Log on using your new identity, and make this your everyday log-on. To install a service pack, alter a restricted system setting, or do some other task forbidden to the Users group, log off and then log back on as the Administrator.

Step 4: Transfer custom settings. If you created a new account as part of this process (instead of changing the group that your existing account belonged to), you may think you have to re-create all your custom settings—Start menu arrangements. screen colors, network connections, and so on—in your new account. Don't worry: It's easy to transfer these items to your new identity.
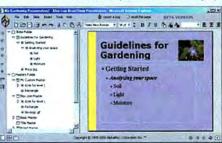
You need to log on to your new identity at least once to create the folder that will hold that identity's custom menus and settings. Then log off, and log on again as the Administrator. Choose *Start•Settings•Control Panel•System*, click the *User Profiles* tab, select the *Administrator* account (or whatever account you want to copy settings from), and click *Copy To*. In the Copy To dialog box, enter the path to the folder for the new identity, or click *Browse* to locate it. The folder you want is in the Documents and Settings folder and has the same name as the identity that you created. For example, if your new identity is the name Joe, type **C:\Documents and Settings\Joe** and click *OK* (see **FIGURE 4**).

Click the *Change* button, choose the new user identity in the Select User or Group dialog box, and then click *OK*. This step lets you modify your settings from within your new account. Click *OK* again to begin copying settings. Windows warns

you in a prompt that rather than merely copying information, this transfer of settings will obliterate the profile it replaces and will delete any files on that profile's desktop. If you're merely overwriting a new default profile, click *Yes* to confirm the operation. Otherwise, click *No*, and then manually move the settings from one profile folder to another via Explorer.

The next time you log on to your new account, it will look much the same as the account you copied it from, but it will include many administrative tools that don't normally show up on the menus of a Users group member. The added tools come in handy, but don't expect all of them to work as before. The restrictions on use are necessary for system security.

Find files in this article at www. pcworld.com/downloads. Find more tips at www.pcworld.com/ hereshow. Windows Tips pays $50 for published tips and questions. Scott Dunn is a PC World contributing editor. ∎

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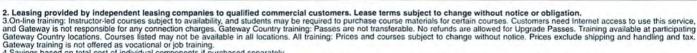
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Windows 98 Utilities Missing in Windows Me?

I RECENTLY installed Windows Me on my system. This morning I tried to run Sysedit and was rudely informed that the file cannot be found or doesn't exist. Did Microsoft really remove this handy utility? Is there an alternative?

Alexander Ross, Boston

THE SYSTEM EDITOR, also called Sysedit, is one of two utilities that were included with earlier versions of Windows but may not be part of Windows Me. (I'll discuss the other missing utility, System File Checker, in a minute.) To edit your system files in a text-editor environment in Windows *9x*, select *Start• Run*, type **sysedit**, and press **<Enter>**. In Windows Me, you may get an error message when you try this.

Microsoft says that the System Configuration Utility (Msconfig), introduced in Windows 98, is a better tool for editing system.ini and win.ini (see **FIG-URE 1**). The other files you once edited in Sysedit—autoexec.bat, config.sys, and protocol.ini—are no longer relevant in the less-DOS-dependent Me environment.

You launch Msconfig much as you did Sysedit: Select *Start• Run*, type **msconfig**, and press **<Enter>**. Alternatively, you can open Sysedit by clicking *Start• Programs• Accessories• System Tools• System Information*, and in the System Information applet, pick *Tools• System Configuration Utility*.

Whether Msconfig's tabbed and structured environment makes editing these files easier is a matter of personal taste: If you prefer Sysedit-style text editing, select *Start• Run*, enter **win.ini** or **system.ini**, and press **<Enter>** to have the file come up in Notepad (or whatever program you've selected as your default text editor). Sysedit and Notepad let you do real editing, and thus allow you to introduce real syntax errors, whereas Msconfig keeps a record of every change you make.

If you've upgraded to Me, you may still have your old Sysedit file. The installation process doesn't always remove the old sysedit.exe file, which still works in Windows Me. Try launching it, and you may be pleasantly surprised.
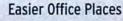
On the other hand, the Windows Me upgrade installation does remove System File Checker. This handy Windows 98 program scans your hard drive looking for important system files that have been altered and offers to restore the original version. This is valuable because installation programs often replace these system files with old, incompatible, or altered versions.

If you have Windows 98, it's wise to run System File Checker after you install an application. To launch it, select *Start• Run*, type **sfc**, and press **<Enter>**.

Windows Me replaces System File Checker with System File Protection. You cannot launch System File Protection; It always runs in the background. This makes the utility more reliable than System File Checker, since it can catch a program in the act of alteration. On the other hand, System File Protection likely contributes to Me's slower performance, and you can't turn the program off.

