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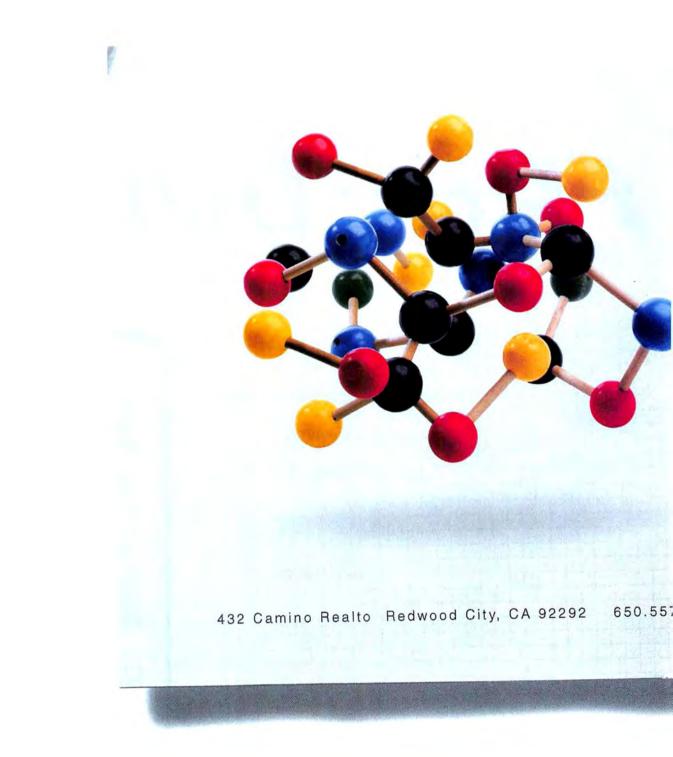
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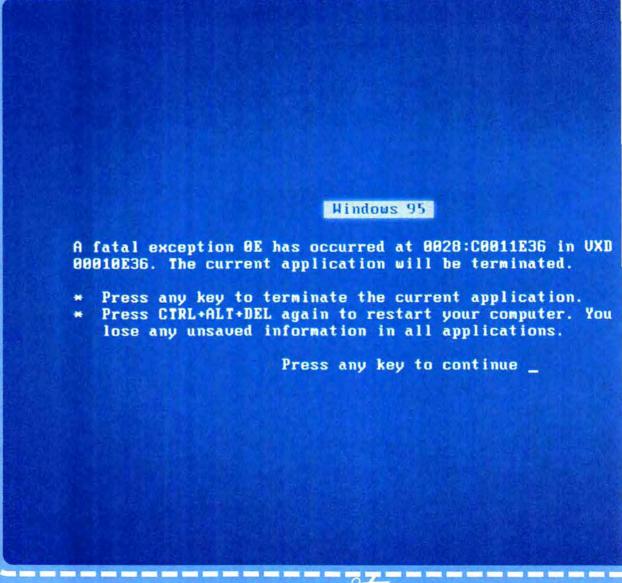
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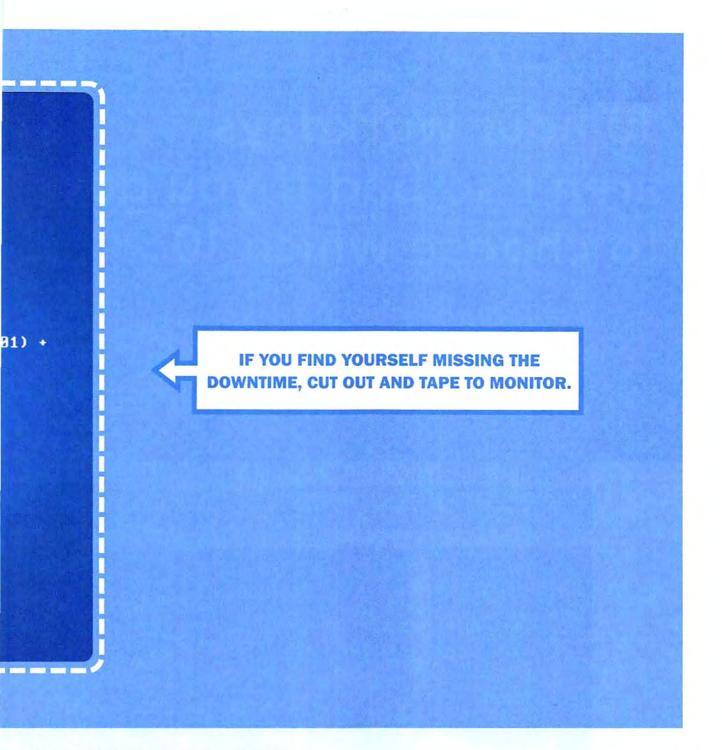

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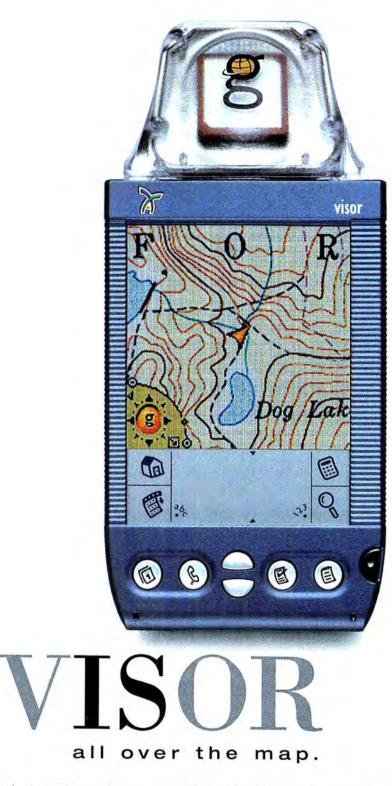
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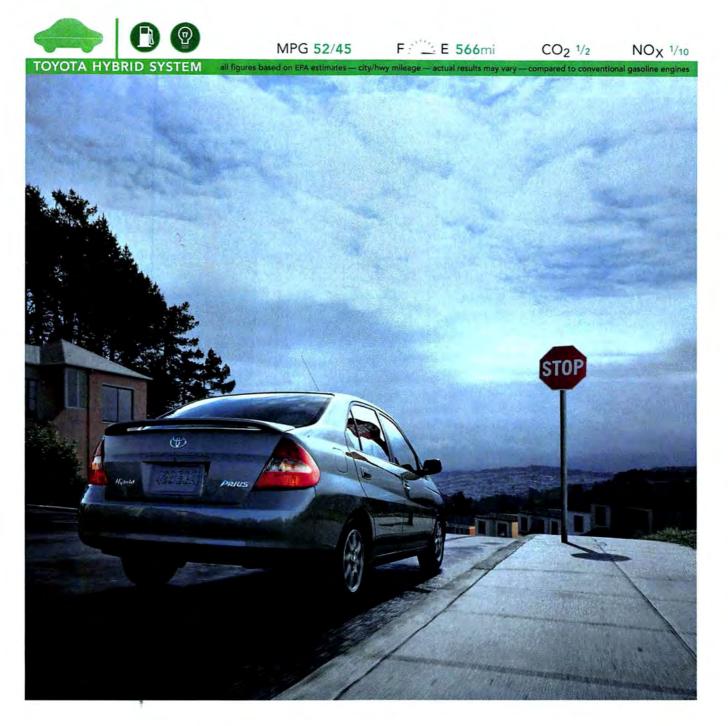
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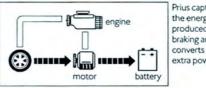
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The Custom Fit

Enterprise-Size Tech Coverage

REGULAR READERS MAY recall that back in August, this column discussed plans for some evolutionary changes to *PC World*—including making our business-related coverage more visible. This month, we're pleased to show one of the most important innovations yet. It's a new section titled *Enterprise Technology* devoted entirely to covering tools and services for larger companies.

Enterprise Technology is a logical extension of *PC World's* usual coverage. We always start with the premise that we can't tell you much about how to run your business, profession, career, or life—but that we can advise you on tools that may help you run all of them more effectively. *Enterprise Technology* does exactly that. The only difference is that it focuses on equipment and services for medium-size and large corporations, with their special needs for versatility, integration, and scale.

BEYOND THE HYPE

IN THE DEBUT EDITION on page 151, for example, writer Eric Knorr—a former editor of this magazine—reports on companies that are using wireless handheld computers to gather time-critical data. Not every firm needs this extra mobility and speed, as Knorr points out. But in situations where your company must collect information from multiple field locations in a hurry, wireless handhelds and Web-enabled cell phones are an excellent choice. These pilot projects represent some of the first practical applications of the much-ballyhooed wireless Web, and Knorr's article shows both their potential and some substantial limitations. (See also Senior Associate Editor Richard Baguley's hands-on review of four popular wireless PDA models, including the Palm VII and Compaq's IPaq Pocket PC, on page 133.)

Also in *Enterprise Technology:* rules of thumb for adding fingerprint readers and other biometric devices to your security system; a reality check on in-flight cell phone service; and advice for anyone implementing a new company-wide storage solution this year. We hope you will find the new section useful.

The March issue also showcases one of *PC World's* most popular recurring features: "Best Free Stuff Online." This is the sixth

The **new special section** beginning on page 151 covers tools and services for your **enterprise-scale** company.

year that we've trolled the Web for freebies. As author Matt Lake reports, it's getting harder to find really useful ones. (Blame that pesky need for profits that felled so many dot coms last year.) But Matt and the rest of the team led by Senior Associate Editor Kim Zetter managed to turn up dozens of worthwhile gems for work, home, or play—including free fax numbers, online storage, Web storefronts, domain names, virus killers, movies, and live-action games. The list starts on page 92.

STORAGE AND PEST CONTROL

SPEAKING OF STORAGE, Stan Miastkowski digs inside today's high-capacity hard drives—models that can warehouse 40 to 80 gigabytes and more. We tested ten drives that deliver performance, value, or both. Read the results in "Livin' Large" on page 106.

Our *Bugs and Fixes* expert, Contributing Editor Stuart J. Johnston, tells how to keep your computer running glitch-free in this month's feature "PC Pest Control" (page 121). A fun part of the package is Contributing Editor Dan Littman's "Bug Awards: All-Time Hall of Shame" —five pieces of hardware and software that have accounted for a surprising share of reader complaints. (By the way, you can report bugs or fixes to us at bugs@pcworld.com.)
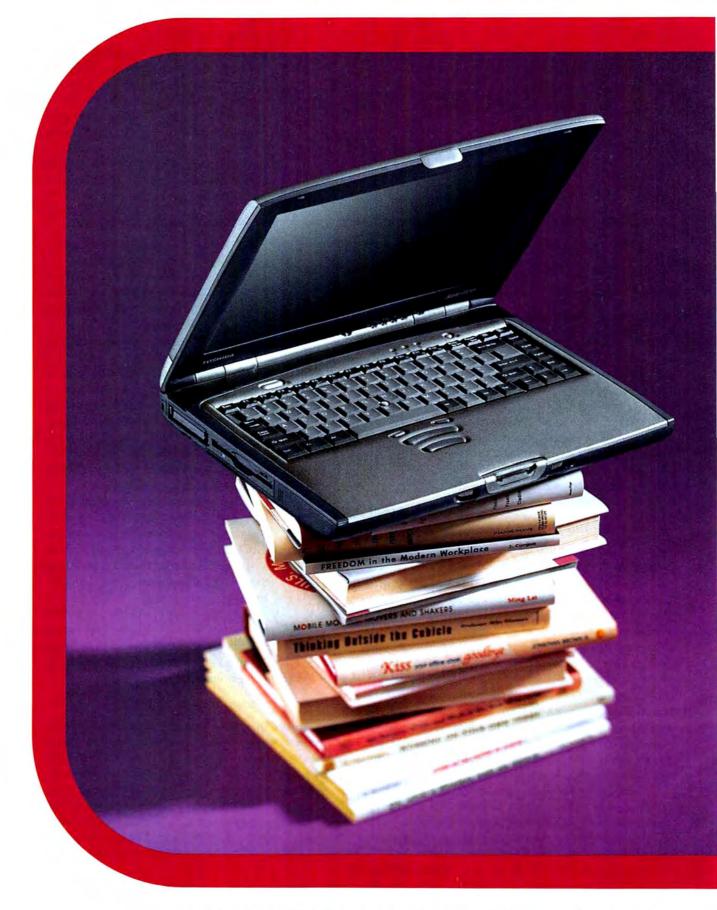
Finally, Contributing Editor Steve Bass, author of our popular *Home Office* column, now writes a regular online newsletter for PCWorld.com. Each week, Steve offers tips and tidbits, as well as vintage Bass humor. In its first few issues, Steve Bass's online Home Office shot up to nearly 40,000 subscribers—making it one of the fastest-growing newsletters we've ever launched. To sign up for this or any of our free e-mail newsletters, visit www.pcworld.com/newsletters. And to comment on this column, or anything else that's on your mind, please feel free to write to me at eddir@pcworld.com.

COMING UP IN APRIL

Troubleshooting Tricks: Tips for ironing out common hardware, software, and Internet wrinkles that can bring your work to a halt.
The Web of Tomorrow: Don't get too comfortable—industry insiders and technology experts let us in on five powerful new trends.
Eat Your Heart Out, Walgreens: We test dye-sub printers, priced from $120 to $450, that turn digital pictures into glossy photos.
So You Think You Know How to Browse: Learn to surf like a pro.
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Kevin McKean is editorial director of PC World. ∎

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CLAMOR OVER SHABBY SERVICE

KUDOS TO Stephen Manes! In his column ["Get Ready for Even Shabbier Service," *Full Disclosure*, January], he reports a bad experience with AT&T's @Home cable service that is almost identical to mine. I switched to Telocity's DSL, but my headaches didn't go away—and it cost $10 more per month. I called AT&T to reinstate my account; they said no problem—but there'll be a $75 reconnect fee.

Brent Kellogg, Oregon City, Oregon

IT'S UNCANNY. Just spent the past few days complaining about how "newer, bigger, and more customer friendly" often turns out to be more unfriendly and unhelpful. Then I read Stephen Manes's column. Right on! My own nightmares have included overhyped DSL service and Windows Me and its incompatibilities. A third was being switched to a dot-com middleman when I wanted to upgrade

some software. The wrong version was downloaded. I'm still waiting for a refund.

Peter Mostert, Mississauga, Ontario

MANES SPEAKS for all of us who are disgusted with the lousy service of hardware manufacturers, software creators, and cable and satellite TV companies. Please encourage him to keep speaking out.

Ron Barr, via the Internet

BROADBAND ACCESS

IN SCOTT SPANBAUER'S article, "Warp-Speed Web Access" [January], I was quoted on the horrible connections my family was receiving from Media-One. It appears that for four months Media-One didn't have sufficient bandwidth for its cus-

tomers, which caused major slowdowns, mainly during prime time.

Since the beginning of December, however, our connection has significantly improved. We now see well over 1-megabit-per-second download speeds, even at prime time. From what I understand, MediaOne had trouble purchasing the required bandwidth. Today the service is incredible, and we are very happy with it.

Joe Schutte, Westland, Michigan

REGARDING "The Best Broadband Sites," let me get this straight: Broadband access is important because I can now get actual moving video pictures depicting: (1) news, weather, and sports from talking heads; (2) dramas that I've never heard of and don't have time to watch; (3) Saturday morning cartoons; and (4) art museums—all while incurring the risk of having people break in and steal stuff. Does this sound oddly familiar? Like plain, old-fashioned TV and burglars? What a waste.

Richard Cottingham, Oakville, Ontario

A MAJOR DRAWBACK of StarBand's satellite system (and Hughes likely has the same problem) is ping time—the time it takes your PC to send a packet to a remote computer and get a response. Because the satellite is some 23,000 miles in space, the shortest ping time you can hope for is around 750 milliseconds. While only a minor nuisance for Web surfing, this makes other Internet services—such as gaming online—impossible.

James Weir, Chico, California

UNWANTED SOFTWARE

JANUARY'S *New Products* notes that Logitech's IFeel Mouse software will not install unless Microsoft's Internet Explorer 5 is installed first. Let's assume that there's a legitimate need for using the Web ▶

HOT BUTTON

'Trouble-Free PCs': Readers' Own Ratings

AFTER READING "In Search of Trouble-Free PCs" [January], I was shocked. I am a PC technician with my own business. Your article says two major companies do only up to 4.5 hours of burn-in. They should do at least a 24-hour burn; 4.5 hours is nowhere near long enough to truly test components.

R. Smith, Carrollton, Georgia

IN YOUR RATINGS, Dell's customer service is ranked tops. However, based on my experience, I cannot recommend Dell's service. I purchased a Dell Inspiron 7000 laptop in October 1999. Nine months later, I had a hard drive failure. A new one was placed on order, with an estimated ship date of September 6, 2000. It did not ship. Dell's customer service explained that the drive came from one of the company's suppliers and Dell could not control when it would be sent. Finally, I contacted an attorney, who wrote a letter to Dell promising a lawsuit if the drive were not furnished to me within ten days. A drive arrived

on my doorstep on the ninth day. It took me five long months and a lawyer to obtain service under warranty from Dell.

David Stubblefield
Fort Smith, Arkansas

YOUR READER SURVEY rated EMachines as Poor. But that is not a fair overall evaluation. I have been a PC user for some 20 years now, and I find the EMachine to be a great home PC. It's easy to set up and use, and it has had no serious problems.

If consumers want top-notch service, they should go to a name brand. I think Compaq, for example, has good customer service, but its product leaves a lot to be desired. My father-in-law had a technician out to his house four times in one year because of problems with his Compaq. Sure, they were helpful on the phone and came out, but that didn't help much when the PC kept going down.

Mike Farnham, Bradenton, Florida

with these two unrelated products. Why on earth couldn't they just use the default installed browser? I am outraged at being forced to install software I neither want nor need on my computer.

Tony Wilcock, Toronto, Ontario

FREE SPEECH AND VIRUSES

CHEERS TO Kim Zetter and Stan Miastkowski for bringing us up-to-date on malicious code ["Viruses: The Next Generation," December]. But the argument mentioned in the article that laws prohibiting the writing and posting of virus code would infringe on our First Amendment rights is only partly valid.

An analogy can be found with biological viruses. If an individual deliberately performed an act that spread a deadly virus, authorities would stop, quarantine, and ultimately prosecute the offender.

Someone who on a public Internet site posts code that physically and permanently alters my PC's system simply by encountering it has acted no differently.

Mary Anne Brown, Clawson, Michigan

REFURBISHED PCs DEFENDED

JANUARY'S *On Your Side* cautions readers about buying refurbished PCs. However, while you may not be able to configure a refurbished PC exactly as you want, I found the extensive inventory and cost savings appealing. I obtained a name-brand PC with a warranty identical to that of a new Dell at almost an 18 percent discount, and I can utilize the same Dell technical support and online documentation when I need it. If you can purchase a refurbished PC with an "as new" warranty, the savings should not be lightly dismissed.

Dan White, via the Internet

THUMBS UP FOR PCWORLD.COM

YOUR NEW WEB SITE is stronger and deeper. It's much easier to find what I'm looking for—a pleasant change from most Web sites (especially those purporting to offer customer support!). Thanks for the effort that went into the new layout.

Tom DeWoskin, via the Internet

PC World *welcomes your letters to the editor.*
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Microsoft Windows NT® Workstation 4.0
Compaq Premier·Sound™ audio
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ProLiant ML330 Server
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  SCSI controller
7 Bays: 5 removable, 2 hard drive
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Dual Wide Ultra2 SCSI controller
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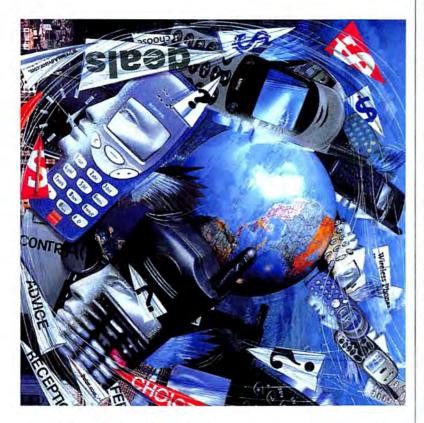
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Cell Phones With No Strings Attached

*How to choose a wireless contract
that won't drain your wallet.*

IT STARTED SLOWLY, back in the eighties. Every couple of blocks, someone would come striding along, cell phone pressed to his or her ear, engrossed in conversation. "Self-important geek," I thought to myself—until I became one myself a few years later. And the trend continues: According to the Cellular Telecommunications & Internet Association, more than 38 percent of the people in the United States now own a wireless phone, with more than 65,000 newcomers signing up for service every day.

The only thing more widespread than the tiny devices are the ads for wireless service. You can't turn on the TV without being barraged with promises of ever-expanding digital networks, anytime minutes, and global roaming. If you believe the advertisements, making a stock trade or wishing Mom a happy birthday is just a matter of pushing a few buttons, whether you're attending a meeting in Manhattan or ice fishing in the Alaskan tundra. And the cost of those calls? Hardly worth mentioning.

But as with most things technological, it's not always that simple. If you've spent any time recently researching plans for wireless phone service, you know how bewildering it can be: How many minutes do you need? Are prepaid plans worth considering? How far does your calling area extend? And how high are those roaming charges? Here's how to avoid some budget-busting pitfalls in choosing a wireless phone service provider—and what to do if you're already stuck with a crummy contract.

SHOP FOR A PLAN, NOT A PHONE

MANY SERVICE PROVIDERS offer generous discounts on phones when you buy their service, but do the math before you commit. A free phone might be tempting, but chances are it's no great deal in the long run. The phones the providers offer for free generally cost them very little. In exchange for the phone, many plans lock you into a long-term contract—two years or more—at a higher monthly rate than you could get elsewhere if you were willing to kick in some dollars toward the phone. If you try to cancel the contract or switch plans, you could be facing a fee of anywhere from $100 to $400.

On top of that, free or discounted telephones don't always have the features that you need. If you travel frequently, for instance, you will probably want a tri-mode phone, which can shift among analog cellular and two frequencies of digital calling. International travelers should consider looking for a phone that can use Global System for Mobile communication (GSM), the mobile phone system that dominates Europe and other parts of the world.

The bottom line? Shop first for the service plan you need. Rates are likely to continue to drop, so try to keep your contract short. Then look for the best deal you can get on the phone.

KNOW YOUR CALLING AREA

SERVICE CAN BE unreliable, with dropped calls and connections that make it sound like the other party is gargling in a tin can. How can you avoid these wireless pitfalls? ▶

For starters, don't assume the calling area map from the service provider is entirely accurate. "Maps really only show a best-case view," says Joseph Bradshaw, general manager of WirelessAdvisor.com, a Web site that helps consumers find wireless service providers. "The best way to [check local coverage] is to ask around."

Ask friends about their experience with the provider in your home calling area. At WirelessAdvisor.com, you can post questions for users of local providers. Also, ask providers to let you test their service. If you leave ID, many will lend you a phone to make calls in your favorite haunts.

Wireless phone service plans generally require you to sign a contract—typically, a year's commitment—in exchange for access to their networks, a free or discounted phone, and whatever additional features and promotions the providers include. As with any contract, read the fine print. Wireless providers don't like to lose customers, and most impose a steep fee for canceling service early. You may also be required to return your phone. So before signing on, understand the implications of opting out before the contract expires. Confirm that the contract reflects any promises made by cellular service salespeople.

If you're already stuck with a contract you don't like, ask your provider about alternative plans. Service plans are constantly changing (and rates are dropping), and your provider may work with you to find a plan that better meets your needs.

If the idea of being locked into a contract makes you squeamish, consider a prepaid plan, which provides a set number of minutes for a flat fee paid up-front. Prepaid plans are usually more expensive and less flexible than other types of plans. But they can be a good alternative for students or folks with less-than-stellar credit, since they don't require a credit check.

If there's one speed-dial number worth programming on your wireless phone, it's the one that tells you how many minutes you've used each month. Once you exceed your monthly allotment, you'll pay. And

Keep track of the minutes you use. Once you exceed your monthly allotment, you'll pay. And pay.

pay. Some wireless providers charge 40 cents or more for each minute over your allotment. Those charges add up fast. So before you choose a plan, figure out how much time you're likely to use every month. Estimate high.

Another expense that can add up fast is roaming charges—the extra fee you pay for each minute you're outside your provider's coverage zone. That could just be while you're visiting a neighboring town. Although some plans don't bill you for roaming, most of them do, and the charge is usually levied on top of long-distance fees. Roaming charges can be steep—as much as 70 cents a minute—so be sure to check your home coverage area carefully to ensure that it corresponds with your most frequent calling areas. If you travel a lot, look for a plan with free roaming.

You will want to keep a number of other bill boosters in mind as well. Most wireless providers round each call up to the next whole minute, even if you connect for only a few seconds. Also, unlike with landline service, you may be charged for busy signals and unanswered calls if you stay connected for more than a few seconds.
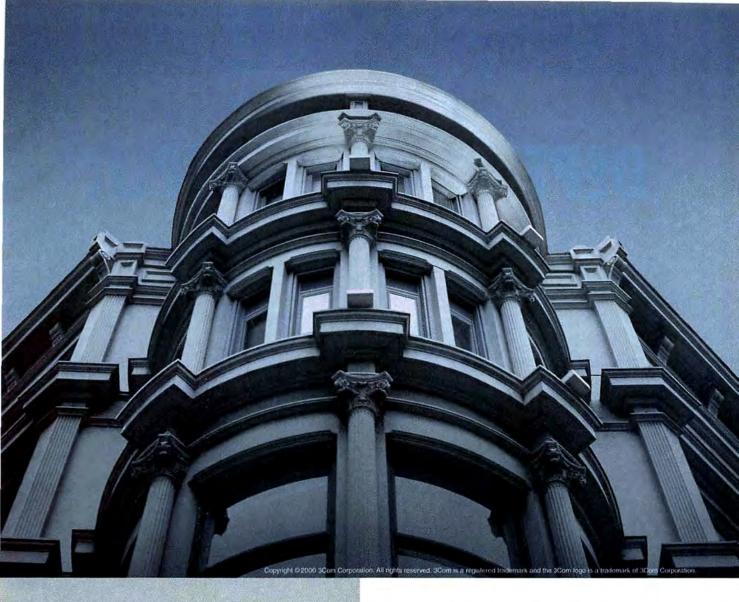
WATCH FOR HIDDEN CHARGES

TOLL-FREE NUMBERS aren't free in the wireless world, either. And don't forget that you pay for incoming calls, though many plans offer the first incoming minute for free. Finally, before you sign on the dotted line, check the plan's activation fee and factor it in over a year's time. A low monthly rate could be offset by a high activation fee, steep long distance and roaming rates, or fees for features such as call waiting and voice mail.

Sorting through the plethora of wireless phone plans and options can make you wistful for the days of rotary dials and party lines. But some great deals are out there. If you do your homework thoroughly, you can end up with one.

Anne Kandra is a contributing editor for PC World. ∎

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PC Price Drops: Don't Lose Out

ISN'T IT ANNOYING when you discover that an item you just bought dropped in price shortly after you purchased it? That's what happened to Frank Day, vice president of operations at Crescent & Sprague Supply in West Virginia. "I bought two Micron Millennia GS133 PCs on a Friday

over the phone. The following Monday I checked the company's Web site and noticed that the price of each system dropped by $120," says Day. "I then called Micron for a price adjustment. A sales rep told me that since the PCs had not yet been built and shipped, I'd be entitled to and charged for the new, lower price anyway."

But guess what? He was billed for the higher price. Micron decides—case by case—whether to reimburse customers who report price changes within 30 days of the product's ship date. When Day complained, Micron refunded him $120 for one machine—leaving him out $120 for the other. After I contacted Micron on Day's behalf, it refunded the other $120.

When you buy your next PC, ask the vendor about its policy on after-sale price

adjustments. Most companies have a refund policy if prices drop. Some vendors, such as Dell, have a price-adjustment program, but others, like Gateway, do not. And some rules are standard. For example, you're eligible for a refund only when the price cut applies to exactly the same model and configuration as the item you purchased.
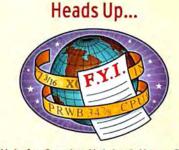
It's up to you to keep tabs on reduced prices and contact the manufacturer for a refund. You must also provide evidence (such as a catalog or an ad) of the lower price to get reimbursed. Special promotions are excluded, and if the new, cheaper version of the system has a different component or extra features, you're stuck with the original, higher price.

Policies vary among companies and stores. Some vendors honor refunds within 14 days of purchase or shipping; others

allow 30 days' leeway. Retailers such as Circuit City and CompUSA will consider price adjustments even if the lower price is at a competing store. And Circuit City will credit 110 percent of the difference.

Heads Up...

Help for Quantex Notebook Users: Direct-PC vendor Quantex appears to be out of business. Owners of its laptops can get free tech support on hardware-related problems from Media Computer Enterprises. Call 888/764-2709, or go to www.portablecomputer.com. **Goodbye 24/7:** PC maker NuTrend has reduced its free tech support hours from around the clock to 9 hours (8:30 a.m. to 5:30 p.m. Pacific Standard Time) on weekdays only. The company hadn't been doing a good job at round-the-clock support, says Hip Lee, NuTrend's general manager. "[NuTrend] did not have adequate [qualified] personnel to accomplish this," Lee explains. To contact the company's tech support, call 888/525-5181, send e-mail to support@nutrend.com, or visit www.nutrend.com/tskb. **Purchased:** Bedeviled by copyright lawsuits like those against Napster, multimedia entertainment portal Scour (www.scour.com) recently filed for Chapter 11 bankruptcy protection; its assets were bought by Centerspan Communications, which says it plans to relaunch a "legal" version of the site.

LETTER OF THE MONTH

I BOUGHT AN HP Pavilion 8754C with Windows Me preinstalled. I want to load my other computer's version of Microsoft Office 97, but an error message pops up when I try to install the program. Microsoft says this is not its problem because this Office 97 is a version customized by my PC maker. HP won't help either, because they say the software is a Microsoft product. I'm caught in the middle. Please help.

Dr. Gordon S. Bierbrier, Ontario

On Your Side **responds:** Finger-pointing scenarios like this occur often. I alerted the two companies to Bierbrier's dilemma, and both contacted him. A Microsoft spokesperson says Bierbrier's version of Office 97 was licensed only to his old PC and couldn't legally be loaded on another. Purchasing a new version of Office 97 normally resolves such problems. In any case, after getting some assistance from both companies, Bierbrier now has Office 97 running on his new machine. ■

GOTTEN A RAW DEAL?
Or a great one? E-mail the details to onyourside@ pcworld.com. We'll follow up on complaints and publish items of the broadest interest. Aoife McEvoy is a senior associate editor for PC World.

Smart Shopping on Today's Web

REMEMBER THE golden age of online shopping? Everywhere you looked, scrappy entrepreneurs were launching Web stores to sell dog food, chain saws, new homes, platform shoes...you name it. They started with breadth of selection and lowball prices that no brick-and-mortar store could match, then sweetened the deal with fringe benefits like free shipping.

It was a great time to be in the market for just about anything—and it was only a few months ago. But recently, inevitably, reality has set in. Now most Web merchants are (get this!) trying to turn a profit. Those that are still around, that is (Pets.com, we hardly knew ye).

So these days, finding the Web's best bargains takes more legwork. Even Amazon.com, the site that practically invented deep online discounts, has gotten stingier. Books I once got at 30 percent off are now discounted only 20 percent (or occasionally not at all). Prices also seem to have inched upward at Buy.com, Egghead.com, and other purveyors of discount computer and consumer electronics gear.

But these and other major Web stores still dole out virtual coupons that let you shave at least a few additional bucks off your purchase price (one typical offer touts $10 off an order of $40 or more). A whole genre of sites has sprung up to track these promotions: DealCatcher.com and HotDealFinder.com are the ones I habituate. My hunch is that these coupons won't be plentiful forever, so grab 'em now.

Today, keeping an eagle eye on shipping charges pays off more than ever. While some sellers have upped their shipping fees, others have kept theirs reasonable, and a few, such as Outpost.com, still offer free overnight delivery. Bear in mind that shipping fees for multiple items are usually more reasonable than those for single items, judged as a percentage of the total amount you pay. For instance, if you hold off on CD or video purchases until you can buy a bunch of them at once, you'll pay less than if you buy them one by one as the mood strikes.

TOOLS IN TRANSITION

OF COURSE, the Web doesn't just make buying stuff easier—it also simplifies researching purchases before you plunk down your money. Smart buyers know to call on shopping bots (which let you compare prices at multiple Web stores) and consumer-rating sites (which offer reviews by real people of computer gear, consumer electronics, and other items). But cool shopping tools have been hit ▶

New on the Net...

Google-ize Your Browser: If you're addicted to Google (www.google.com), the Web's best search engine, why not put it at your fingertips? That's the idea behind the Google Toolbar, a nifty downloadable utility for Internet Explorer 5.0 and above. The toolbar embeds Google's uncannily accurate search tools into the browser itself. Google offers it in a standard edition that can detect the Web page you're visiting and report it back to Google (necessary for some features), and in a less snoopy (and slightly less capable) one aimed at privacy absolutists.... **My.MP3.com Returns:** Until lawsuits by music publishers killed it last year, MP3.com's My.MP3.com service—which let you listen to tunes from your CD collection on any Net-connected PC—was a boon to music lovers. Now it's back. But since MP3.com is still striking deals with publishers, not all the CDs and tracks are available yet. And unless you cough up $50 a year for a premium account, you can store only 25 CDs' worth of music. Is My.MP3.com worth paying for in this hobbled state? I'm still trying to decide.

GIMME FIVE

Top Sites for PC Hardware Fanatics

Looking for sources of advanced information on PC nuts and bolts? Head to these prime destinations for under-the-hood news, reviews, and advice:

1. Tom's Hardware Guide: This full-blown community of PC fans teems with opinionated message boards. www.tomshardware.com

2. The PC Guide: Technical hardware info in plain English, plus a great guide to PC fundamentals. www.pcguide.com

3. Ars Technica: Unabashedly geeky coverage of CPUs, motherboards, and the like; if you plan to build your own PC, go here first. www.ars-technica.com

4. MadOnion.com: Free tools such as downloadable benchmarks and an upgrade advisor that analyzes your PC's parts.

5. StorageReview.com: A wealth of data on hard, CD-RW, and DVD-ROM drives, including specs, tests, and a comparison engine.

hard by the dot-com downturn. Many buying-advice sites and shopping bots that *PC World* recommended over the past year have vanished altogether or been swallowed up by competitors. Among the missing: 2020Consumer.com, Evenbetter.com, IChoose.com, and Productopia.

Fortunately, several worthy contenders are still in the game. ConsumerReview.com and Epinions.com are my favorite destinations for reviews by real people—I wouldn't buy even a toaster oven without consulting them. And though no single shopping bot has won my allegiance, I have three mainstays: DealTime.com, MySimon.com, and Shopper.com.

Lately, though, I've learned to be wary of some of the deals that bots sniff out. Obscure Web merchants that claim ultralow prices sometimes find sneaky ways to jack up your total cost. Consider DoubleDiscount.com, a site that touts 51 percent markdowns on best-selling books. Pretty incredible—until you spot the fine

print that says there's a 10 percent handling fee on every item, above and beyond the shipping cost. Even with the surcharge, the prices are bargain-basement cheap. But it's tough to find any information about DoubleDiscount at vendor-review sites such as Gomez.com.
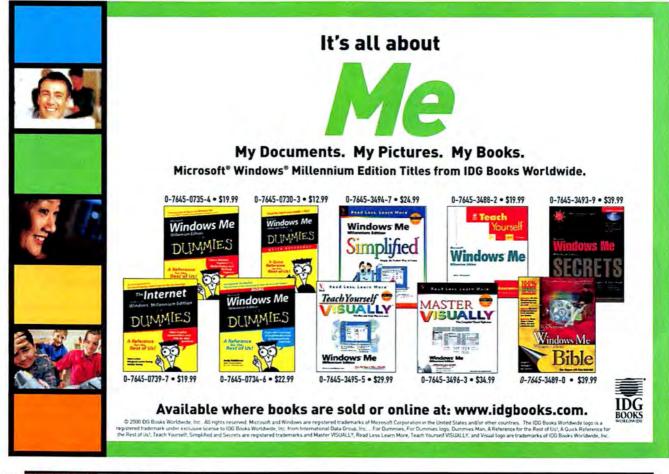
Then there's TurboPrice.com, a site that listed rock-bottom prices for digital cameras. At press time, for example, it had Nikon's Coolpix 880 for $537, better than $100 less than the big guys wanted. When I tried to order, however, I found that the site couldn't handle credit-card transactions—a fact it had failed to mention. Instead, I was instructed to call a toll-free number to seal the deal. When I did, I learned that TurboPrice charged a ridiculously steep $24 for ground shipping.