UNINSTALL THE RIGHT FONTS

I'VE HEARD that having too many fonts can cause system problems. I have about 625 fonts on my PC. Is this too many? If so, how can I tell which ones are critical to my system?
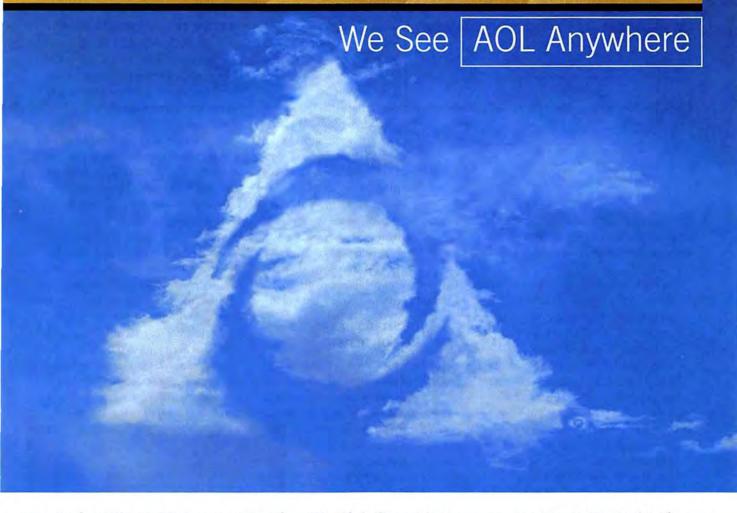
Paul J. Dubman, Boise, Idaho

EXCESS FONTS can hog system resources, but it takes a lot of them to have an impact. Since you have so many installed, you might want to do some trimming.

To view your fonts, select *Start• Run*, type **fonts**, and press **<Enter>**. To see what a font looks like, double-click its icon. You can delete a font by right-clicking it and selecting *Delete*, but it's safer to unin- ▶

Easier Office Places

THE NOVEMBER 2000 *Answer Line* column explained how to customize the Places Bar in Office 2000's Open and Save As dialog boxes by editing the Windows Registry. Reader Dave Traweek of Portland, Oregon, knows an easier way. Mike Craven's WOPR PlaceBar Customizer freeware offers a dialog box for choosing your preferred places, and it makes the Registry changes for you. You'll find the program at PCWorld.com's Downloads and at Woody's Office Portal (www.wopr.com/office2000/placebar.htm).

FIGURE 1: EDITING SYSTEM FILES via the System Configuration Utility is safer and easier than with Sysedit.

FIGURE 2: BE CAREFUL NOT to delete Windows system fonts, which are identified with a red 'A' rather than a gray-blue 'TT'.

stall it by dragging it to another folder or drive—so you can always drag it back. You must do this dragging (in either direction) from within Windows Explorer. Moving or copying a font to or from the C:\Windows\Fonts folder via DOS commands or a third-party file management utility won't properly install or uninstall it.

Some fonts should stay put—notably Windows system fonts, which have the extension .fon instead of .ttf. The icon for a system font has a red 'A' rather than a gray-blue 'TT' (see **FIGURE 2**). System fonts are usually hidden files, but they're visible in the Fonts folder in Explorer. They disappear when you move them elsewhere, though. Some applications require specific fonts, such as Arial or Times New Roman, so you'd better keep them around.

CHANGE WIN ME'S PLACES BAR

IN THE NOVEMBER 2000 issue, you explained how to customize the Office 2000 Open Dialog Places Bar. Windows Me has a seemingly identical Places Bar. How do you customize this one?

Paul Slater, Palatine, Illinois

I WAS ABOUT to give up on finding an answer to this problem (a Microsoft representative I consulted told me flatly that it was impossible), when reader Shaun Lyon of Studio City, California, helped me out. Microsoft's Tweak UI freeware lets you customize the Places Bar. You'll need to have version 1.33, which is available from PCWorld.com's Downloads.

Select *Start•Settings•Control Panel* and double-click *Tweak UI* (in Windows Me,

you may have to click *view all Control Panel options* first). If your Tweak UI dialog box does not include three rows of tabs, it's not version 1.33.

To change the Places Bar, first click the *Open* tab. There you'll see a combination box for every icon that the bar contains. You can replace an icon either by selecting another choice from the pull-down menu (these are the Microsoft-approved choices) or by typing in the path to any drive or folder. A browse button would have been useful, but none is included. Click *OK* once you've made your change.

HIS OUTLOOK EXPRESS OR HERS?

MY WIFE AND I use Outlook Express identities to access our e-mail accounts. If I don't remember to pick *File•Switch Identity* when I use the program after her, the e-mail I send appears to come from her. How can we ensure that Outlook Express will know which of us is using the program?