So bargain hunters, beware: Check out sites carefully before doing business with them. All in all, I try to stick with sellers I know and trust, even if they aren't the very cheapest options on the Web.

Or for that matter, *off* the Web. My new favorite bookseller turns out to be the neighborhood shop I frequented back in pre-Web days. Its discounts no longer pale in comparison to Amazon's, the service is expert and personable, and same-day delivery is always free, since I provide it myself. But even when I buy offline, I still like to start by loitering in the best Web stores and partaking of the free advice such features as Amazon's reader reviews and Recommendations Wizard provide. Nobody's kicked me out yet.

Write PC World *Executive Editor Harry McCracken at websavvy@pcworld.com.* ∎

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Shadow Mask

the electron beam is filtered through a metal plate punched with microscopic holes for crisper images. It's ideal for CAD/CAM, precision graphics and heavy text applications.

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Model	Technology	Size (Viewable)	Horizontal Dot Pitch/ AG Pitch	Maximum Resolution
P225f	AG	22" (20.0")	.24mm	2048 x 1536
P220f	AG	22" (20.0")	.25mm–.27mm	1600 x 1200
P95f	AG	19" (18.0")	.25mm–.27mm	1920 x 1440
PF790	AG	19" (18.0")	.25mm–.27mm	1600 x 1200
PF775	AG	17" (16.0")	.25mm	1600 x 1200
G90f	Shadow Mask	19" (18.0")	.21mm	1600 x 1200
E70f	Shadow Mask	17" (16.0")	.21mm	1280 x 1024

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PC Problems?
Check Your Cables

WHEN YOU THINK about upgrading your system, what's the *last* component you'd consider changing? I bet it's your PC's cables. (Don't roll your eyes. I'm on to something here.) The right cables can keep your modem's connection up to snuff, speed up your printer (and free a port), and connect two of your PCs in a matter of minutes.

Besides some cable tricks, I'm also going to tell you about a gizmo I found that lets two PCs in close proximity share a monitor, keyboard, and mouse.

PHONE-LINE FOIBLES

WANT TO HEAR a cable horror story? A user-group buddy of mine kvetched that his dial-up modem connection was slowing down. His 56-kbps modem that used to connect at 48 kbps dropped to 34 kbps.

The poor guy tried everything—changing dial-up numbers, swapping modems, and switching ISPs. The problem? A short circuit in the cheap phone cable that extended from a modem to a wall jack. And get this—the faulty phone line was in his *daughter's* room, yet it affected *his* connection. Here are a few simple tricks to keep your phone wires in line:

Frayed, not: Inspect the phone cable for frays, and just as important, examine the wires behind the wall jack's faceplate in each room to check for damaged wire or loose connections. Be careful, though. There's a small electric charge in those wires, so hands off the metal! And make sure everything is neat and dust-free before you replace the faceplate.

Be a squeaky wheel: Do you have persistent phone problems? If you complain long and loud, you may be able to coax

You may be able to coax the phone company into replacing the wire you use for data connections.

your phone company into replacing the wire that you use for data connections in your home office. Pacific Bell replaced the old data wire when it installed my high-speed DSL line, and that made a big difference when I had to revert to my former 56-kbps connection.

Ferrite where you belong: Those small plastic doodads that may have come with, say, your monitor are called ferrite chokes, and they filter and reduce radio frequency interference (stray electrical signals) from many peripherals. Attaching them to each end of your video and modem cable connection will decrease the chance that interference will slow your modem or LAN speed. If you lost the ferrite chokes that came with your peripherals, they're cheap to replace—about $5 per pair at most electronics stores.

If you don't already have two (or more) PCs in your home or office, don't kid yourself—there's a good chance you even-

tually will, and probably sooner than you think. A poll of the user group I run shows that roughly 70 percent of the members have two PCs. Nearly 40 percent have three computers, and about 10 percent have more than three.

SHARE AND SHARE ALIKE

IF YOU HAVE two PCs in close proximity that don't need to be connected, save money on peripherals with Belkin's OmniCube, a fancy electronic switching box that lets two computers use one monitor, mouse, and keyboard. You move from one PC to the next with the click of a button. I had a little trouble grasping the idea (I'm not nearly as bright as I look), so let it sink in.

My OmniCube lets me shift between the PC I use for business and the one I use to play games and test unknown software and live viruses. The two machines are about 3 feet apart, so a click on the OmniCube is a lot easier than sliding my chair across the room.
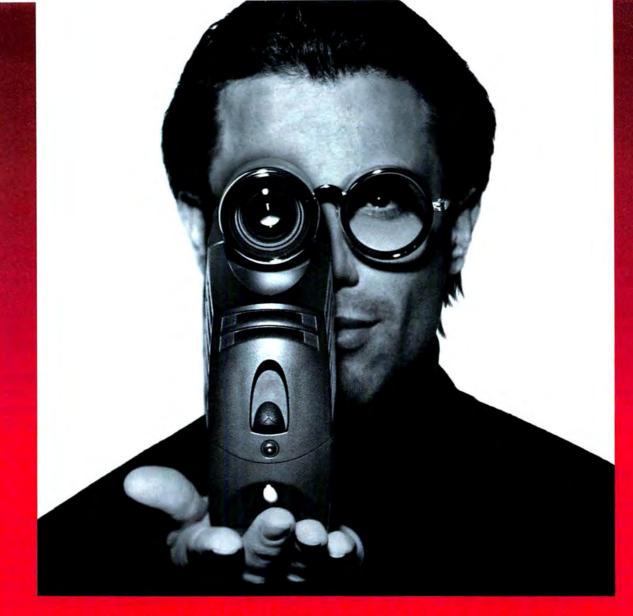
The OmniCube isn't cheap—about $107 discounted, plus another $40 for cables. But it's enormously handy, and it's much cheaper than buying a second monitor, keyboard, and mouse (from anywhere but the clearance bin, that is). I get some great side benefits, too. I save energy and money, and fewer heat-generating machines means my office is cooler.

Finally, I really hope you take a minute and read about my love affair with USB, "USB's Fast and Easy—No Bones About It," at www.pcworld.com/july99/usb. Then check out Kirk Steers's September 2000 *Hardware Tips* on USB at www.pcworld.com/sep2000/usb_hardware.

While we're on the subject of upgrades, I've been converted to a new medium. Read my new weekly Tips and Tweaks online newsletter with info, pointers, and a couple of shenanigans. (Don't worry, you'll still find me in print every month, too.) You can sign up at www.pcworld.com/bass_letter.

Contributing Editor Steve Bass runs the Pasadena IBM Users Group. He can be reached at steve_bass@pcworld.com. ∎

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Media Player disaster ◆ Internet Explorer holes ◆ **AOL 6 woes** ◆ Outlook invader

Entertainment— With Hack Included

BE CAREFUL. Playing some streaming music or video files could allow hackers to entertain themselves with your system. A nefarious code jockey could commandeer your computer by causing Windows Media Player versions 6.4 and 7 to malfunction. The malicious code would be embedded not in the streaming file itself but in an Active Stream Redirector (.asx) file that tells Windows Media Player where to find the streaming media file.

In the worst-case scenario, the perpetrator would gain the ability to do anything on your PC that you could do—such as deleting or renaming files and even reformatting your hard disk. All you'd have to do to set the chain of events in motion would be to visit the site where the bogus file was located—you wouldn't even have to play the file. Alternatively, the attacker could send you the .asx file and entice you to preview or play it. If you saved it to your hard disk and then clicked on it, the hacker would have free rein with your system.

A second Windows Media Player bug offers attackers a different avenue through which to infiltrate your computer. This flaw affects your system only if you use an add-on *skin*—an alternative user interface that alters Media Player's look and feel.

Microsoft has posted a patch that fixes both vulnerabilities. Find it and the lowdown on the bugs at microsoft.com/technet/security/bulletin/ms00-090.asp.

ICON: JEFFREY PELO

AOL 6 Cripples Some Computers

CAN'T READ YOUR E-MAIL? Can't surf the Web? Can't access files on the network? If you recently upgraded to AOL 6, that may be the cause of your headaches. Many AOL members have reported a slew of problems like these after upgrading.

AOL concedes that version 6 isn't perfect, but the company insists the snags are not widespread. "Only a very small number of members have reported problems," asserts AOL spokesperson Andrew Weinstein. And Weinstein says these problems vary depending on each system's configuration. "We have fixes available for specific issues, but none affect a broad class of users," he adds. AOL declined to give us further details.

If AOL 6 has wreaked havoc on your PC, look for answers under the keyword "help." If that doesn't work, Weinstein advises you to call AOL's customer service line at 800/827-6364.

IN BRIEF

Worm Weaves Through Outlook

SYMANTEC RECENTLY WARNED Microsoft Outlook users about the potential for damage from a troublemaker known as W32.Prolin.Worm. The worm spreads via Outlook by e-mailing itself to everyone in the program's address book. The e-mail comes in with the subject line 'A great Shockwave flash movie', with the worm attached as 'Creative.exe'. W32.Prolin.Worm can mess up your files by renaming and moving all of the .jpg, .mp3, and .zip files in your local hard drive. The W32.Prolin.Worm goes by other names as well, including Troj_Shockwave.A, Creative, and Troj_Prolin.A. For specific instructions on how to steer clear of the worm—and how to remove it should it slither into your PC—go to www.symantec.com/avcenter and select *W32.Prolin.Worm*.

KEEP SNOOPS AWAY FROM YOUR DATA

MICROSOFT HAS BEEN BUSIER fixing potholes in Internet Explorer than a highway construction crew patching the ruts in Pottstown, Pennsylvania, during the rainy season.

If you use Internet Explorer 5.5 (the latest version), you're vulnerable to a glitch that could turn your PC into a hacker's playground. IE 5.5 has a new feature called Print Templates (used in IE's Print Preview mode) that enables you to customize how Web pages look when you print them out. Bug sleuth Warren Greer discovered a flaw in the Print Templates design that could permit an application on a hacker's Web site to execute its own Print Template remotely on your computer, with potentially disastrous results. Suppose that you unknowingly visit a hacker's site. As soon as you click the print icon on the diabolical site's custom template, the site offers you its own Print Template to use. Code hidden in this template could exploit IE 5.5's design flaw to let the hacker change data in your files, or to send data to another computer via the Internet.

Microsoft has issued a patch that fixes the Print Template bug and a handful of other snafus. To apply the fix, though, your system must have IE 5.5, IE 5.5 Service Pack 1, or IE 5.01 Service Pack 1. Get the skinny on the bugs and the patch at microsoft.com/technet/security/bulletin/ms00-093.asp.
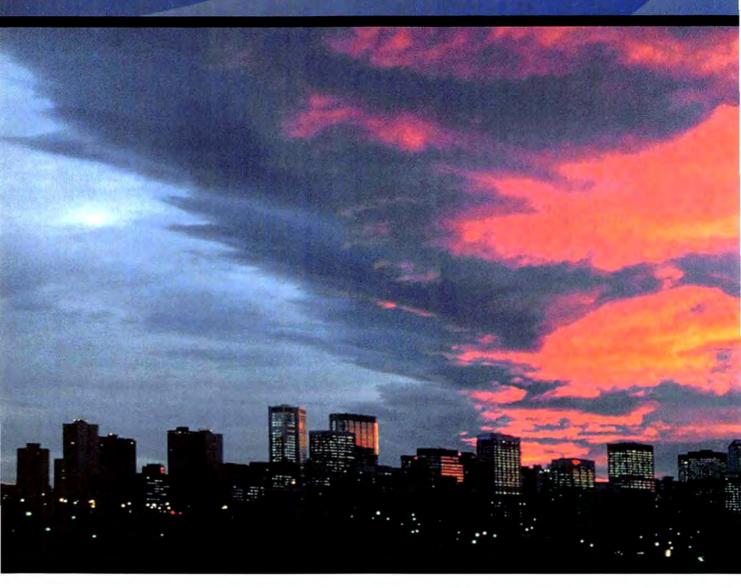
You'll find files from this article at www.pcworld.com/downloads. Stuart J. Johnston is a PC World contributing editor. ∎

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TOP OF THE NEWS

Big & FLAT

LCD monitors 17 inches and larger are coming down in price. So are those huge 40-inch-plus plasma screens. Is it time to get into a bigger picture? ◆ **By Yardena Arar**

EVERYBODY loves the look: a large, skinny screen that occupies only a sliver of your desktop or hangs like a picture on the wall. And whether you typically work on page layouts, juggle multiple windows, play games, or watch DVD movies, you'll find that a large screen makes most work easier and most play more fun.

But while 15-inch LCDs have become more affordable in the last year or two, very large flat-screen displays—whether for a desktop, a boardroom, a reception area, or a state-of-the-art home theater—have continued to command astronomically high prices that leave them out of reach for all but businesses with specialized needs, or the super rich.

That is finally changing.

LCD monitors won't compete in price with their CRT counterparts anytime soon. But the same price drops that have already brought many 15-inch displays under the $1000 mark (see January's "Dream Screens," www.pcworld.com/jan2001/screens) are beginning to make larger LCDs more affordable—less than $1500 in the case of two 17-inchers we review here.

There's good news about the really big screens used for so-called digital signage (such as gate information at airports), presentations in large boardrooms, and dramatic-looking wall TVs, too. Once priced at $20,000 and up, more and more superlarge, 40-inch-plus plasma displays are dipping below the $10,000 mark. No, they won't replace standard TVs—or rear-projection systems—in the near future, but upscale consumers who love home theater are already taking them seriously. According to industry observers, plasma's audience should broaden by 2005, when prices could sink to $4000 or less.

By then, we will probably have new display choices ▶

BRILLIANT NEW LCDs GIVE YOU the big picture at a far lower price than before: Eizo's top-notch 18-inch FlexScan L675 (left) costs $2900. NEC-Mitsubishi's 20-inch MultiSync LCD2010X (middle) carries a $3899 price tag. And Samsung's 17-inch SyncMaster 170T sells for a remarkably low $1199.

PHOTOGRAPH: KEVIN CANDLAND; ICONS: JEFFREY PELO

Product Pipeline

➤ **Xbox Unwrapped:** Look out PlayStation 2, here comes Xbox, Microsoft's snazzy new video game console. The company unveiled the industrial design of the console—a black box with a glowing green X on the top—and its controllers at the 2001 Consumer Electronics Show. Xbox features a 733-MHz Pentium III CPU, a specially designed NVidia graphics chip, and an ethernet port to allow multiplayer gaming over broadband hookups. The Xbox is due in stores in late fall; early titles include Tony Hawk Pro Skater 2, Malice, and the WWF Raw is War wrestling game.

Tidbytes

➤ **Satellite Radio:** Car radio listeners will soon have more to tune in to, thanks to new satellite radio services. Both Sirius Satellite Radio and XM Satellite Radio will offer 100 genre-based stations with few commercials (Sirius promises none) and fewer signal interruptions than analog radio, thanks to powerful satellites designed for nationwide coverage. Both digital services plan to charge subscribers about $10 a month. Satellite-ready car radios are due this summer from stereo makers like Alpine, Panasonic, Pioneer, and Sony; they'll cost approximately $150 more than standard car radios. ▶

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that solve problems today's offerings don't even address (see "Future Visions," below). Technologies such as organic light-emitting diodes promise to unite energy savings and a CRT-quality display in a super-thin—possibly even flexible—panel. Meanwhile, advances in ultra-high-resolution screens and microdisplays may offer eye-soothing performance and render extremely clear text in a way that today's monitors can't even approximate.

THE 17-INCH SOLUTION

SO WHO needs to go larger? Anyone who's ever tried to write a report in a word processor while doing research in a browser, running a spreadsheet, and keeping an eye on e-mail will appreciate a roomier screen. We looked at four of the latest large LCD models from Eizo, NEC-Mitsubishi,

and Samsung, all offering terrific-looking displays and good value. Text looks so sharp and crisp that most people will feel no eyestrain at these models' 1280 by 1024 native resolution—although 17-inch LCDs benefit from a larger font size.

The chief strength of NEC-Mitsubishi's MultiSync LCD1700M ($1499) is its exceptionally wide viewing angle—160 degrees horizontally and vertically—coupled with decent built-in speakers. Samsung's new $1199 SyncMaster 170T has both an analog interface and a newer DVI digital interface; the latter will become useful as more graphics adapters that support digital video output (which offers superior quality for LCDs) appear. Both of the units carry 17-inch screens.

Once the screen sizes exceed

17 inches, prices rise steeply: Some 17-inch monitors are half the price of their 18-inch counterparts. (Blame lower yields for 18-inch screens for this disproportionate price differential.) For example, Eizo's 18-inch FlexScan L675 screen costs $2900—which is still an improvement over the $3000-plus prices 18-inch LCDs used to command. In the Eizo's case, you're also paying for such high-end features as an ultrathin bezel and a screen that can be rotated for landscape or portrait-style viewing.

Even some of the largest

screens cost less than they used to. We were impressed by NEC-Mitsubishi's 20-inch MultiSync LCD2010X, which goes for $3899—not cheap, but far better than the $8000-plus price tags on comparable-size displays of the last few years. And the LCD2010X can handle both analog and DVI digital hookups.

Rhoda Alexander, an analyst with display market research firm Stanford Resources, expects prices to continue falling through the rest of 2001. By year's end, some 17-inch displays will likely sell for less than $1000, with average prices resting at that mark or slightly higher. But don't wait beyond then if you're serious about buying: By early 2002, supply is expected to get tight again, and then prices will stabilize or rise once more.

> Expect **display prices** to continue **falling** through the rest of 2001. By **year's end, 17-inch LCDs** will likely sell for less than $1000.

Future Visions: Flexible, Portable, and Ultraclear

WHILE PLASMA DISPLAYS, projection systems, and large-format CRTs duke it out for supremacy in the big-screen arena, several emerging technologies promise to solve different display challenges. Some are already appearing in products, but most won't be commonplace for at least a few years.

Organic light-emitting diodes (OLEDs): How'd you like a personal digital assistant that you can roll up like a tiny, pencil-size window shade? OLED displays promise to make that roll-up PDA a reality. An emerging competitor to LCD technology, OLEDs use carbon-based (organic) materials that emit light when an electric current passes through them. They don't require backlighting, and they use far less power than active-matrix LCDs. Their organic materials can be deposited on cheap, flexible plastic instead of on the expensive glass used in LCDs. Some problems remain to be worked out, however, such as how to keep airborne contaminants from leaking through the

porous plastics. Currently paired with glass panels, the first OLEDs have already appeared in car stereo systems and cell phones; expect to see them soon in digital camera displays.

Ultra-high-resolution displays: One reason people don't like reading books on PCs or on e-books is that the screens are tougher to look at than paper and ink. Part of that problem is the relatively low resolution of a digital display: Notebook LCDs, for example, generally have fewer than 100 dots per inch, whereas any decent laser printer runs text at 300 dpi or more. Vendors are addressing this

OLYMPUS'S EYE-TREKS make a big-screen experience portable.

problem with two technologies that let you crowd more pixels per square inch: Toshiba has been experimenting with low-temperature polysilicon, while IBM has already used amorphous silicon to produce a monitor capable of 200 dpi. Unfortunately, these technologies are still very expensive.

Near-to-eye microdisplays: When you use your laptop on a plane, anybody can look over your shoulder at your work or at that DVD movie you brought. There is a workaround: new displays worn much like a pair of glasses. The image looks huge to your eyes, but your neighbors can't see a thing. Products have already arrived, including the slick, silver Olympus Eye-Trek series. Several models are available, ranging from an older $549 version to a new, sleeker, lighter, and more powerful $1199 version. That's not cheap, but it's definitely more affordable than a big screen or projection display, which is the kind of experience these glasses can approximate.

THE WOW FACTOR

THERE'S NO getting around it: Plasma displays have an undeniable wow factor. Match a high-resolution, 50-inch plasma display with a DVD like *Toy Story 2*, and suddenly you're in home entertainment heaven. The on-screen colors are pure, the detail is breathtaking, and the visual impact is jaw-droppingly spectacular.

But plasma screens aren't just for fun. Scott Evans, product manager for the NEC-Mitsubishi plasma monitor line, estimates that only about 20 percent of the 50,000 to 60,000 plasma displays sold last year went into the homes of the wealthy. Most are used for public displays and corporate multimedia presentations in such high-traffic places as airports, corporate office lobbies, and trade show exhibits.

A relatively new technology that, like the cathode-ray tube, uses phosphors to create images, plasma has some strong points: It's bright, has a wide viewing angle, and does video very well.

Plasma is subject to image burn-in, however, much as early CRTs were (remember the days when screen savers were more than a personal statement?), and it does lose brightness over time. Display manufacturers have been hard at work on that problem. Craig McManis, vice president of sales and marketing for the industrial displays division of Pioneer New Media Technologies, says that it takes 30,000 hours for his company's plasma displays to lose half their brightness. An always-on display in an airport might need replacement every three years or so, but that translates into a lot of TV viewing at home.

Plasma screens remain very expensive for mainstream home theater use, but vendors like Panasonic, Pioneer, Samsung, and Sony all now offer sub-$10,000 panels. Most of these displays work at a resolution of 640 by 480, however, and may not satisfy your image-quality standards.

Pioneer's 40-inch, 640-by-480 PDP-V402, which costs

PIONEER'S 40-INCH plasma panel is less than $7500, but its 640 by 480 resolution may not meet your needs.

less than $7500 on the street, is a case in point. At a normal TV viewing distance, our *Top Gun* DVD looked quite good, but videophiles would doubtless have found the images a bit grainy. Unless viewed from a fairly long distance, Windows applications also tend to look unattractive on such a big, low-resolution screen; and the unit lacks HDTV support.

In contrast, Pioneer's new, top-of-the-line PDP-502MX, with its 50-inch screen, 3.5-inch thickness, and 1024 by 768 resolution, looks great—and this unit does support HDTV.

Watching the same film on it was entirely different: The colors looked truer, image edges were crisper, and details such as the F-14's cockpit controls were clearer—all improvements you'd expect from a $13,000 product.

Few of us have that kind of money for home entertainment, however. So while you wait for the prices of plasma screens to come down, Stanford Resources analyst Paul Semenza suggests a good alternative: a $2000 rear-projection TV with a large 50- to 60-inch display.

If you want to purchase a plasma display now, note both the resolution and size: A 40-inch panel might be fine in a boardroom or reception area, but larger rooms will probably need to have a bigger screen. An onsite service warranty is a definite plus. Plasma displays, though thin, weigh more than you might expect and are no fun to cart around. And finally, McManis says that users who want to display data should confirm the screen is Windows Hardware Quality Lab–compliant.

If your budget can't accommodate a big, flat PC monitor or wall display now, take heart: Prices should continue to slide in coming months and years. That picture on the wall may someday be a Windows app—or your latest DVD movie. ▶

Site to See: NationalGeographic.com

TRY SOME virtual conservation: Tired of political spoof Web sites? Try a little exploration instead. On National Geographic and Ford Motor Company's beautiful new site, www.nationalgeographic.com/earthpulse, you can use interactive maps, join a virtual expedition to the Great Barrier Reef, view Webcasts of efforts to preserve Hawaiian coral reefs, and learn more about Earth's natural treasures.

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Whose Hard Drive Is It Anyway?
Plan Could Limit What You Can Do With Data

A N A L Y S I S

HOLLYWOOD WANTS a piece of your hard drive.

An obscure proposal now pending before a technology standards committee could lay the groundwork for manufacturers to include content-protection capabilities on your next hard drive.

A group called the 4C Entity is pushing the content-protection plan. Composed of industry heavyweights IBM, Intel, Matsushita Electronic, and Toshiba, the group asked a subcommittee of the National Committee for Information Technology Standards (NCITS) to incorporate new code into the next ATA standard. The ATA standard dictates the way a PC communicates with its hard drives and other storage devices, and this code would enable copy-protection features like the 4C Entity's Content Protection for Recordable Media. CPRM is an encryption and key-management technology that prevents unauthorized copying of protected content.

Opponents contend that the plan will lead to content protection on hard drives, limiting how you can use your PC by curtailing the exchange of digital audio, video, and information. Some claim it is the first step toward the end of free content on the Web. They argue that the strategy plays directly into the hands of greedy music companies and

movie studios, and that it could even hinder basic tasks such as hard drive backups.

"There is a lot that is bad for everyone whenever use of content is carefully metered and controlled," says Brad Templeton, chairman of the board of the Electronic Frontier Foundation, a free-speech advocacy group.

"Once this technology is in, you could use it on everything," he notes. That could lead to a day when content companies allow downloads only onto secured drives, which would fundamentally change the Net, he says, and how people use it to exchange information.

Proponents ridicule such claims and argue that the proposal has nothing to do with hard drives or limiting the function of PCs. They say that the plan involves only removable storage media such as flash storage and IBM Microdrives—and that it won't

touch regular files. "The scenario [that opponents] put forth is hilarious," says Intel spokesperson Manny Vara.

Which side's claims are valid? As we go to press, it's hard to say. The co-inventor of the plan, IBM's Jeff Lotspiech, declined repeated requests for an interview, and hard drive vendors remain silent. However, Lotspiech and others in the 4C Entity have been working on a paper that should be viewable at http://4centity.com/4centity by the time you read this. A draft version of the document obtained by *PC World* appears to support both sides of the argument.

MIXED SIGNALS

THE PROPOSED changes to the next edition of the ATA standard would not introduce the encryption technology itself into the storage media,

but would add code that lets device manufacturers incorporate CPRM (for a fee) or other types of content protection during production.

The draft version of the 4C Entity's document that *PC World* obtained states repeatedly that CPRM is not intended for hard drives. However, a sentence in the document indicates that the group had indeed discussed this possibility: "We did consider fixed hard drives in the technical group and some of our design decisions anticipated that."

This statement seems to indicate that the 4C Entity reversed its position—perhaps in response to growing protest against the standard.

Andre Hendrick, a storage-industry consultant on the subcommittee—called T13—was the first to object, he says. While he missed the initial proposal meeting, and later discussions omitted talk of hard drives, Hendrick says he felt that that use was implied.

Despite the 4C Entity's claims to the contrary, Hendrick also contends that CPRM content could cause backup problems for users and might even require new utilities. He is pushing to have a disable feature included if the T13 subcommittee accepts the standard, he says.

QUESTIONS LINGER

YOU CAN EXPECT questions about this issue to persist for months, says Kate McMillan, director of the NCITS Secretariat. The new ATA standard will not be finalized for quite some time, she explains.

The T13 subcommittee may approve the standard at its February 20 meeting, but then must make it available for public review for at least 45 days so opponents and supporters can voice their opinions. "I'm sure we're going to get some comments," McMillan says.
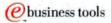
—*Tom Mainelli and Anush Yegyazarian* ▶

> Opponents say the **plan will limit** how you can use your PC by curtailing the **exchange of data.**

Pen and PC: Sony's Winning Combo Lets You Draw, Type, or Mouse

MOUSING and typing are fine for most PC chores, but when it comes to graphics, they're a poor substitute for good old-fashioned drawing and scribbling. But until now, the closest you could get to using a pen on a desktop PC was to use a stylus on a pen tablet—not exactly an intuitive skill.

Sony's new VAIO Slimtop Pen Tablet PCV-LX900 is a full-blown Windows PC that bypasses this cumbersome routine: It allows you to write with a stylus *directly* onto a sleek touch screen that you can either adjust to lie flat or set upright to use with a conventional keyboard and mouse. This terrific feature should appeal to professional graphic artists and photo editors, and thanks to some ingenious software that comes bundled with the machine, it should be a lot of fun for novices too.

DRAW ON

THE SONY VAIO Slimtop Pen Tablet is not the first computer to feature touch-screen input, but the others were either mobile devices—"tablet PCs" that you have seen most often in the hands of package deliverers—or highly specialized systems that are most often seen in restaurants.

The Slimtop Pen Tablet is definitely not designed for mobile use or niche markets. At first glance it looks like other svelte desktops in Sony's VAIO Slimtop line, with a bright 15-inch LCD monitor and a box slightly larger than a notebook.

The box holds the PC's substantial innards: a 1-GHz Pentium III, 128MB of SDRAM, an 8X/4X/32X CD-RW drive, integrated graphics, a V.90 modem, an ethernet interface, Type II PC Card and Sony Memory Stick slots, four USB ports (the monitor has a fifth), two IEEE-1394 (Fire-Wire) ports, and one free PCI slot—but no serial, parallel, or game ports. Oddly, the unit does not come with an AGP slot, which would enable users to upgrade to a high-end graphics card.

Push the 1024-by-768 display back, and its double-hinged stand lets it lie almost horizontally so that you can use the included stylus right on the screen, much the way you would write with pen and paper on your real desktop. You can completely cover the keyboard with the screen, or you can slide it out if intermittent typing is required. Because the touch screen uses electromagnetic technology, it's not prone to recording the inadvertent brush of a knuckle or sleeve. And it looks good even when viewed from an angle.

For professional graphics artists, the ability to work directly on an illustration or photo has obvious benefits. But the Slimtop Pen Tablet targets a wider audience of graphics aficionados. The software bundle includes Adobe Photoshop LE for image editing, GoLive for Web page design, and LiveMotion for Web animation. For beginners, Sony provides its own new Picture Toy application, which makes simple drawing and image ornamentation a snap. If you don't opt to draw from scratch, you can start with one of your own photos (or choose one from a small library of stock shots), then draw or write on it, or even add a little cartoonlike balloon with your own text.

At $3000, the Slimtop Pen Tablet is not for bargain hunters: The VAIO Slimtop PCV-LX800—similarly configured but with an 800-MHz Pentium III proces-

SONY'S Slimtop Pen Tablet lets you draw right on a bright LCD touch screen.

sor and a standard LCD display—runs about $700 cheaper. And given these prices, you wish Sony had included a graphics board with its own memory rather than an integrated chip set that shares system RAM. But for graphics pros and affluent users who've yearned for an easier way to draw electronically, the premium may be well worthwhile.

—*Yardena Arar* ▶

PHOTOGRAPHS: KEVIN CANDLAND
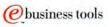
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Security At Your Fingertips–
New Notebooks Offer Biometric Protection

H A R D W A R E

YOUR LAPTOP is missing—and with it, all your confidential data. Qualcomm Chairman Irwin Jacobs lived this nightmare last year when his notebook was stolen. In June came a scarier case: The elite Nuclear Emergency Search Team discovered that two laptop hard drives full of nuclear secrets had been misplaced.

There is no foolproof way to protect your notebook data, but biometric security technologies can make it safer. Unlike passwords, biometric devices measure unique biological traits—like fingerprints, voice prints, or retinal images—and compare them to a stored profile. You can use the PC if, and only if, your biometric data matches the profile of the rightful user.

Fingerprint recognition, the most developed of these technologies, is now appearing in the corporate world. Both Acer and Compaq have released new notebooks with built-in fingerprint scanners. The units run on Windows 2000 Professional edition.

NO CLOAK-AND-DAGGER

THE DEVICES are not error-free, so they're best suited for businesses that need another safeguard for standard or somewhat sensitive data—not for top-level company secrets or environments where you need to log on quickly every time. (For more on this, see "Rules of Thumb to Strengthen Security," page 160.)

To get started, you enroll one or more of your fingerprints in the units' biometric database. During enrollment, the PC records your fingerprint minutiae—the characteristic bends and end-points of your fingerprint ridges. You repeat this process several times to verify the consistency of the results before the system adds your profile.

To log in, scan in your fingerprint again. The system then compares the new scan with the stored image. If a certain number of details match, you'll gain access to your PC. You never have to match all of the stored details—this lets the system work even if you scratch your finger or position it differently on the scanner than you did before.

And therein lies the rub. If you require too many matched details for identification, you will get lots of false negatives—so you can't get to your data. If you set the acceptance threshold too low, you'll increase the number of false positives and may allow access to unauthorized users. Both of the laptops that we looked at enable you to alter this setting.

HANDS ON

ACER'S $3499 TravelMate 739TLV uses a Veridicom sensor and comes with two biometric programs: VbxCTR software controls rebooting and log-in, while WhoIsIt lets users encrypt directories and store passwords. Unfortunately, the two programs don't share a single biometric database, so you have to enroll your prints twice.

The $3999 Compaq Armada E500 uses an Identix scanner. When sensing a fingerprint, the unit emits a red light, so you can easily tell when the scan is done. Another plus is easier enrollment: The Identix software is integrated with the Windows 2000 user management database, so you can enroll through an option in the log-in dialog or by navigating the system administration dialogs.

Neither laptop's biometric system worked perfectly. Getting the scanners to accept my fingerprint was like struggling to feed a faded dollar bill into a vending machine—try and try again. On the reboot check, the Acer locks up after four failures and requires a

COMPAQ'S Armada E500 (left) and Acer's TravelMate 739TLV both come with built-in fingerprint scanners.

hard restart before allowing four more tries. With practice—and patience—you can train yourself to present your finger more consistently, and the false negatives go down. As a backup, both systems let you use a password to get in.

The Compaq's biometric features seem better integrated with the OS, simplifying administration. The Acer's WhoIsIt program, however, gives it a features edge, despite the inconvenience of double enrollment. The technology is far from perfect right now and mostly seems to solve one real problem: People often choose bad passwords.

—Jamie Fenton ▶

Acer TravelMate 739TLV
Street price: $3499; 800/733-2237; www.acer.com/aac

Compaq Armada E500
Street price: $3999; 800/345-1518; www.compaq.com

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Part #6270P2U

IBM NetVista A40
Perfect for small business
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10/100 Ethernet
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for Small Business $51/MO.¹⁰, 36 MOS.

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Iomega Zip 250 USB Drive
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IBM recommends Windows 2000 Professional for business.

Small Wonders: Portable Projectors Get Light, Bright, and Slight

FIRST LOOK

IT'S A RARE presenter who breaks a sweat carrying a portable projector into a meeting these days. The newest models barely exceed 3 pounds, so a full pot of coffee is likely to be heavier. Even better, these units demand few of the image-quality compromises typical of their predecessors.

We looked at three of the latest: Compaq's MP2800, NEC's MultiSync LT150, and Optoma's EzPro 718. All use the latest version of Texas Instruments' Digital Light Processing technology, the space-saving alternative to LCD projection. These units also use lighter case construction, more-efficient ventilation, and brighter miniature lamp systems to up the ante on brightness and image quality in a small, light package.

The drawback? You'll pay a sizable premium for these sleek models. Presenters who aren't constantly on the road might prefer to lug around a few extra pounds if that means saving hundreds of dollars. For example, you can find Lightware's L-1020 Plus, a 13.5-pound LCD projector rated at 800 ANSI lumens, for as little as $2995—a good $1300 less than the cheapest of these ultralights.

LIGHT AND EASY

THE THREE units we looked at all weigh from 3 to 5 pounds (without their included carrying case, cables, and remote control), deliver at least 800 ANSI lumens of brightness, and provide 1024 by 768 resolution—equal to the usual native resolution of the large-screen notebook PCs they've been designed to accompany.

COMPAQ'S MP2800 (left) and NEC's MultiSync LT150 projectors weigh less than many large-screen notebooks.

The two smallest units—the Compaq and the NEC—project readable images at up to approximately 32 and 22 feet, respectively. This makes them more than adequate for most small-group presentations. In comparison, the heftier Optoma's whopping 1100 lumens can project larger images at distances of nearly 40 feet, making it the superior choice for use in larger rooms.

All three projectors have durable magnesium casing, which is stronger than plastic and lighter than aluminum—materials used in older cases. The tower-style MP2800 and EzPro 718 both sit vertically, which their vendors say allows for cooler operation by increasing air circulation and heat dissipation. The MP2800 also features a detachable audiovisual module for sound and video inputs. The module includes an unusually powerful 6-watt built-in speaker (most projectors offer only anemic 1-watt speakers), but you can leave it at home if your presentations don't require multimedia effects. The horizontally oriented LT150, on the other hand, is the first projector in its weight class that lets you run simple presentations from a CompactFlash card (not included), so you can leave your notebook at home.

All three projectors were easy to set up and use with a 500-MHz Pentium III notebook. In my tests projecting PowerPoint presentations, digital photos, and test patterns onto a 50-inch portable tabletop screen and a highly reflective white wall, all three produced sharp, bright images with good contrast and color fidelity. They managed equally good results when projecting video from a TV tuner and an S-VHS VCR, for the growing group of presenters who take projectors home for after-hours movie viewing. Adjusting projected images was a snap via top-panel buttons or remote controls that come with each of these units.

Each projector has its strong points. The Compaq's sleek modular design and superior multimedia hardware may justify its premium price, while the NEC's CompactFlash slot and svelte profile may enhance its value to users who can otherwise dispense with a notebook. And for presenters who don't mind toting a couple of extra pounds, the Optoma's brightness and competitive price make it a worthy alternative.