Bob Slemmer, St. Augustine

IF YOU USE Internet Explorer 5 (and thus Outlook Express 5), you can make the program ask you to select an identity every time Outlook Express loads after Windows boots. In Outlook Express, select *File•Identities•Manage Identities*, and in the 'Start up using' field, select *Ask Me* and click *Close*.

Unfortunately, if you exit Outlook Express and then reenter it, you won't be asked your identity; and Outlook Express 5.5 doesn't give you this option. (Outlook Express versions before 5 didn't offer identities at all.) So make Outlook Express change its appearance when you change identities. Since the program remembers the shape and size of its window for each identity, if one of you agrees to maximize the window to full screen, and the other agrees not to, you'll see the difference. Any change to the look of the program, including options from the View•Layout dialog box, should suffice.

ORGANIZE YOUR NEWSGROUPS IN OUTLOOK EXPRESS

I SUBSCRIBE to a long and unwieldy list of newsgroups in Outlook Express. Is there any practical way to separate them by subject?

Jason Smith, Albuquerque, New Mexico

OUTLOOK EXPRESS allows you to create as many newsgroup accounts as you like, and it doesn't care a bit if all of them are set to point to a single ISP account.

To create a newsgroup account, select *Tools•Accounts* and click the *News* tab. Double-click your existing account (I'm assuming you have one) and click the *Server* tab. With the 'Server name' field selected, press **<Ctrl>-C** and then **<Esc>**.

In the Internet Accounts dialog box, select *Add•News* and follow the instructions in the resulting wizard. When asked for a News Server, press **<Ctrl>-V**.

After you're done with the wizard, double-click the new account and rename it appropriately (**Movies, Music,** or whatever); then click *OK* and *Close* (see **FIGURE 3**).

FIGURE 3: ADDING A NEW newsgroup account is a breeze with Outlook Express's Internet Accounts dialog box.

Unfortunately, you won't be able to copy or move newsgroups from one account to another. Instead, you'll have to subscribe to each one in the new account and then unsubscribe in the old one.

Find files from this article at www.pcworld.com/downloads. Send questions to answer@pcworld.com. Answer Line pays $50 for published items. You'll find Contributing Editor Lincoln Spector's humorous writing at www.thelinkinspector.com. ∎

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Check Your Hacker Vulnerability for Free

IF YOU'VE SPENT ANY time looking into cable modems, DSL, satellite, or some other always-on Internet-access technology, you've probably heard over and over that you need to install and use a personal firewall—either firmware inside your access device, or software such as Network ICE's BlackICE Defender, Zone Labs' ZoneAlarm, or Symantec's Norton Internet Security. Although a firewall may be sufficient to keep intruders from accessing your system remotely, how can you be certain? One quick way is to visit a Web site that will test your system and try to find Internet security flaws just as a cracker would. Steve Gibson's free Shields Up service at shieldsup.grc.com tests common port addresses on your system and issues a report on your hacker vulnerability. Gibson clearly explains complex Internet-security technologies in plain English. And if you have firewall software running on your system, you'll get a report listing all the probes that originated from the Shields Up site.

Shields Up checks only a handful of your system's thousands of possible ports, however. If you are interested in a more thorough probe, give the incredible HackerWhacker service a try. HackerWhacker (www.hackerwhacker.com) offers a higher level of security by scanning your PC's entire range of more than 130,000 possible port addresses. It also examines Windows' NetBIOS networking configuration (see **FIGURE 1**). Hacker-Whacker offers a complementary trial scan, but additional scans cost $10 apiece. Alternatively, you can pay $30 for a three-month Home Computer Membership, which gives you unlimited scans. The peace of mind that the service offers is unrivaled.

WEED OUT DEAD BOOKMARKS

ISN'T IT SAD when your favorite Web sites dry up and blow away? You may be fastidious about keeping your bookmarks organized, but it can be downright disturbing to find that a link points to a site that has moved or been deleted.

Fortunately, Netscape's Navigator offers a feature that helps you keep your bookmarks fresh: The browser can be set to detect changes to your bookmarked pages. Navigator won't automatically find the new pages (if any), and it doesn't tell you whether a page is gone or has simply moved, but it does tell you which pages you don't need
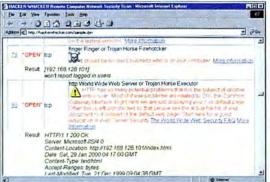
Ask a Champion for Netscape Help

STILL RESISTING the urge to give in to the Dark Side and use Internet Explorer? Chances are you're using Netscape's Communicator suite, including the Navigator Web browser. Netscape's own help files are often useful, but sometimes you need to ask an expert. The Netscape Unofficial FAQ (ufaq.org) contains the collected wisdom of the Netscape Champions (listed at help.netscape.com/nuggies/members.html). The site covers PC versions from 3.0 to 6.0, as well as Macintosh and Unix versions.

to update yourself. To check all your Navigator bookmarks automatically, press <Ctrl>-<B> to open the Bookmarks window, choose *View• Update Bookmarks,* then click *Start Checking.* Navigator will add a question mark to the icons of the bookmarks that require updating.