—*Richard Jantz* ▶

Projectors by the Numbers

MODEL	Street price	Weight/ traveling weight (pounds) [1]	Brightness (ANSI lumens [2])	Projected lamp life (hours/re-placement cost)
Compaq MP2800	$4999	3.4/6.5	900	1000/$439
NEC MultiSync LT150	$4795	3.3/5.5	800	1000/$475
Optoma EzPro 718	$4295	5.0/8.0	1100	1500/$595

[1] Weight is for projector only; traveling weight includes accessories such as carrying case, cables, and remote control. [2] Industry-standard brightness rating.

Do-It-Yourself DSL Goes Mainstream, But Glitches and Delays Mar Offerings

CONSUMER ALERT

INSTALLING A DSL line yourself sounds appealing: No technician to wait for, no new cables to put in—everything works over your existing telephone line. And getting DSL from your current ISP makes the deal seem even sweeter.

Self-install DSL has been available before, but new offerings from EarthLink and AOL mark the first time national ISPs provide the option.

AOL offers a self-install DSL version of its AOL Plus broadband service, but only to existing users. You can order the service directly from AOL or buy a $170 Actiontec USB DSL modem (a PCI version is $150) with AOL Plus software from a local Circuit City. Check your eligibility for DSL service at AOL's site before you buy a modem, and note that when AOL lists Windows 95 or 98 under its AOL Plus system requirements, these are the *only* operating systems that currently work with the service. (AOL says Me support should be available in February.) We were unable to test AOL Plus in time for this story.

We tested Earth-Link's self-install service ($40 per month, including modem), but our experience proved less than ideal. We faced a string of missed deadlines, bad communica-tion, and appalling service. As for speed, well...for the first three weeks, my DSL line was slower than a dial-up connection. It took some time for the company's promise of a fix "soon" to become a reality, and it was a bumpy ride.

HURRY UP AND WAIT

AS WITH any DSL service, you must first see if you can get DSL at all—you may need to call your ISP (as you must with Earth-Link), check its site, or call the phone company.

After I placed my order with EarthLink, the provider contacted my phone company to set an installation date, and then informed me. (Though a technician does not have to come to your house, your phone company still needs to reconfigure wires at its end—be prepared to wait.)

A DSL kit arrived about two weeks after I placed my order.

Clear instructions covered the entire installation process, although nothing mentioned EarthLink specifically. Pacific Bell, which handles the physical DSL connection for Earth-Link in my area, provides this generic kit for all ISPs using its DSL service. My kit contained a Westell WireSpeed DSL modem, a Kingston PCI ethernet card, and five micro-

> A technician does not have to come to your house, but your phone company still needs to reconfigure wires—be prepared to wait.

filters that you place between your phone jacks and phones or fax machines to prevent DSL signal interference.

A few days later, the software arrived. It too was fairly easy to install, though it lacks native support for Windows 2000 and Me. However, the connection failed to work on the preset installation day.

The culprit was confusion between the various companies involved—a common problem with DSL service. Pacific Bell postponed its installation, but EarthLink didn't know. Another two days passed before I received a letter from Pacific Bell offering an explanation and a

new date, set for a week later.

The line worked on that date, but I couldn't use the service. Another call to EarthLink tech support revealed I had not been entered properly into its database, which took another day to correct. Finally, slightly less than five weeks after ordering the service, I was up and running.

THE FIX IS IN

UNFORTUNATELY, the line was glacially slow. The average download speed was mired around 28 kbps—well below the several hundred kbps that DSL connections can offer, and far below the speed of a 56-kpbs dial-up modem. Numerous calls to EarthLink's tech support revealed there was "an issue" caused by a router that transfers data from EarthLink's network to Pacific Bell, which then sends me the data. Both companies were aware of the problem—although no one told me about it when I signed up—but it took several weeks to fix. EarthLink says it will offer refunds to customers in my area who have experienced that difficulty.

But that's not all. EarthLink tech support recommends I turn the DSL modem off when it's not in use to prevent DSL signal loss—odd for a service billed as an "always-on connection." It could also be a real problem with a home gateway, which lets several people use a single connection.
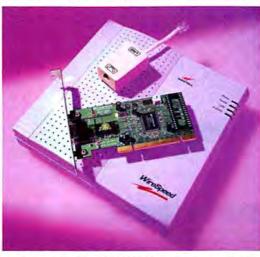
So while self-install kits may be convenient, our experience reveals that the long-anticipated nirvana of a DSL line that's easy to install and fast is still some ways off.

—*Richard Baguley* ■

MY EARTHLINK DSL kit contained a Westell DSL modem, an ethernet PCI card, and several microfilters.

One day,
Timmy will zap space aliens on the PC
while
his sister listens to digital music
while
Mom downloads a restaurant review
while
Dad checks his e-mail
and no one
will have to wait to get online.[1]

In Gateway country, that day is today.

Introducing the Gateway Connected™ Home.
All your technology's connected so everyone can use it at the same time.

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Gateway Performance™ 1300:
Continue using your PC even while it works as the hub for all the rest of your home's connected technology.

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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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Connect them all together with one of these PCs:

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Intel® Pentium® 4 Processor 1300 (1.3GHz) • 128MB PC800 RDRAM • EV700 17" Monitor (15.9" viewable) • 32MB NVIDIA™ GeForce2™ MX AGP Graphics
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$1599 or as low as $45/mo. (APR 14.9%) for 48 mos.⁴

Gateway Essential™ 933

Intel® Pentium® III Processor 933MHz •
64MB SDRAM •
EV700 17" Monitor (15.9" viewable) •
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(new members only)

$999 or as low as $28/mo. (APR 14.9%) for 48 mos.⁴

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PC to Explore Digital Photography Your Way" •
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(new members only)

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

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DIGITAL PHOTOGRAPHY:
Sound Advice for Smarter Shots

Shutterbugs, rejoice!

Amateur and professional photographers alike can now afford dynamite digital cameras from some of the world's leading camera makers. But they also face a bewildering array of digital options, and many will save hundreds, even thousands, of dollars by heeding expert advice.

"Start by asking yourself what kind of photographer you are," says Boston-based digital artist Sean McCabe. "If you hope to see your work in a gallery one day, you should invest in a camera that you can grow into. But if you just want to have fun and an easy time taking pictures, you may want a less expensive, point-and-click camera."

Most importantly, any digital camera should at least offer photographers the option to take high-resolution pictures. "It's all about megapixels," McCabe says, referring to cameras that can store at least 1MB of data. "Until recently, a megapixel camera was almost too expensive for anyone but professional, studio photographers. But now even low-end cameras often come with 1.2 or 1.4 megapixels of storage."

Megapixel cameras can take pictures sharp enough to withstand resizing and reformatting for print reproduction. "With higher resolutions, you can always save down," McCabe says, "but if you want to blow a picture up more than 30 or 40 percent, then only a higher-resolution camera will give you the picture you really need."

Few digital camera makers match megapixels with sophisticated lenses and hardware; many more sacrifice ease of use to get there. But this winter, Canon U.S.A. Inc. rolled out its PowerShot Pro90 IS, which combines Canon's strengths as a camera and lens designer with its own innovative imaging technology. The 2.6 megapixel PowerShot Pro90 IS takes still pictures at resolutions of up to 1856 x 1392 pixels and records 30-second, 320 x 240 (QVGA) video clips at 15 frames per second.

Unlike other digital cameras in its class, the PowerShot Pro90 IS gives serious photographers real manual control over shutter speeds and apertures as well as white balance (seven modes), exposure compensation, and five flash control modes (including those that help reduce the ruinous effects of red-eye). But photographers at any level will find the PowerShot Pro90 IS easy to use, with its friendly user interface and universally understood icons.

Canon last year developed a 10x super telephoto zoom lens especially for its digital cameras, including the PowerShot Pro90 IS. The all-glass lens is small and lightweight, yet it effectively corrects aberrations in zoom and telephoto shots. And the camera's Optical Image Stabilizer feature (based on technology Canon developed for some of its 35mm SLR lenses) ensures maximum picture quality without adding to the size or weight of the camera.

Canon is shipping the PowerShot Pro90 IS with Photoshop 5.0 LE, QuickTime 4.1, and other image tools to help photographers make a masterpiece out of every picture. But to start, McCabe insists that even digital users must adhere to the fundamentals of good photography. "Always remember the basic rules of composition," he says. "Start with good lighting, and take the time to frame your shots. Whichever camera you choose, these things will always remain the same."

The PowerShot Pro90 IS from Canon U.S.A. Inc.

are you digital yet?™

Any camera can be digital.
Only one can be an ELPH.

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PowerShot S100
DIGITAL ELPH

- The world's smallest, lightest, 2 megapixel digital camera with zoom lens.
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NEW PRODUCTS

AOL, Yahoo Buddy Up to Wireless Messaging

AOL's Mobile Communicator (left) and Yahoo's ELink.

E-MAIL PAGER

PUT YOUR instant messaging buddy list in your back pocket with new mobile IM services from America Online and Yahoo. Both use the souped-up alphanumeric pager from Research in Motion to let you swap instant missives easily and send and retrieve e-mail messages from anywhere.

There are drawbacks: These gadgets aren't cheap; wireless coverage gets spotty outside major cities; and associated service charges are pricey.

I tested shipping models of the **AOL Mobile Communicator**—with a base cost of $330, plus a month-ly service fee of $20 on top of a re-quired AOL membership ($22 a month)—and Motient's $335 **ELink Fortified With Yahoo** device. The ELink runs a flat $35 per month for unlimited wireless access or $15 a month for 100KB of data, plus 15 cents for each additional KB.

The huge AOL Instant Messenger community is one of the Communicator's biggest draws: You can link up with about 61 million users. But the unit can only do instant messaging and e-mail. The ELink, in contrast, offers PDA functionality and the ability to trade messages with Yahoo's community of 10 million Yahoo Messenger users.

The ELink also gives users instant messaging and e-mail; a calendar and address book that synchronize with a desk-top PC and any Web-based My Yahoo account; and a mobile Web browser that links to headline news and connects with your choice of wireless-friendly Web sites.

You also get a PC syncing cradle and an AA battery that accepts recharging inside the unit when it's in the cradle. AOL's Communicator ships with a nonrechargeable bat-tery and no cradle.

In tests conducted in the Boston area, I obtained con-sistently trouble-free con-nections with the AOL ser-vice. I wasn't as fortunate with the Yahoo service—the ELink's coverage was spotty even though I tested it within advertised coverage areas. The AOL Communicator uses the Bell South Wireless Data net-work (available in 492 U.S. cities). Yahoo's ELink uses the Motient wireless data network (available in 500 U.S. cities).

Both devices automatically sync your buddy lists with cor-responding lists stored on cen-tral servers, so the same buddy data that shows up when you use the desktop software ver-sions appears on the mobile devices. Both let you conduct simultaneous chats and store e-mail and e-mail addresses.

I especially appreciated the way the ELink handled multi-ple accounts, letting me use any Yahoo Messenger name. In my tests, the Communica-tor limited me to using only AOL screen names linked to my AOL account.

—Tom Spring

AOL Mobile Communicator

PRO: Outstanding coverage in my tests; reaches large AIM community.
CON: No PDA functions; pricey.
VALUE: Vast reach may be worth it.
List price: $330, plus $20 monthly service charge on top of $22 month-ly AOL service payment
America Online
800/827-6364
www.aol.com/anywhere

ELink Fortified With Yahoo

PRO: Doubles as PDA; good integra-tion of PC and Yahoo portal services.
CON: Spotty coverage in my tests.
VALUE: Somewhat expensive toy.
List price: $335, plus $35 a month for unlimited access or $15-plus a month for limited service
Motient
800/494-1727
www.elinkhere.com

PHOTOGRAPH: MARC SIMON

CONTENTS

The Sound and the Fury of Dell's THX PC

PC THEATER

IF YOU WANT a solid PC that doubles as a home theater, but you're intimidated by the task of selecting the best components for the job, consider a Dell **Dimension 4100** desktop.

I tested this system, which is the first THX-certified PC. (George Lucas's THX grants seals of approval for audio and video systems.)

The $1959 shipping system I tested included a 933-MHz Pentium III CPU, 128MB of PC-133 SDRAM, a 20GB hard drive, a 12X DVD-ROM drive, a graphics board based on a 32MB NVidia GeForce 2 GTS chip that uses DDR memory, a Turtle Beach Santa Cruz DSP sound card, a 56-kbps modem, a set of Altec Lansing ADA885 speakers, a 19-inch P991 Trinitron FD monitor, and the Windows Millennium Edition operating system.

My out-of-box experience wasn't great—Dell provided incorrect speaker cables and a dead subwoofer. But once I got the system running, I had no trouble configuring each piece of hardware for precise sound and video, using the THX optimization software.

Powered by the Santa Cruz sound card, the well-designed five-piece Altec Lansing package (four speakers plus a subwoofer) produced sharp sound, especially suitable for use with Dolby Digital DVD movies.

Experience the aural thrill of *The Matrix* while perched in the speakers' sweet spot (dead center), and you'll never go back to lesser sound. The 19-inch Trinitron monitor and GeForce2 GTS graphics board delivered good color with sharp details, and DVD playback looked very crisp.

Overall, the system easily handled my informal tests. To future-proof it, however, I'd add memory and a larger hard drive. After all, the system's 20GB is likely to fill up fast if its fantastic sound triggers an MP3 binge.

—*Tom Mainelli*

DELL'S THX-certified Dimension 4100.

Dimension 4100

PRO: A good PC with outstanding multimedia components.
CON: Pricey for a 933-MHz PIII.
VALUE: Consider this system if you want a home-theater-style PC without configuration hassles.
List price: $1959
Dell
800/915-3355
www.dell.com

Racking Up Great Sound

SOUND CARD

HERCULES'S LATEST sound board, the $149 **Game Theater XP**, offers a twist on the latest Dolby Digital 5.1–compatible sound cards. Like most of the 5.1-capable boards we've tested, my shipping copy pumped out great sound and convincing 3D game effects. But this board's biggest attraction is a stylish rack of connectors that offers enough audio options to rival what the Live Drive from Creative Labs' $199 Sound Blaster Live Platinum offers.

Instead of housing audio connections in a drive bay, as the Live Drive does, Game Theater XP uses an external breakout box that is slightly smaller than a cigar box. The usual six-speaker outputs are present, along with optical and coaxial digital-in and -out jacks. There's even a four-port USB hub and game port—a good place to hook up game controllers or other USB devices.

The Game Theater XP bundles good software, including MusicMatch Jukebox, Power-DVD, and Sonic Foundry's Acid and Siren music-editing packages. Also included are MIDI in/out jacks, line-level analog inputs, and headphone and microphone jacks with separate volume controls.

My only quibble is with how few internal audio connectors there are. My DVD and CD-RW drives occupied the two internal audio connectors, leaving my modem and TV tuner cards out in the cold. The Game Theater XP also lacks a high-quality internal S/PDIF connector—one that resides on the PCI sound card instead of on the rack—so you can't get digital audio straight from your DVD drive either.

—*Eric Dahl* ▶

Game Theater XP

PRO: Sturdy construction; impressive array of connections.
CON: Fewer internal audio inputs.
VALUE: Full-featured Dolby 5.1 upgrade makes a great choice if your drive bays are full.
List price: $149
Hercules
877/484-5536
www.hercules.com

PHOTOGRAPH: MARC SIMON

Olympus's Camedia E-10: 4 Megapixels at Last

DIGITAL CAMERA

THE FIRST 4-megapixel camera arrives: the **Camedia E-10** from Olympus. Digital shutterbugs should swoon at the quality—and the price.

Encased in black aluminum, this solidly built camera offers more features than a multiplex movie theater. The $1999 E-10 lets users manually adjust focus, zoom, aperture, and shutter speed, and adapt settings to different ambient light conditions, providing creative flexibility for serious amateurs and professional photographers. With 4 million pixels at its disposal, the camera captures handsomely crisp, uncompressed TIFF images at 2240 by 1680 pixels (its highest image-quality mode)—great for achieving sharp 8-by-10 prints. But at this setting the included 32MB SmartMedia card stores only two pictures.

GET GREAT PHOTOS (at a large price) from the Camedia E-10.

Because the Camedia E-10 is a single-lens reflex (SLR) model, the picture you see through its optical viewfinder is exactly the image you capture—a feature that most sub-$1000 digital cameras lack.

The shipping copy I examined was dotted with control buttons, making it look complicated to use. But with practice, I found that changing settings such as flash mode and storage format with the buttons was easier than navigating through multiple menu layers on the tiny 1.8-inch LCD monitor. The E-10 accepts both SmartMedia and Compact-Flash memory-card formats.

The camera can save photos at any of several compression levels (which gives you control over an image's size), but you must click through a few layers of menus on screen to change the setting. The E-10 also permits you to print directly from the camera to a printer. The Camedia runs on two bundled lithium-ion batteries, but I suggest that you invest in four optional NiMH rechargeable batteries and a recharger ($70 for the set from Olympus).

Transfer photos to your PC easily with the included Olympus Camedia Master 2.5 software and USB cable. You can edit images with the bundled Adobe Photoshop 5.0 LE.

With so many flexible features, the Olympus Camedia E-10 is ideal for people who are serious about photography and can afford to splurge.

—*Grace Aquino*

Camedia E-10

PRO: More bells and whistles than a church full of referees.

CON: Control buttons require some practice to master.

VALUE: A long list of advanced features helps justify its high price.

List price: $1999

Olympus

800/622-6372

www.olympus.com

A Wristwatch With an Eye for Photos

DIGITAL CAMERA WATCH

WATCHMAKER Casio shifts its attention from techno-nerds to wannabe secret agents with its latest gadget, the **Wrist Camera Watch WQV1D-8CR**, which does double duty as a full-featured timepiece and a basic digital camera.

This $230 stainless steel Casio device captures poorly detailed photos at an extremely low resolution of about 25,000 pixels—that's

CASIO's Wrist Camera Watch.

roughly 1/40 the resolution of a 1-megapixel photo. Thanks to its puny capture level, the Wrist Camera Watch can store up to 100 gray-scale images in its modest 1MB of memory.

The shipping version that I examined can produce up to a 16-level gray-scale image at its default setting, which is Normal mode. The watch's Art mode records high-contrast, two-tone pictures; and two tiny images can be combined side-by-side in the Merge mode. The watch

falls short in transferring photos to a PC: It requires an included, sluggish 115.2-kbps infrared link. You can also use this link to exchange shots with another Wrist Camera. Once they're on a PC, you can convert pictures into bitmaps or JPEGs, but don't expect to see a lot of detail at this camera's very limited resolution.

Framing a shot on the Wrist Camera's screen is easy—if you have adequate lighting to preview with. Though you can adjust the brightness level and indoor/outdoor setting, I had difficulty getting enough light for my indoor subjects. You view snapshots simply by cycling through all of the images on the unit's 0.8-inch-square screen. I had no difficulty deleting unwanted shots.

All in all, the Wrist Camera Watch is a great concept. Buyers would be far better served, though, if the watch produced brighter, sharper photos.

—*Grace Aquino, with Dennis O'Reilly* ▶

Wrist Camera Watch WQV1D-8CR

PRO: Watch and camera in one.

CON: Produces poorly detailed, gray-scale photos; requires an IR adapter to download photos to a PC.

VALUE: Cool but unperfected.

List price: $230

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An Ambitious Audio/Video Digital Recorder

DIGITAL RECORDER

LOOKING FOR an affordable, removable way to store and catalog home movies digitally? TeraOptix targets this growing market with its $599 **Terapin CD Video Recorder**.

The Terapin can record and play back audio CDs and video CDs (VCDs), and it's compatible with both CD-Recordable and CD-Rewritable media.

Nearly everyone is familiar with audio CDs, but the VCD format is popular largely outside the United States. Think of it as the CD version of a DVD movie disc, with lower fidelity. The Terapin features analog stereo audio inputs and outputs, digital audio in and out, composite video in and out, and S-Video in and out—so it's easy to attach a stereo receiver, CD player, VCR, camcorder, and other devices to it.

Audio CD recording is a breeze. I simply queued up my audio material, loaded a blank CD into the Terapin, pressed first the record button and then the Terapin's Confirm button to start, and began playing my source audio. The 74 minutes of music I recorded sounded just like the original.

Recording video is similarly straightforward, and the Terapin can record from any video source, using your TV's audio and video outputs. When I recorded a one-hour show, the results were viewable but not as sharp as those from my M661 Toshiba VHS recorder. The Terapin's MPEG-1 compression scheme is particularly weak on shows with movement, such as sporting events.

Quality loss was harder to detect when I transferred home movies to VCD—mostly because the quality of the original material wasn't high. The Terapin could be quite useful to a novice consumer for storing and cataloging home movies. But the device lacks advanced editing features: A PC with a video capture card, editing software, and a CD-RW drive would be a far more versatile tool.

Though the Terapin might fit some people's needs, average users are probably better off waiting until the prices of DVD digital recorders and media become affordable. And to handle audio CD recording, you can buy a dual CD recorder/player like JVC's XLR5000BK with far more features for about $150 less.

—*Jon L. Jacobi* ▶

Panasonic's Slender, Steely Beauty
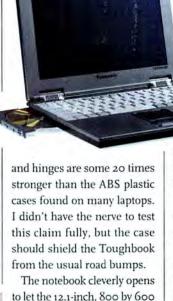
NOTEBOOK

PANASONIC'S **Toughbook CF-37** notebook resembles an haute couture supermodel—streetsmart, thin and light, with an ultrasleek design.

The 4.4-pound, brushed silver and charcoal Toughbook, which is a mere inch thick, sports a full magnesium-alloy lower frame and LCD case, with a shock-damped 8GB hard drive and a 1X–24X CD-ROM drive tucked into its versatile Multimedia Pocket. An optional $449 DVD-ROM or $224 LS-120 SuperDisk drive or a second battery can go into the pocket instead.

Panasonic boasts that the CF-37's magnesium LCD case

THE PANASONIC Toughbook has a magnesium-alloy case.

and hinges are some 20 times stronger than the ABS plastic cases found on many laptops. I didn't have the nerve to test this claim fully, but the case should shield the Toughbook from the usual road bumps.

The notebook cleverly opens to let the 12.1-inch, 800 by 600 TFT Touchscreen lie like an open book on a flat table, allowing viewers on both sides of it to see the screen. The included Display Rotation Tool software enables you to flip the screen image so that it's right-side-up for viewers sitting opposite each other; it also permits one user to manipulate the image while another views.

The notebook's Pentium III-

500 processor handled its chores with aplomb, though I'd suggest doubling the standard 64MB of SDRAM for improved performance. In my informal tests, the lithium ion battery managed to perk along for well over 3 hours of running time in normal use.

The Toughbook includes all the expected ports—serial, parallel, external monitor, PS/2, USB, integrated 56-kbps modem, and sound, plus a Type II PC Card slot. Surprisingly for a business-oriented Windows 2000 notebook, it lacks a built-in ethernet connection. Another minus is an external power switch that I inadvertently switched on—even with the lid closed.

Still, the Panasonic Toughbook CF-37 is worth considering for its versatility and its durable construction—not to mention its supermodel looks.

—*Michael S. Lasky*

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- 30GB Ultra ATA 7200 RPM Hard Drive
- PCI Wavetable Integrated Sound
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- 17" (.25dp) Monitor (16" viewable)
- 52X Max CD-ROM
- Cyber Acoustics CA-15 Speakers
- Intel® EtherExpress 10/100 Adapter
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Create Custom Albums for Your Digital Photos

PHOTO SERVICES

DO YOU HAVE oodles of photos that you'd like to put into albums? PrintLife.com, Zing.com, and Kodak.com let you create custom-printed photo albums from digital or scanned images—and you don't have to leave your PC to do it.

PrintLife's **PhotoBook** and Zing's **Keepsake Album** both

a 10.25-by-7-inch book of up to 16 pages containing as many as three photos per side, all for $30 plus $5 shipping. I loaded my images into the PrintLife software template and then dragged them to the book's page layout, which was easy to

Ten pages cost $35, additional pages cost $3.50 each, and delivery costs about $7. You must register with Zing.com first; then go to the Design Gifts section of the Web site, and select *Keepsake Album*. From there, the site walks you through the straightforward process of

Kodak's image resizing and the ability to automatically generate layouts particularly enticing. When finished, I clicked the Print@Kodak icon in AutoAlbum, and the Kodak Web site quickly uploaded my images, captions, and layouts.

Of the finished albums, I was quite impressed with PrintLife's PhotoBook—the glossy image quality was excellent, and color reproduction was mostly accurate. The quality and color of my

BOUND ALBUMS
from PrintLife (left) and Zing.

generate bound books. Kodak's **Picture Pages** are individual, two-sided sheets that you can easily insert into standard three-ring photograph album binders. These Web-based services, all tailored for novices, are fairly simple to use.

Armed with images from a 3.3-megapixel digital camera and some 300-dpi scans, I tried all three services, with varying results. Zing albums are created online, while PrintLife and Kodak supply downloadable applets that allow you to do most of the work offline; PrintLife also offers an online version with fewer features.

I found PrintLife's Photo-Book Publisher applet to be the most creative—and time-consuming. Starting from a predesigned layout, you build

manipulate. However, it took me several attempts and approximately 10 minutes to complete a 33MB book upload over a fast T1 connection.

Zing keeps things simpler, but at a higher price. When I used Zing, the company permitted one photo per single-sided page, and 15 words per caption; images are printed in landscape orientation in a book that's slightly larger than a standard 8.5-by-11-inch page.

building your book via check boxes and pull-down menus.

With Kodak.com's Picture Pages, you can obtain as many pages as you want and add them to your photo album or binder. Double-sided pages, printed on approximately 9-by-11-inch photographic paper, cost $7 each and can hold up to 12 images with captions per page. Shipping adds $2.

To order, just download the Auto Album applet. I found

Kodak Picture Pages also were excellent, making this service a great choice for people who prefer the flexibility of album pages or want to squeeze more than three images onto a page.

The Zing Keepsake Album, however, failed to knock my socks off: The same images that were brilliant in the Print-Life book and on the Kodak pages were grainy and pixelated in my Keepsake Album.

—*Melissa J. Perenson* ▶

PHOTOGRAPH: MARC SIMON

Picture Pages

PRO: Great quality; easy image resizing; multiple images per page.
CON: Not bound; gets pricey as page count multiplies.
VALUE: Beautiful two-sided pages.
List price: $7 per two-sided page, plus $2 shipping (unlimited pages)
Kodak.com
800/235-6325
www.kodak.com

PhotoBook

PRO: Offline software, multiple layout choices; great print quality.
CON: Sluggish image transfer and slow book-uploading process.
VALUE: Best deal for a bound book.
List price: $30 for up to 16 pages, plus $5 shipping
PrintLife.com
888/591-1187
www.printlife.com

Keepsake Album

PRO: Very simple to use.
CON: Too few design options; too expensive; grainy pictures.
VALUE: There are better deals.
List price: $35 for ten pages, then $3.50 per additional page, plus about $7 shipping
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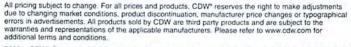
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$299.00 CDW 250553

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Compatible with Handspring Visor

Allowing you to type text into your Handspring™ Visor™ anywhere you go, the **Targus Stowaway Portable Keyboard** collapses to fit in your pocket. Setup is also a snap–just open the Stowaway, snap your Visor into the built-in dock and type away.

$99.99 CDW 221204

Handspring Visor sold separately

OLYMPUS
OLYMPUS AMERICA INC.

Olympus Camedia E-10
SLR digital camera

Designed for the avid photographer, **Olympus Camedia™ E-10** digital camera has a dual auto-focus system, 9-36mm zoom lens (35mm equivalent) and an adjustable LCD display. The Camedia E-10 is also equipped with a dual media slot, for both SmartMedia™ and CompactFlash™ cards.

$1999.00 CDW 247759

HP Digital Sender 8100C
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UMAX AstraNet e5470
Internet scanner

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$199.00 CDW 250995

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MP3 Player/2.4 Megapixel Camera—Pick One

DIGITAL CAMERA

EVER YEARN to enjoy Mozart while photographing beautiful landscapes? You may think your wish has been granted with Fujifilm's combination 2.4-megapixel digital camera/MP3 player, but regrettably the **FinePix 40i** can't perform both functions at once.

As a camera, the $699 FinePix allows you to adjust white balance, set brightness from −1.5 to +1.5 EV, and use a macro setting for close-up photos. It has a digital zoom, and you can shoot up to 80 seconds of video with sound. Photos taken with the shipping unit I tested looked crisp and realistic, and videos were sharp, albeit dark. A 16MB SmartMedia card comes with the camera, but you'll probably want to invest in a new card that has more memory, especially if you plan to use the FinePix as an MP3 player. A 64MB card will hold about an hour of music at a compression rate of 128 kbps.

Unfortunately, as a two-in-one device, the 40i may be more trouble than it's worth—the MP3 player seems like an afterthought. To listen, I first attached a remote with playback settings to the camera, then attached headphones to the remote, and finally set up the software for downloading MP3 files to the camera. Fujifilm includes MP3 creation software. I found the remote extremely easy to use, and the music sounded quite clear.

Unless you buy multiple SmartMedia cards, you must store your photos and MP3s on the same card, which leaves less space for either function. And of course, using two functions in one device runs down the AA rechargeable batteries faster (a recharger is included).

To fully use this product, you'll need to install and run more software on your PC. And would you feel safe tossing a $699 camera, instead of a much less expensive MP3 player, into your gym bag? In view of these issues, the main question about the Fujifilm FinePix 40i seems to be: Why?

—Lisa Cekan

FinePix 40i

PRO: Easy-to-use digital camera with many extra features.

CON: One device performing two major functions quickly exhausts memory and battery life.

VALUE: Good stand-alone camera, but don't expect it to replace a separate MP3 player.

Street price: $699

Fujifilm

800/800-3854

www.fujifilm.com

Let's Do the Cell Phone Boogie

MP3 PLAYER

A CELLULAR phone that plays MP3 music files—now finally there's a convergence product that makes sense.

Samsung's $400 **Uproar SPH-M100** combines a stylish cell phone with a decent MP3 player. In some respects my shipping copy felt like the first-generation product it is, but I found plenty to like, too.

Start with the small-but-mighty, dual-band (analog and digital) flip phone. Slightly bigger than a large pack of gum, the Sprint PCS phone includes extras such as voice dialing, memo recording, Web browsing, and a PIM.

The keys are tiny, and the flip door is flimsy, but overall it's a good phone that would probably sell for about $250.

The real reason you'll want to get this itty-bitty cell phone, though, is the tunes, baby.

The phone's MP3 player has 64MB of built-in storage for about an hour of music compressed at 128 kbps. Aside from struggling with a too-short USB cable, I had little trouble transferring the music. I used the included MusicMatch software, but the company said the software could change by press time.

A large Play button starts the music, and small side controls handle volume. Navigating the tracks, however, requires using either the tiny keypad or a lame remote control that dangles from uncomfortable but decent-sounding ear-bud headphones; the headphones also include a microphone, so you can keep your hands phone-free.

The headset works well with the phone, but it's somewhat silly-looking, so I preferred to use my own standard headphones to listen to the music.

I enjoyed using the MP3 player, and I squeezed almost

Uproar SPH-M100

PRO: Lets you play MP3s on a cool-looking cell phone.

CON: Phone has a first-generation feel, with unexceptional headphones. Track navigation is tricky.

VALUE: This solid package costs less than buying individual devices.

Street price: $400

Samsung

800/726-7864

www.samsungusa.com

SAMSUNG'S musical cell phone.

11 hours of play from a single charge of the phone's standard lithium ion battery. The Uproar lacks some features, but the sound is quite good. I would expect to pay $200 or more for a comparable player.

If you need a new cell phone and want to add music to your life, the Uproar makes sense, even though it is a bit rough around the edges. At $400, it's cheaper than buying two devices, and besides, it's a whole lot easier to carry.

—Tom Mainelli

Xerox's Pricey All-in-One Falls Short

MULTIFUNCTION DEVICE

THE NEW **WorkCentre M940** multifunction device (MFD) from Xerox uses an ink-jet print engine for printing and copying. But at $399, it costs roughly the same as many MFDs that are based on more business-useful laser-print engines. And on top of that, this shipping M940 lacks the built-in fax capability that most competing systems offer.

The M940's advantages? It can scan documents to your computer at 600 by 600 dots per inch in 24-bit color; print at 1200 by 1200 dpi; and make black-and-white or color copies without enlisting a PC.

The M940 also sports a simple control panel, with clear menus shown on an LCD and separate buttons for most operations. However, it lacks such digital-copier features as the ability to collate copies

XEROX'S WORKCENTRE M940 can make black-and-white or color copies without relying on your PC, but lacks built-in fax capability.

of a multipage document and to gather several images onto a single print.

I liked the M940's copy quality for black text and color photos, though I got mixed results when I printed documents from a PC. Solid black text had crisp edges in most cases, but color photos looked washed out, with poor detail and a grainy texture.

In addition, the M940's ink is pricey: 5.9 cents for a page of text, and 17.9 cents for a page of graphics. But unlike most ink jets, the M940 has separate tanks for each color, so if a color runs out, you can replace just the empty tank.

Xerox provides software for faxing scans, but using it is cumbersome. Also included are TextBridge Pro 9 OCR, for

converting scanned type into editable text; Pagis Pro 3, to run the scanner and archive text and graphics scans; and MGI's PhotoSuite 8, for editing photos. Cumulatively, this software gobbles up 200MB of your hard disk, but all of it is powerful and easy to use.

If you want color prints and don't need to fax, check out Lexmark's Z82 multifunction device. It costs half as much as the WorkCentre M940 and offers essentially the same features, though it is burdened with mediocre software.

—Dan Littman

WorkCentre M940

PRO: Easy to use; good software; good copy quality.

CON: High ink costs; middling print quality; no built-in fax capability.

VALUE: Expensive for an ink-jet-based MFD that doesn't fax.

Street price: $399

Xerox

800/832-6979

www.xerox.com

Prepare to Jump to the Lightspeed CD-RW?

CD-REWRITABLE

LIKE *Star Trek*'s U.S.S. Enterprise, the surprisingly affordable **Lightspeed CRW2100** CD-RW drive from Yamaha boldly takes its users where no one

Lightspeed CRW2100

PRO: Currently the fastest CD-R burner on the market.

CON: Mediocre CD-RW write and CD-ROM read performance.

VALUE: Saves time burning CD-R discs, but wastes it in other ways.

Street price: $250

Yamaha

888/926-2426

www.yamaha.com

has gone before—in this case, into the realm of burning CD-R discs at a superfast 16X.

Happily, engaging the 16X/10X/40X CD-RW produced a record-breaking 4-minute, 3-second burn of *PC World*'s 430MB test image. This performance establishes the $250 Lightspeed as faster by 40 seconds than the previous record holder, Ricoh's 12X/10X/32X MP7120A CD-RW.

Extrapolate this over a full 650MB, and you should save a minute or more on every full-capacity, standard-size disc you burn.

The shipping CRW2100 I tested also set a record in reading *PC World*'s 100MB test folder from CD-RW—a scant 41 seconds. Digital audio extraction was stellar as well—the Lightspeed set yet another record by extracting a 250MB test song from CD in only 1 minute and 37 seconds.

Nevertheless, the Lightspeed gave lackluster performance in other areas. For instance, the 2-plus minutes the 10X-rated Yamaha took to write the 100MB test folder to CD-RW is worse than the times turned in by many 8X-rated drives.

Installing Microsoft Office was easily the biggest disappointment—the Lightspeed took almost 4 minutes longer than the average drive.

The Yamaha unit currently ships with Roxio's (formerly Adaptec's) Easy CD Creator 4.02 for CD mastering on a PC, and DirectCD 3.01 for PC packet writing. Toast 4.1 is bundled for CD mastering chores on the Mac, and you can get Ahead's Fast Audio Rip as a free download.

The Lightspeed is a promising CD-RW drive. But I suggest that you wait to buy until Yamaha straightens out the unit's performance problems.

—Jon L. Jacobi ▶

WHY OUTSOURCING TODAY?

Worry-free IT
for small and
distributed offices

n these times of rampant IT skills shortages, with PC help-desk profession-als typically earning $40,000+ per year (if you can find them at all), and with the pace of technology change spinning almost out of control, it's not sur-prising that many businesses are asking, "Is outsourcing right for us?"

Perhaps, if you are working in a smaller office, you may assume that there are no outsourcing options available that would permit you to focus all your precious time on your business instead of monkeying with computers, networks and software.