Internet Explorer offers a similar capability. It automatically downloads updates for any pages on your Favorites list that have changed since the last time you viewed them, but it doesn't tell you much about the pages that have vanished. In IE 4.*x*, you must first subscribe to the Web site (either when you add it to your Favorites list or afterward by right-clicking the entry and choosing *Subscribe*). To activate this feature, select the *Only tell me when this page is updated* option.

It would be nice if there were a way to subscribe to multiple shortcuts with one operation, but it appears that you must subscribe to each site individually. To check for changes in your subscribed shortcuts, choose *Favorites• Update All Subscriptions.* In Internet Explorer 5.*x*, choose *Favorites• Add to Favorites,* then check *Make available offline* before clicking *OK.* Alternatively, you can right-click an entry on the list and choose *Make available offline.* To retrieve updated pages, simply choose *Tools• Synchronize.*

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FIGURE 1: WHACK A HACKER (or at least keep one from whacking you) by testing your firewall with HackerWhacker.

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ULEAD

CREATIVE INTELLIGENCE

Ping is in the air ◆ Your PC's (color) depth perception ◆ **Off-color monitor cables**

Fix PC Crashes via Conflict Resolution

BAD SOFTWARE happens, despite the substantial efforts of Microsoft and other software developers around the world. PCs freeze up with annoying frequency, sometimes due to a corrupted program file and sometimes due to poor software design. Either way, you have to find the software scofflaw before you can take it out of circulation, and that entails examining all the programs running on your PC.

FIGURE 1: NIP TROUBLE in the bud by disabling unwanted programs that start automatically.

Just how many programs *are* running on your PC? The number may surprise you. To find out, hit **<Ctrl>-<Alt>-<Delete>** once—*and only once*—to see a list of all programs currently active (and taking up CPU cycles). You'll probably find a few programs running that you didn't know about. Mice, keyboards, and other PC devices often place small utility programs in your StartUp folder during installation, and many application programs do the same. You probably neither want nor need these programs, but they load at start-up just the same. Often—but not always—each utility is accompanied by a new icon in the system tray in the lower-left corner of your screen.

Identifying the program responsible for causing system crashes involves working by a process of elimination: Disable a running program via <Ctrl>-<Alt>-<Delete>, reboot your system, and see whether the crashes stop. If they continue, enable the program you disabled previously, disable the next one, reboot, and see whether the crashes stop this time. Fortunately, Windows 98 and Windows Me provide the System Configuration Utility to speed up this process.

FIND THE FALSE STARTS

TO LAUNCH THE System Configuration Utility, click *Start•Run*, type **msconfig**, and press **<Enter>**. Choose the *Startup* tab to see a list of programs that automatically start when you boot your system (see **FIGURE 1**). Check or uncheck the boxes on the left side of the list to select or deselect programs for automatic start-up.

Before you test each program individually, make sure your troubles are due to one of your start-up programs. Go to the *General* tab, uncheck *Load startup group items* (see **FIGURE 2**), and then reboot the system. If your problem goes away, one of your start-up programs must be guilty. Now go back to the *Startup* tab and enable one program at a time (rebooting each time, of course) until the problem recurs. When it does, you've isolated the trouble.

A housekeeping suggestion: Disable the programs you don't need. They slow Windows' start-up, and they waste system resources. If you don't recognize a file name on the Startup tab and you aren't sure what the associated program does, look for a familiar name in the file's path

on the right. If that strategy doesn't help, look for a readme file or another text file in the file's folder, open it, and hunt for clues to the program's identity there.

(CON)FIGURING OUT FAILURES

THE SAME PROCESS of elimination will work for the hardware drivers and other programs listed under each of the other tabs in the System Configuration Utility dialog box. Each program can be disabled or enabled with a single click, just like those in the StartUp group.

Before you test or change any configuration file, take a moment to back them all up. In Windows 98, click the *Create Backup* button at the bottom of the System Configuration Utility's General tab. This step will copy all your configuration files to your PC's root folder, where they'll appear with the extension .pss. In Win- ▶
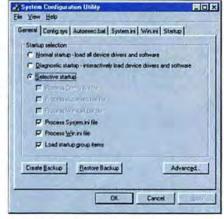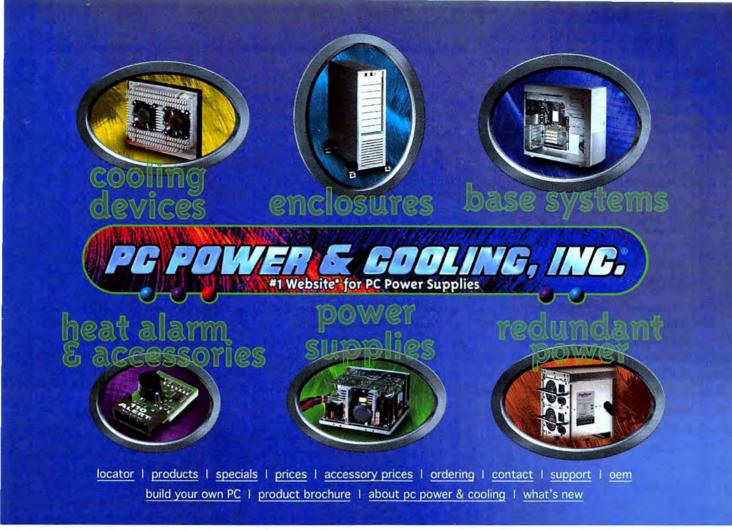
FIGURE 2: DISABLE ALL THE FILES under a tab by unchecking a box under 'Selective startup'.

ILLUSTRATION: JEFFREY PELO

dows Me, click *Launch System Restore*. Windows Me does the rest automatically.

Each of the System Configuration Utility's tab headings is also listed under 'Selective startup' on the General tab. Unchecking a single check box in this list disables all the programs in that group, so you don't have to test one program at a time. (A grayed-out box indicates that the associated group doesn't exist on your system.) If the problem goes away when you uncheck a group, one of the programs in that group is the source of the trouble.

When you find the file causing your headaches, open the appropriate tab and disable each item line by line. Some tab names in Windows 98 differ from those in Windows Me, but they work similarly. **Win.ini and system.ini:** Windows 98 and Windows Me still use these old configuration files to load software. System.ini holds many hardware settings and is the most likely cause of the trouble. Because it's also a big file with many command lines organized into subsections, save

FIGURE 3: YOU KNOW YOU'VE PINGED successfully if the lines that appear on the screen begin with the words 'Reply from'.

time by checking whole subsections instead of one line at a time. Win.ini holds software settings. Lines in win.ini that start with 'Load=' or 'Run=' launch programs, so try checking them first. **Autoexec.bat and config.sys:** These configuration files are holdovers from the days of DOS. They're usually present in Windows 98 systems, and you may also find them on a Windows Me PC. Both files could contain command lines for launching software and setting software parameters that can cause conflicts. **Load environment variables:** This tab does for Windows Me what autoexec.bat's Prompt, Path, and Set commands did for Win 98. Windows Me eliminates many

trappings of DOS, but it maintains the dear old operating system's functionality. **Load static VxDs:** This option, which is also found only in Windows Me, selects certain virtual device drivers (VxDs)— mostly relating to networking and communications. Virtual device drivers are another common source of conflicts.

WEB SITE SOUNDINGS

I RECENTLY MOVED to a new town, signed on with a new ISP, and added a new V.90 modem to my computer. Since the move, I've had trouble connecting to many Web sites that I used to access easily. I suspect the problem is my new modem, but I'm not sure. Is there any way to tell whether my modem, the ISP, or the Web site I'm trying to contact is to blame?

Peter Russo, Bloomington, Indiana
PROBLEMS OF this type can be tricky to solve, but a handy utility included with Windows 95 and Windows 98 may help. It's Ping, a small DOS utility that network administrators and techies who enjoy tinkering with their networks frequently use.

Ping sends a signal from your PC to another computer on the Internet and then waits for it to return a signal—much like a sonar ping—to acknowledge a successful connection. If the target device doesn't respond, there's a hardware problem, but if it does respond, you can be certain that all of the equipment between you and the target computer is working.

To run Ping, open a DOS window. In Windows 9*x*, click *Start•Programs•MS-DOS Prompt*. In Windows Me, click *Start•Programs•Accessories•MS-DOS Prompt*. At the C> prompt, type **ping** followed by a space, and then type the URL or IP address of the computer that you're trying to contact. For example, to check your connection to the ESPN Web site, you would type **ping www.espn.com**.

As **FIGURE 3** shows, a successful ping returns three or four lines starting with the words *Reply from*. An unsuccessful ping returns a single line stating only that

the target computer was not found.

Ping is primarily a tool for the network savvy, but three ping tests are useful for everyone. First, you can test your own PC's configuration by pinging the IP loopback address: Type **ping 127.0.0.1** and press **<Enter>**. If you don't get a reply, there's a problem with your TCP/IP settings.