The fact is there are excellent desktop outsourc-ing options—and accompanying benefits—avail-able for the smallest to the very largest organiza-tions. More importantly, outsourcing in general is a major trend in business today, where increasingly the mantra is: "Focus on core competencies; out-source as much of the rest as possible."

For example, an emerging group of so-called management service providers uses its expertise to offer new services to small and mid-sized com-panies struggling to get a handle on managing their IT resources. Meta Group, a market research firm in Stamford, Conn., believes this new class of service provider will see its revenues soar to $10

FREE TO FOCUS

Businesses can turn their attention to business instead of troubleshooting computers.

Of the many companies tracking outsourcing and the reasons for it, perhaps none is more highly regarded than International Data Corp. (IDC), Framingham, Mass., which projects a nearly $20 billion market this year for LAN and desktop outsourcing services.

From its outsourcing research, IDC has devel-oped a series of answers to the questions of why such a rapidly growing number of small and mid-

WHY OUTSOURCING TODAY?

billion by 2004. Market research firm Input, Washington, D.C., predicts that the U.S. market alone for IT outsourcing will total a whopping $110 billion by 2003.

The bottom line is that outsourcing is big and getting huge, and for plenty of good reasons. The Outsourcing Institute has compiled a list of these reasons, and topping the list are: the ability to reduce and control operating costs; improved business focus; gaining access to world-class technology capabilities; and freeing up internal resources for other, business-critical work.

FIT FOR ALL

But perhaps the most interesting aspect of outsourcing, particularly of PC resources, is that it is truly appropriate for organizations of any size. Typically, desktop outsourcing can include support, maintenance, help-desk services and, of course, installation of all system components, with software loaded to the exact specifications of the customer. And with the flexible hours many of today's professionals keep, support for

PC resources cannot be limited to the typical workday. It has to be there when the user needs it, which is to say on a 24x7 basis.

NASA, for example, is in the midst of a multi-year plan to outsource some $2 billion worth of desktop outsourcing contracts. The aim is to free up scientists and engineers, who often handle their own PC support, to instead focus on the critical work of the agency. NASA is not just looking to save money by outsourcing the hardware. Rather, the main goal is to reduce the "soft costs" of PC ownership associated with supporting machines and technology that are both complex and in frequent need of "tweaking."

Meanwhile, in another example, a two-person office with just three PCs has found an outsourcing solution that allows the staff to focus totally on their consulting work.

Obviously company size doesn't matter when it comes to reaping the benefits of desktop outsourcing. What does matter is a desire to focus less on the technology that supports the business and much more on the business itself.

THE RIGHT STUFF

Consultant regulates business with outsourcing solution

After 21 years as a county administrator and the last decade as a government consultant, Bob Braitman admits he knows a great deal about organizing local governments and their functions. But when it comes to understanding the computers and technology, apart from the applications he uses, Braitman offers a different take.

"I know squat," he says. Nonetheless, computers are a big part of the consulting services that his company, Braitman & Associates of Ventura, Calif., offers clients throughout the state. His databases hold three decades worth of information on everything from incorporating new municipalities to fiscal planning to utilities provisioning to conflict resolution, not to mention his business's financial records.

Nearly two years ago Braitman grew tired of the endless cycle of equipment purchases, software upgrades, hardware upgrades, LAN troubleshooting and new-generation equipment purchases. He had a business to run and clients to service, clients like the Truckee-Donner Public Utility District. The

District hired Braitman to help work with various regulatory agencies so it could bring fiber-optic Internet services to the small town of 12,000.

"That's the work we like to do, not messing around with our computers and printers and software," says Braitman. "So one day my office manager heard about this company called Everdream. They offered to do all the computer work for us, including providing all the equipment. We've never looked back."

Specifically, Everdream Corp. (www.everdream.com), Fremont, Calif., brought in brand new Hewlett-Packard computers, all preloaded and pretested with the exact software configuration Braitman & Associates had specified. The equipment was provided as part of a monthly fee to Braitman that is a 100 percent deductible business expense.

Then Everdream added in 24x7 phone support for all the equipment it provided. And as a kicker, Everdream remotely and automatically backs up all of Braitman's data on a daily basis.

FREE TO FOCUS

sized companies are turning to outsourcing.

As to the "why outsource?" question, the reasons include:

- Rapid advances in network technology have made the networking component of using an outsourcer more reliable than ever.
- Real-world experiences, IDC observed, have yielded proven benefits, including reduced costs; greater ability to focus on the business without technology distractions; and gaining freedom from the never-ending cycle of PC and software upgrades.
- With the chronic IT skills crunch showing no signs of letting up, outsourcing offers a way to get the technology and support an organization needs with little or even no in-house IT staff.
- The pressure on new and existing companies to build and deploy e-business solutions often leaves few internal resources to support desktop computing.

In addition, IDC has compiled a profile of companies that can gain the most benefit from outsourcing some or all of their IT resources. These include small to mid-sized companies with plans for rapid growth; companies for whom IT is not a central part of their value proposition; or companies that need to be particularly flexible in anticipation of a merger or acquisition.

For a growing number of companies, Everdream Corp. (www.everdream.com), Fremont, Calif., is providing just the sort of business value that IDC views as the leading reasons to consider outsourcing in the first place. For a fixed monthly fee, customers get a comprehensive package that includes PC service, hardware, software and high-speed Internet access.

The Everdream solutions get you up and running in days, backing all equipment with the same kind of high-level support you'd expect from a large and highly skilled IT staff. This support includes a remote diagnostics capability in which solutions analysts at Everdream's Solutions Center take control of your desktop via a high-speed Internet connection to fix the problem without your having to wait for help to show up at the office. And all Everdream PCs, laptops and servers are from Hewlett-Packard, the broadly acknowledged quality leader. Perhaps most important, though, Everdream is working whenever you are, offering 24x7 personal support.

FRIED, BUT NOT BURNED

This automated backup was vital to Braitman & Associates last summer, when a particularly nasty virus snuck through the front-line antivirus protection and "fried two hard disks loaded with what amounts to our business," Braitman recalls. "With no questions asked, Everdream sent us two new drives. They walked us through a simple process of installing them. And when we brought up the system, all our data was there, except for one day's work. It saved us."

Mary Everett, Braitman's office manager, has similar praise for the PC outsourcing solution and for Everdream's support professionals.

"I suppose the best compliment I can pay them is that when I call, it's as though I am the only person they have to deal with," Everett notes. "This is what I find so reassuring about them. They are patient, very smart and unfailingly competent. I was scared to death about replacing the drives after the virus attack, but with their help, it was like putting bread in a toaster."

One of Everett's favorite features of Everdream support is the ability of the support staff to take control of her computer screens remotely in order to fix problems that she is having difficulty fixing on her own.

ANDREA MAROUK PHOTOGRAPHY

Mary and Bob Braitman, shown here in their home office, feel secure about their computers thanks to Everdream.

For Braitman, he can focus 100% of his efforts on servicing clients. When the next generation of hardware comes along, Everdream will replace Braitman's computers with new equipment, all the while keeping pace with software upgrades.

"I have this nice sense of security now about our computers, knowing that we are backed up regularly and that we have the latest and most productive equipment," Braitman says. "This was the right thing for us and I'd recommend this solution for just about any small business."

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

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

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

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A Quick Study: Intuit's New QuickBase Service

DATABASE MANAGER
THERE'S NOW A cheap, effective way for your workgroup to collaborate on projects and to share some of your company's resources such as its contact lists—Intuit's new **QuickBase**.

QuickBase is a database management service—tuned for extreme ease of use—that exploits the universal communications backbone of the Internet. Your data resides on Intuit's servers; you can view or download the report, table, chart, or other info-bit you need by using any SSL-equipped Web browser, such as Netscape or Internet Explorer.

Share data with coworkers, offsite business associates, or even the public through a Web site. The interface's familiar Web browser functions make QuickBase a quick study.

Preconfigured templates simplify setting up common database types for contact management, event tracking, or project management. Or just clone QuickBase samples. You also can import your own databases from your hard drive or copy and paste information from a Microsoft Excel spreadsheet or Word table.

Clean-looking Web pages house your data only, and pull-down menus and strategically placed Web links offer appropriate task options. QuickBase also provides an array of data manipulation capabilities.

Intuit also relies on the popular folder metaphor. The principal folder has the name "Owned"—that's where you

QuickBase

PRO: Extensive database templates and import options.
CON: There often are slight pauses when HTML pages redraw.
VALUE: Easy to start up and use.
List price: Free for up to 3 databases; $15 monthly for 4 to 15 databases; $50 per month for 16 to 50.
Intuit
www.quickbase.com

keep databases you've created. If you own it, you determine which individuals can view, change, or add to your database. Downside: Every action requires a Web page redraw, and of course your access to data is only as good as your Internet connection.

QuickBase is free to all database viewers and to creators of 3 or fewer databases. The service costs $15 monthly for 4 to 15 databases and $50 monthly for 16 to 50. If you need more than 50 databases, QuickBase may not be your best bet.

This Web-hosted database manager focuses on providing data sharing and analysis at the pace of business. Today, that's pretty quick.

—*Mike Hogan* ▶

FileMaker Pro Comes to PDAs

PDA SOFTWARE

FILEMAKER, long known for its popular database management software, now enters the Palm arena with its new $49 **FileMaker Mobile** software. It works on any device running Palm OS 3.1 or later, including the Handspring Visor series and Sony's CLIE. Mobile is designed to work with the company's $249 FileMaker Pro 5, version 3. (On FileMaker's Web site, the company offers free upgrades to version 3 for earlier versions of FileMaker 5.)

After installing the shipping Mobile software on my PC desktop, I used HotSync software to automatically install it on my handheld. I discovered that porting an existing FileMaker Pro 5 database was simple and intuitive. A configuration dialog box allowed me to set various parameters for synchronization.

Once you've transferred a database to the handheld, you are free to view, edit, and create records. Mobile does have certain strict size limits, however. It holds a maximum of 5000 records per database, a maximum of 20 fields per database, and a maximum of 2000 characters per field. These restrictions preclude extremely lengthy entries. You're also confined to your handheld's free memory, because that's where the application and its associated data must be stored. A set of five databases containing some 2000 records in all, with the

SHARE PC-based databases with your Palm using new software from FileMaker.

application itself, occupied about 231KB on my PDA.

Users who don't have File-Maker Pro 5 might check out Handmark Software's $15 MobileDB and DDH Software's $25 HanDBase. These programs are cheaper and have a more handheld-centric design than FileMaker Mobile. But not being linked to a full-featured desktop database program, they require more effort to convert and port data to the handheld from the desktop.

Heavy database users might feel a bit constrained by File-Maker Mobile's size limitations, but most casual users will find it a solid and convenient companion.

—*Keith Kirkpatrick* ∎

FileMaker Mobile

PRO: Permits database editing on Palms; simple to install and use.
CON: Mobile database size limited to 20 fields; requires FileMaker Pro 5 software to use.
VALUE: An easy-to-use extension to the popular business- and consumer-focused FileMaker Pro 5.
List price: $49
FileMaker
800/325-2747
www.filemaker.com

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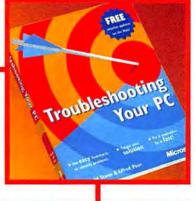
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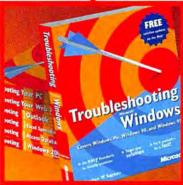
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BEST
free*
Stuff Online

BY MATT LAKE

Great Web freebies aren't as plentiful as they were before the dot coms ran into financial trouble, but we found 60 useful gems that can help you at work, at home, or at play.

*Get 'em while you can!

EVERYONE LOVES TO GET SOMETHING FOR nothing. Nowhere is that concept more appealing than on the Web.

At *PC World,* we've spent years scouring the Web in search of the best free stuff the Internet has to offer. But lately, the job's been a little tougher. New sites distributing freebies aren't cropping up as rapidly as they once did, and old ones are dropping out at a breakneck pace (such as the free ISP service Freei.net, or General Magic's MyTalk voice-mail service). Some stuff that once was free is now offered only for a fee (like Think-Free, a formerly free software suite that's similar to Microsoft Office). It's a changing Web out there, and it's hard to make a buck when you're giving away the goods for free (see "Free Stuff's Hidden Hitches," page 95).

For this sixth installment of our annual Free Stuff guide, we sifted through a lot of dreck to uncover our list of favorites. Forget about those worthless sites touting free postage and credit reports; we focused on sites offering something really useful, such as free Internet access, top-notch office suite software, and cheat codes for computer games to help you get higher scores—yeah, we know what's really important.

We've broken the sites into three categories: work, home, and play. You'll find stuff to save you money and time at home, to help you run your business or small office, and to help you kick back and enjoy your leisure time. We also rounded up some quick hits of the best sites for free file downloads, online privacy services, organizing tools, reference works, and music. As long as they're giving it away, why not take it?

Free Stuff @Work

Fax Facts

JCONNECT FREE Many sites provide free phone numbers for incoming fax and voice messages, but J2 has been doing it the longest—for a fee—under its former name, JFax. Now the JConnect Free service does the same at no cost and asks for very little personal information in return: name, e-mail address, age, gender, and zip code. You'll get a unique phone number that forwards messages, in the form of well-compressed audio and image files, to your e-mail in-box. If you overuse the service, however, J2 may ask you to limit your usage, and the company may cancel the account if you don't—a prudent policy, and one that should ensure JConnect doesn't go the way of other failed free services (although JConnect doesn't define what it considers "overuse").
www.j2.com

Site to Be Seen

FREESERVERS This domain-registration site will give you 20MB of Web site space free, as well as a host of terrific features (you don't actually need a domain to have a site hosted here). For instance, you can import or upload sites wholesale via FTP or a Web-based tool, or build new pages using easy-to-follow templates. Freeservers also processes e-mail sent to your domain (if you have one), either by forwarding it to the account you specify or by storing it in a Web-based mailbox at the Freeservers site. Its tools for analyzing your site's traffic are sterling: You can view daily or weekly breakdowns of the pages that surfers visit, the browsers they use for surfing, and the referral pages that send them to your site. Not bad, in exchange for letting the service display just one ad banner.
www.freeservers.com

Little Shop Around the Browser

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www.freemerchant.com

I Spy

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5 Best Free Download Sites

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③ **www.nonags.com:** Downloads that don't limit the number of days you can use them or nag you to buy upgraded versions.
④ **www.tucows.com:** Zippy downloads and thoughtful editorial selection.
⑤ **www.pcworld.com/downloads:** Okay, we're biased, but our own site offers over 7000 downloads for everything from business apps to screen savers.

the info in a neatly compiled page or e-mail a regular digest of what's new with a particular company. Even if the report is just a quote from someone bad-mouthing the firm in Yahoo's investor forums, you'll still wanna know about it.
www.companysleuth.com

Web Cop

NETWHISTLE How reliable is the company you pay to host your domain's Web site and e-mail? NetWhistle's Personal-Whistle will tell you. This free monitoring service pings your Web site at fixed intervals to see if it's up. It can also check e-mail boxes at the same intervals. If there's a problem, the service logs it and notifies you via e-mail (or by pager, if your paging company has an e-mail gateway); it also delivers a weekly report card. The service will monitor up to five URLs or e-mail boxes at specific intervals; to either monitor more addresses or monitor at more-frequent intervals, you'll have to pay.
www.netwhistle.com

Good-bye to Office

SOFTWARE602 Want to break free of your Microsoft cage? Software602's free word processor and spreadsheet program, 602Pro PC Suite 2000, is comparable to Office and compatible with it as well—the suite handles Word 2000 documents with several layers of tracked and high-lighted changes in them and Excel documents laden with statistical formulas. You may never have to call on Microsoft again. Software602 also throws in a decent photo-editing tool that supports over 15 graphics formats. The 14.5MB program has no ads and no subscription fee. The

company hopes to make money by selling you feature upgrades such as a thesaurus, as well as LAN and fax software. But its free offering is excellent and stands alone.
www.software602.com

City of Bytes

APPCITY For companies looking to dive into the Web-based software phenomenon and throw away their shrink-wrapped boxes, AppCity is a great place to try out some online programs. Download its 9.09MB AppPlayer, and you'll be able to run programs from AppCity's site immediately. The site offers tools for expense and time tracking, sales force automation, and project management, as well as others to help you track employees and memberships. Better yet, the site's AppZapper lets you easily create a custom application using drag-and-drop features. Certainly, there are more-sophisticated programs available—but not ones that are free, customizable, and Web-based so that you can access them from any PC.
www.appcity.com

Internal Affairs

INTRANETS.COM Corporate intranets are great for organizing internal communications and helping to keep your workforce well informed and up-to-date on company news. Intranets.com provides an intranet for free—complete with a calendar for scheduling group and personal appointments, and a file-sharing capability that tells you who was the last person to work on a document. After you set up an administrator's account for your

password-protected site, you can add participants at will. Employees can post messages to your intranet's home page, participate in discussion groups in the threaded messaging forums, vote simultaneously on projects and ideas in the polling section, and even share internal instant-messaging services.
www.intranets.com ▶

Free Stuff's Hidden Hitches

CAVEAT FREELOADER! The Web's wealth of free items has its share of catches. Here are a few things you should be aware of when grabbing the gratis goods:

Obtrusive ads: Many free sites and services support themselves by dishing up banner ads. Some do it more subtly than others, but you might not want to use a free program or service for your business if it covers your screen or e-mail correspondence with ads. (Some services offer ad-free versions, for which you pay.)

Annoying e-mail: Many sites automatically sign you up for e-mailed newsletters and product ads, or let "partners" bombard you with e-mail. Feel free to uncheck any default opt-in box for these "important messages."

No privacy: Free sites also make money by selling your personal information to advertisers. Look for a TRUSTe seal or a privacy policy if you're concerned about what will happen to your info. Don't provide any data you think the site has no need to know.

Massive downloads: Many free downloads are multimegabyte files that take a while to grab (especially over dial-up connections) and hog hard disk space. The best sites warn you about a file's size and transfer time before you click Download.

Disappearing sites: In these days of dot-com fallout, many free Web services are here today, gone tomorrow. You can't count on any service being around forever, so think twice before relying on any of them for crucial business or personal needs.