Next, ping your PC's default gateway. To find your default gateway address, click *Start• Run*, type **winipcfg**, and press **<Enter>**. The default gateway is the first computer your PC connects to when trying to reach the Internet. It may be located at your ISP or within your company's network. If you can ping the default gateway, the problem resides outside your local network.

Finally, ping the Web site's server. If you get no response, the problem is outside both your PC and your local network.

OUT OF MY (COLOR) DEPTH?

I WORK WITH graphics and frequently have to change my monitor's color depth from '256 Colors' to 'High Color (16 bit)' and back again. On my old Windows 95 system, I had to restart my PC each time I changed the setting, but on my new Windows 98 system, I can choose to reboot or not after making the color-depth change. I always choose not to reboot, but I wonder whether I am damaging my PC or monitor by not rebooting. Can you clarify?

Terry Smith, New York
CHANCES ARE GOOD you're not hurting your PC. The only reason to reboot when you change color depth—that's the number of colors your PC is capable of displaying at one time—is if you are running old software that's incompatible with the new color depth you set. If you haven't noticed any problems by now, you probably have nothing to worry about.
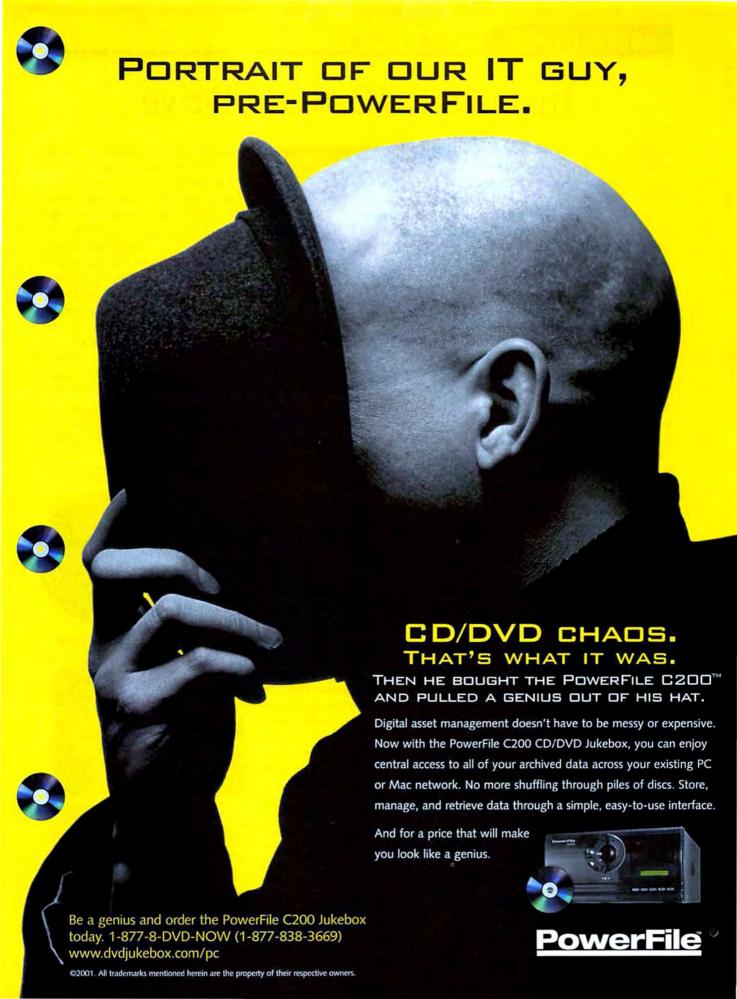
For additional hardware tips, see www.pcworld.com/heres_how. Hardware Tips *welcomes your tips and questions and pays $50 for published items. Kirk Steers is a* PC World *contributing editor.* ∎

Install a DVD-ROM Drive

ALTHOUGH PREDICTIONS of software becoming widely available on DVD-ROM haven't yet come to pass, installing a DVD-ROM drive is still a popular and useful upgrade project, especially if you want to watch movies on your PC. The drives also read standard CD-ROM and CD-RW discs, and some new models double as CD-RW writers as well.

DVD movies are recorded using MPEG-2 compression, so you'll need to consider the options for decompressing the video. To get the best movie experience, you need to use hardware decompression. Some drives come with software for playing DVD movies, but unless you have a PC with a very fast CPU and oodles of RAM, the player can skip frames, causing jerky video playback.

Many advanced graphics cards have built-in hardware assistance for MPEG-2 decompression. Before you decide which DVD-ROM drive to buy, check your graphics board's manual or its manufacturer's Web site to find out if the card includes hardware-based decompression. If it does, you can save money by purchasing just the DVD drive.

THE TOP DOWN

Benefits: Play DVD movies, use DVD-ROM–based software, and read current CD-ROM and CD-RW discs.
Cost: Bare drives $100 to $150, upgrade kits with hardware MPEG-2 decoders $200 to $250
Time required: 60 to 90 minutes
Tools required: Phillips screwdriver, needle-nose pliers, antistatic wrist strap (recommended)
Expertise level: Intermediate
Vendors: Creative Labs (www.soundblaster.com), Hi-Val (www.hival.com), OPS (www.qps-inc.com), Toshiba (www.toshiba.com)

For the rest of us, an all-in-one DVD-ROM drive upgrade kit is the best choice. These kits, such as the Creative Labs DVD Encore shown here, include a hardware-based MPEG-2 decompression board that can deliver DVD movies as effectively as stand-alone DVD players. Most boards include an S-VHS port as well—a big plus if you want to show movies on your TV.

With some variations, you should consider a DVD-ROM drive upgrade only if your PC has at minimum a Pentium II-400 processor and 32MB of RAM. A faster CPU and more RAM are even better. And don't forget that you'll need a good-quality sound card and speakers to get the most from the advanced audio of DVD movies. (See next month's column for details on upgrading your sound card.)

Stan Miastkowski is a PC World contributing editor. ∎

1 Start with a trouble-free PC. Installing the DVD-ROM drive, the MPEG decoder add-in card, and all the software will change your PC's configuration substantially. So before you start, make sure your computer hardware is trouble-free. Select *Start•Settings•Control Panel,* double-click the *System* icon, and click the *Device Manager.* If you see an exclamation point next to any of the device entries, select *Start•Help,* search for "hardware troubleshooter," and follow the directions to clean up any problems. Also, as before any upgrade project, do a full backup before you begin.

2 Install the decoder card. Turn off your PC, unplug it, and remove the cover. Ground yourself, preferably with an antistatic wrist strap clipped to a grounded, metal object. Find a free PCI expansion slot and remove the metal cover on the back of the slot. Carefully slide the card into the slot, making sure it's firmly seated. Secure it with a screw.

- Line out
- Dolby Digital AC-3 audio out
- TV set connector
- Monitor connector
- Video loopback connector
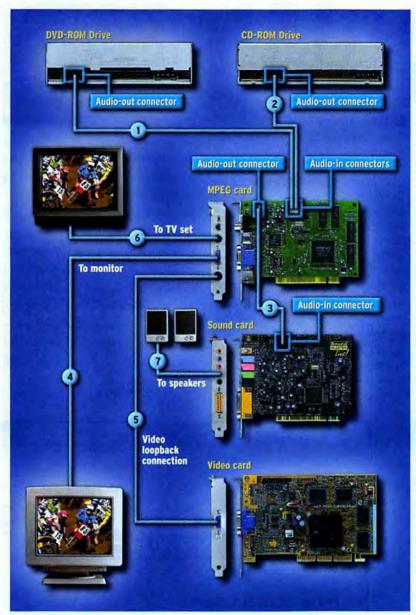
3 Install the DVD-ROM drive. PCs have primary and secondary IDE connectors on the motherboard. The best place to hook up your DVD-ROM drive is on the channel that serves the CD-ROM drive. You should find a spare connector on the wide data cable. If not, use the cable that came with your DVD-ROM kit. If the secondary channel already has two drives (for example, both a CD-ROM drive and a CD-RW drive), connect the DVD-ROM drive to the free connector on the hard drive's channel.

Make sure the jumper on the back of the DVD-ROM drive is set to Slave (A). If special brackets are needed to mount the drive in your PC, attach them now. Slide the DVD-ROM drive into your PC's mounting bay (B), and connect the wide data cable and the power cable to the rear of the DVD-ROM drive (C). Make sure the colored edge (usually red) of the data cable is attached to pin 1 on the DVD drive connector.

DVD-ROM Drive

CD-ROM Drive

Audio-out connector

② Audio-out connector

①

Audio-out connector   Audio-in connectors

MPEG card

To TV set

⑥

To monitor

③ Audio-in connector

Sound card

⑦

To speakers

④

⑤

Video
loopback
connection

Video card

④ **Hook up the cables.** The typical DVD-ROM drive upgrade kit has many cables and involves many required connections; the specifics vary by manufacturer. The instructions given here apply specifically to the Creative Labs PC-DVD Encore 12X kit with the Dxr3 decoder. Read the manual that came with your kit carefully, and work slowly and methodically.

1. Connect the audio cable (included with the kit) to the rear of the DVD-ROM drive and the audio-in connector on the MPEG card.

2. If an audio cable runs from the rear of your existing CD-ROM drive to the sound card, disconnect it from the sound card and connect it to the audio-in connector of the MPEG card.

3. Connect an audio cable from the line-out connector of the MPEG card to the sound card's internal CD audio connector.

4. Disconnect the monitor cable from your PC's video card and connect it to the lower (external monitor) connector on the MPEG card.

5. Take the video loopback cable included with your DVD-ROM drive kit and connect it to the MPEG card and to your PC's video card.

6. If you'll be watching DVD movies on a television set, connect the TV to the MPEG card. If your TV has S-Video input (for the highest quality), you'll need an S-Video cable (not included with most DVD-ROM drive kits). Otherwise, use the included 'S-Video to composite video' cable adapter. You'll also need a standard RCA cable to complete the connection to your TV. That's also not included with the kit.

7. If you have a stereo receiver or PC speaker system that can decode Dolby Digital Surround Sound, connect a cable (usually not included with the DVD-ROM drive kit) between the MPEG card and the stereo or speaker system.

⑤ **Install the drivers and DVD-ROM drive software.** Plug your PC back in and turn it on. Windows should detect the new drive and board and ask for the drivers. Insert the floppy driver disk (sometimes a CD-ROM) into the PC, and follow the on-screen directions.

After the driver is installed, install the DVD-ROM drive software that came with the upgrade kit. Details vary, so follow the directions included with the kit.

Finally, test to be sure your new drive will read both standard CD-ROM and DVD-ROM discs. If you have problems, turn off your PC and recheck all your connections. (With all the cables involved in this upgrade, it's easy to get confused.) If you still have problems, call the upgrade kit maker's technical support line.

When you're sure everything's working correctly, power down your PC and put the cover back on the case.

Pop in your favorite DVD movie, grab some popcorn, sit back, and enjoy the show.

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When Services Die: A Survivor's Guide

HERE'S A WIRELESS PHONE that's big, clunky, and never really worked indoors. Now it won't work outdoors either, because the service it connects to has gone dark—except for "heavy industry and government customers." It's the Iridium satellite phone, harbinger of a trend for the new millennium: the essential service that disappears, usually at the very moment you begin to depend on it.

The list of such services is long and getting longer, and it increasingly affects people who would never give a thought to making calls via outer space. Revenue-starved Internet service providers, particularly those offering DSL connections, are pulling up stakes and slinking out of town. Companies that once trumpeted free Internet access are charging fees, curtailing their offerings, or calling it quits altogether.

DISAPPEARING ACTS

TWO FREE WEB storage sites, Netdrive.com and Docspace.com, were acquired by firms that target the corporate marketplace, forcing free-riding users to find somewhere else to stash their data. Application service providers Hot-Office, Pandesic, and Red Gorilla all passed away last year, leaving customers scrambling for alternatives. Come to think of it, even California's deregulated electricity industry can't reliably keep Silicon Valley lit and running 24 hours a day.

> If you're going to rely on **Web services,** everything about them had **better be dependable.**

This is the dirty little secret nobody bothers to mention when promoting the concept of putting thin clients on the desktop and data and applications out on the Web. If you're going to rely on Web services, everything about them—from uptime to connectivity to longevity—had better be dependable. Since that's a tall order, make sure you have an exit strategy before you sign up.

A friend who happened to discover that her ISP was about to go broke contacted its DSL partner for help. The response from "customer care": Contact the failing ISP. But that company wasn't even answering its phone. She survived this nightmare by getting a second provider on another phone line rather than counting on a dying company for her connection and e-mail.

So if you can't live without e-mail, think about getting your own domain and being prepared to move it at a moment's notice. If you must have high-speed access to the Web, buy it from somebody who's likely to be around for a while. Switching Web and mail hosts can be done in a relative hurry; installation backlogs mean that changing the provenance of the wire that comes into your office can take a lot longer.

ASKING THE TOUGH QUESTIONS

OUTSOURCE WITH care. If you're running your office on Web-based software, consider how you'll cope if your high-speed connection quits or the company that hosts your applications suddenly goes under. What if you lost all access to your business data, along with all the applications you use to manipulate it? Your would-be provider had better have a very good answer, one that might involve regularly delivering physical backups such as CD-ROMs to you in a format that standard programs can read.

Free services may be particularly flaky, and doubtless more will fail. When I finally decided to use an online backup service, I picked Connected.com in part because it charges for its services, giving me a sense that it might have an actual business model that could keep it around for a while. The company says it stores data at two separate facilities, so it can withstand a disaster at one of them. But since no enterprise can promise eternal existence, I fear a repossessor more than an explosion. You can bet I'll back up crucial files on local media just in case.

Aggressively monitoring service providers can also save you money. I learned that back in the early days of the Net, when my very first ISP went belly-up only a month or two after I paid for a year's service in advance. Fortunately, when intermittent outages became daily ones and I heard rumblings about its imminent demise, I managed to cancel my service and get a refund—just a few days before that long-gone outfit closed its doors forever.

Call me Mr. Lucky.

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.* ∎

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