Smells Like Team Spirit

ALEXSYS TEAM 98 Keeping track of your employees and their assignments on a desk calendar can get pretty messy, especially when you want to revise assignments and deadlines. This multiuser, password-protected project-management program lets you track work assignments neatly and efficiently, and it includes an internal database and extensive report options to summarize your projects. The download is about 11.9MB, and you can expand and customize its interface to suit your needs.
www.pcworld.com/downloads/alexsys

Free Stuff @Home

Surfer Sam

SURFSAVER 2.2 Your browser has a File/Save option, but it's not ideal for trying to save online content to your hard drive to read offline—formats disappear, and text gets jumbled. That's where Ask-Sam's SurfSaver 2.2 comes in. This 5.5MB download lets you save entire Web pages—including any linked pages connected to the page you're saving—in a single step. It retains the page formatting even when frames are involved so that you see the data exactly as it appeared online.

It also creates a searchable offline archive of all the Web pages that you save, and lets you organize these pages by dragging them into separate subject folders. You can even annotate the saved pages with comments to highlight information that you want to stand out.
www.surfsaver.com

Master of Your Domain

NAMEDEMO; NAMEZERO If you want to register your name as a .com, .net, or .org but you don't want to pay for the privilege, these two sites will give you a free domain name (one per customer) as well as e-mail and Web services. Namezero and Register.com's NameDemo are services from domain registrars accredited by ICANN (the Internet Corporation for Assigned Names and Numbers) that are trying to bulk up their numbers by offering a free service. The catch? You don't actually control the domain; it remains registered to the company that provides it. But you do get to use the name as long as you're a member of the free service. Both companies also supply a Web site redirection function to refer traffic to and from your other sites, but it comes with a substantial banner ad promoting the domain registrar businesses—making it unsuitable to use for *your* business.
www.namedemo.com;
www.namezero.com

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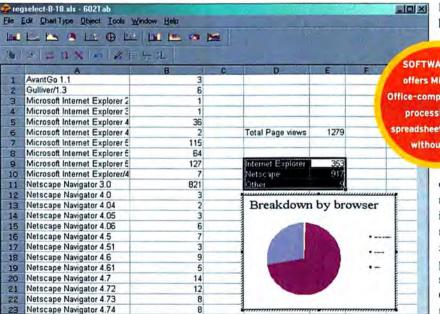
On Call

NET2PHONE In the past year, countless freewheeling Net companies have turned coat and started charging for their one-time gratis services. Net2Phone, however, has gone the opposite route, turning its fee-based service into a free one. After installing the company's 860KB download, you can make free PC-to-phone and PC-to-PC domestic calls to anywhere in the United States. For PC-to-PC calls, the recipient must first download the Net2Phone program. Net2Phone also lets you send free voice-mail messages to anyone in the world via e-mail. The recipient receives brief instructions about downloading the software to hear your message. In addition, the site offers a free answering service in the United States and Canada that lets you hear incoming phone messages through your PC's speakers, and while you're still online. However, the feature uses your existing telephone line and your phone company's "forward on busy" answering service, so you'll have to pay your phone company for that extra service.
www.net2phone.com

SOFTWARE602 offers Microsoft Office-compatible word processing and spreadsheet programs without ads.

Personal Shopper

COPERNIC SHOPPER Want to save money when you shop? Copernic adapts its well-established search engine to its new program, Copernic Shopper (a 2.87MB download), to poll shopping-comparison sites in 13 categories. Enter the name of a product you want to buy, and Copernic Shopper searches dozens of different sources, serves up the best prices
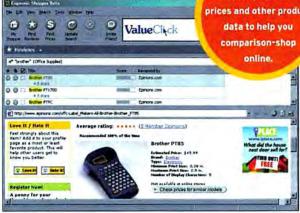
5 Best Free **Privacy** Services

1. **www.anonymizer.com:** Proxy site that lets you anonymously surf URLs you type in.
2. **www.enonymous.com:** Enonymous Advisor plug-in rates the privacy policy of the sites you visit.
3. **www.hushmail.com:** Easy-to-use, end-to-end, Web-based encryption.
4. **www.privacyx.com:** Offers a secure POP3 e-mail box for reading your encrypted correspondence.
5. **www.zonealarm.com:** Robust firewall for Web connections and incoming e-mail.

Kill Bugs Dead

PC PITSTOP; HOUSECALL; SECURITY CHECK When it comes to virus protection, there is no better solution than installing a solid scanning program on your system and updating it regularly. But in the absence of such a program, these companies offer you a Web-based virus scanning tool for free. PC Pitstop, in addition to its virus scanner, offers a disk analyzer, an Internet connection monitor, a tool for analyzing your PC's configuration and making recommendations for better performance, and a diagnostic tool that tells you if unwanted ActiveX controls are lurking in your PC. HouseCall, Trend Micro's free online scanner, is easy to use and effective, and it will not only find viruses but also remove most of them. Symantec's Security Check finds viruses (but won't eliminate them), analyzes whether your PC is vulnerable to hacking, and tells you if your browser is feeding your personal information to Web sites.
www.pcpitstop.com; www.antivirus.com; www.symantec.com/securitycheck

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HANDSFREE BROWSER The problem with browsing the Net is the carpal contorting that clicking on hyperlinks demands. Edumedia's HandsFree Browser (a 2.47MB download) takes care of tedious click-work by using plug-in and voice-recognition technology (but it works only with Internet Explorer, not with Netscape). When you run the browser, it automatically checks all the links and forms on the cur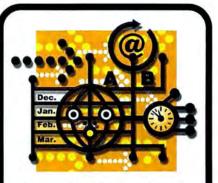rent Web page, and jumps to a link when you say its name—just remember to enunciate. You can also fill in Web forms with such information as your name, address, and phone number using a single command.
www.edu-media.com/ hfbdownload.htm

Free ISPs

NETZERO; BLUE-LIGHT; FREEDOM-LIST Free Internet service providers are an endangered species, but they're great to use as a backup in case your paid provider goes down. While two other free ISPs keeled over as we were writing this, NetZero and Blue-Light seem to be holding strong. And they can save you over $200 a year in access fees if you forgo a paid service altogether. Sure, you pay indirectly for these services by having to endure large ad frames placed on your screen while you're online. The companies also record your surfing history to serve you targeted ads, and they limit the amount of time you can be online (BlueLight locks you out after 25 hours a month, NetZero begins charging you after 40 hours). What's more, there's no guarantee these services won't go the way of other free ISPs. But if they do, you can always search for alternative free ISPs (and access a list comparing their features) at Freedomlist, which also keeps track of the latest ones to bite the dust.
www.netzero.com; www.bluelight.com; www.freedomlist.com ▶

from various e-vendors, and lists the shipping costs and product availability. Click one of the results, and you'll arrive at the corresponding vendor's site where you can order the product online (Copernic accepts a commission from sites that offer a referral fee, but the company says this doesn't determine which vendors it includes in its service). Copernic Shopper also throws in a currency converter as well as a search-history function to save you from doing search replays, and it updates itself automatically to keep your results current.
www.copernic.com/copernicshopper.exe

COPERNIC'S shopping tool culls prices and other product data to help you comparison-shop online.

5 Best Free **Organizers**

1. **planner.excite.com:** Syncs your schedule with Palm PDAs, Outlook, and select smart phones; can also send you reminders of events by e-mail and pager.
2. **www.delphi.com:** Superb Web-based messaging service lets you hold public or password-protected threaded discussions.
3. **www.evite.com:** Electronic invitations and event planning.
4. **www.palm.net:** This organizer for your handheld also guides you to what's playing on TV, at the movie theater, or at the local stadium.
5. **www.visto.com:** Calendar and task manager, online file storage, and a program to sync home, work, and Visto files.

Reference Guru

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www.atomica.com

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APRCALC The real costs of a home loan can take you by surprise if you don't calculate them up front. This 1.33MB home finance utility lets you compare loan options simply and quickly. All you do is enter the amount financed, the payment term, and the interest rate, and it computes your monthly payment. You can also view amortizations for various types of mortgages and calculate your break-even dates for paying discount points on loans to determine how long you'll need to own a house to come out ahead.
www.pcworld.com/downloads/calc

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CASH EXPRESS 2000 If you're having trouble keeping track of all your financial data, you can try this free and useful home-budgeting utility. The 3.88MB download helps you manage your bank accounts, stock investments, mortgage, credit card bills, and other financial data—it even lets you organize your bills into separate groups to be paid on specific days of the month. The password-protected program also lets you generate graphs and print checks.
www.pcworld.com/downloads/cash

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5 Best Free Reference Sites

1️⃣ **www.imdb.com:** Searchable Internet Movie Database cross-references stars, directors, script writers; throws in collections of quotations and a lot more.

2️⃣ **www.infoplease.com:** An almanac, encyclopedia, dictionary, and atlas in one.

3️⃣ **www.infospace.com:** White and yellow pages, business listings, and maps.

4️⃣ **www.mapquest.com:** Reliable turn-by-turn driving directions and maps.

5️⃣ **www.onelook.com:** Calls on dozens of dictionaries, glossaries, and specialized vocabulary lists across the Web, and serves up search-engine-style links, on one page.

Atomica - draconian

🔍 draconian

Atomica

draconian (druh-KOH-nee-uhn)

A descriptive term for strict and unreasonably harsh rules, laws, and penalties: "These draconian laws will certainly cause a rebellion."

• Draco, after whom draconian measures were named, was a lawgiver in ancient Athens.

Did You Mean?
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Politics
Translation
Web Search
Books

HOUGHTON MIFFLIN COMPANY — The Dictionary of Cultural Literacy, Second Edition, Revised and updated Edited by E.D. Hirsch, Jr., Joseph F. Kett, and James Trefil. Copyright © 1993 by Houghton Mifflin Company . All rights reserved.

ATOMICA'S dictionary tool will help you find definitions for words appearing in any of your Windows programs.

Free Stuff @Play

The Game's the Thing

MSN GAMING ZONE; HEAT.NET; GO-CHEAT; POGO.COM So you like to play games, do you? Well, of the many sites where you can face off against a live foe in Quake II or Jedi Knight, two stand out. MSN's Gaming Zone has 100 free or free-trial games that range from checkers and cards to wilder offerings like Magic & Mayhem and Monster Truck Madness. Heat.net has 115 online multiplayer games, including Warcraft II and Diablo. You do have to download game software, so during setup be sure to select only the games you want. While you're at it, check out GoCheat for workarounds to game rules. What's that you say? You like to play by the rules? Well, hard-core gamers know that cheat codes can help them gain unlimited lives, sneak around the interface the back way, and generally lord it over wimpy weekend gamers. GoCheat offers codes for PCs and game consoles and catalogs them in easy-to-navigate lists. For tamer games, Pogo.com offers card and board games, bingo, and casino games.
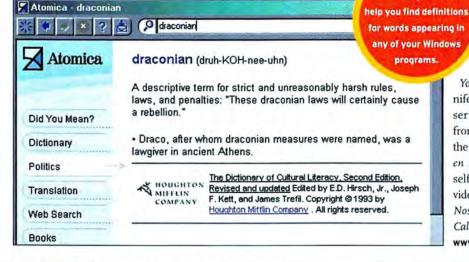**www.games.msn.com; www.heat.net; www.gocheat.com; www.pogo.com**

@ the Movies

ATOMFILMS; THE SYNC Got a couple of hours to spare—or just a couple of minutes? Take in a movie from the comfort of your office chair at AtomFilms or The Sync. Both showcase excellent shorts in RealVideo and Windows Media formats. AtomFilms boasts the winner of the 2000 Oscar for best live-action short film (*My Mother Dreams the Satan's Disciples in New York*), short works with cameos by Jennifer Aniston and George Clooney, and a series of stop-motion animation shorts from Aardman Studios (the team behind the Wallace and Gromit films and *Chicken Run*). The Sync's offerings are more self-consciously edgy, though it also provides full-length, must-see classics such as *Nosferatu* (1922), *The Cabinet of Doctor Caligari* (1919), and *Reefer Madness* (1936).
www.atomfilms.com; www.thesync.com ▶

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Van Gogh's Van Goghs

The Bedroom

ART MUSEUM'S amazing 3D exhibit of van Gogh's works lets you "enter" two of his paintings.

The Puzzlers

YAHOO GAMES: CROSSWORDS; PUZZLE-DEPOT Okay, so you made short work of crossword puzzle editor Will Shortz's efforts in the *New York Times* during your coffee break. Now where will you turn for your puzzle challenges? Yahoo Games features daily stumpers that are archived for two weeks. And no pencil required. Oh, and if you need a helpful clue, Puzzle-Depot's word pattern–matching tool can help you fill in the blanks. For those lazier days, the site also provides free online crosswords that aren't that tough to crack. **play.yahoo.com/games/login?game= Crossword; www.puzzledepot.com**

Ears to You

ARTMUSEUM.NET If the Net had been around a century ago, van Gogh might have made a fortune on EBay. Vince died in utter poverty, but you can still enrich yourself with this amazing virtual tour of his works, which actually lets you "walk into" 3D representations of two of his paintings. Presented by Intel and the Van Gogh Museum in Amsterdam, the tour includes a 3D stroll through the museum accompanied by an audio narrative and a spectacular zoom-in function that lets you see brushstrokes almost as clearly as if you were a nose-length from the actual painting. The program is 12MB and is best accessed using a broadband connection, since your computer has to connect with a server in Reykjavik, Iceland (don't ask), to produce the art. But even if you don't have a speedy connection, you can still

visit the site's other great exhibits on Andy Warhol (parental discretion advised), and the Whitney Museum's fascinating retrospective of twentieth-century art and culture. **www.artmuseum.net**

Junior Sings the Blues

JUNIOR'S JUKE JOINT A compendium of all things Delta (Mississippi, that is)

5 Best Free **Music** Listening Sites

1 **www.echo.com:** Interactive radio station lets you choose the music genres and vote on the playlist.

2 **www.iuma.com:** Unsigned acts in spades...and in MP3 format.

3 **www.live365.com:** Online broadcaster lets you search for acts through thousands of stations, or create your own station.

4 **www.mp3.com:** Eclectic mix of downloadable and broadcast tunes.

5 **www.sonicnet.com:** Hip news and reviews, downloadable music, radio broadcasting, and videos on demand.

and all things blues, this interesting site, run by a self-described redneck anthropologist, combs the Deep South to bring the fading culture of southern juke joints to the masses. Part VH1, part travelogue, and part Martha Stewart, Junior's Juke Joint attempts to preserve a lively and colorful roadhouse music tradition that is becoming nearly as rare as A&Ws and Dairy Queens. The 50-something "Junior" travels the American South in his 1983 Chrysler "bluesmobile" to bring you living history and colorful yarns about the people and cultures of the region.

The site includes short stories, a write-up about each juke joint that Junior has visited, and tips for pulling off a successful pig roast (hint: It's best done while under the influence of moonshine). No sign yet, however, of the promised recipe for barbecued 'coon. **www.deltablues.net**

Watson on the Web

CRIME SCENE This site should come with an addiction warning because you're bound to return to it again and again—like a criminal to the scene of the crime. Satisfying the armchair detective in you, Crime Scene lets you follow the investigators of Yoknapatawpha County (the fictional setting of William Faulkner's books) as they troll through the unseemly underbelly of society to solve the mystery behind grisly murder cases. You can either participate as an observer for free—which means you can examine evidence such as crime scene photos, surveillance videos, interrogation transcripts and tapes, and lab reports—or for $5, you can sign up as a case detective and ask the investigators questions about niggling details or offer them your own ingenious theories about the crime. The site notifies you by e-mail when new evidence is available for viewing. Cases can string along for weeks, but it's fascinating to watch the evidence unfold. **www.crimescene.com**

Matt Lake is a freelance writer living in Pennsylvania. When not writing for PC World *he operates RegSelect (www.regselect. com), a shopping-comparison site for people looking to register Net domains.* ■

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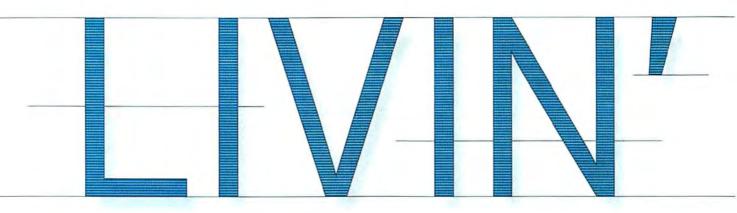
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BY STAN MIASTKOWSKI

THE OLD SIDESHOW BARKER'S patter about "amazing, colossal, and stupendous" attractions could well apply to the latest crop of hard disk drives. In our last roundup of drives, in October 1999, 20GB models were among the biggest. Now 20GB drives are middle-of-the-road and often appear in low-cost PCs.

This time around, we review what Ed Sullivan might have called *really* big" drives. Yes, if your data-storage needs and your budget are modest, a good selection of drives is available in

20 GB

40 GB

46 GB

LARGE

the vicinity of 20GB. At the other extreme, some drives hover in the 60GB-to-80GB range. But the sweet spot where you get ample capacity for a reasonable price now lies around 40GB. We tested ten flagship drives from four major manufacturers: IBM, Maxtor, Seagate, and Western Digital. We evaluated IBM's 20.5GB Deskstar 40GV, as well as the company's 46.1GB and 75.1GB Deskstar 75GXP models. Maxtor provided the 40.9GB DiamondMax VL 40, the 60.5GB DiamondMax Plus 60, and the 81GB DiamondMax 80. Seagate sent two 40GB drives—the U Series 5 and the Barracuda ATA III. And finally, Western Digital supplied the 20GB WD Protégé and the 40GB WD Caviar.

Quantum, the other big name in consumer hard drives, is ▶

missing from our list because its new drive, the Fireball Plus AS, was not ready in time for this article. You can find a review online, however, at www.pcworld.com/reviews/fireball. While working on our review, we also learned that Maxtor has purchased Quantum's hard drive operations. The two companies are working out a merger, but for now, each maintains its own line of drives. Other manufacturers, including Fujitsu, Hitachi, Samsung, and Toshiba, are omitted because they primarily sell bare drives to original equipment manufacturers such as PC vendors, not directly to consumers.

SQUEEZING IN DATA

IN MOST CASES, today's drives offer twice the capacity of last year's models for about the same price. On a per-gigabyte basis, prices for this year's crop range from $3.83 to $7.06, with half the drives falling in the range from $4 to $5. If you're looking to make a modest investment, a 20GB drive is a great choice—with an average street price of just over $100; 40GB drives, depending on rotational speed, run from $145 to $195. If you want the maximum storage space, you'll need to lay down a few more bucks: Figure on spending about $300 to $500 for drives with capacities between 60GB and 80GB.

You can get more storage for the same price every time you upgrade, thanks to the continuing increase in *areal density*—the amount of data that can be stored on a single, two-sided disk platter. To make an even bigger drive, manufacturers stack up multiple platters. Most vendors stop at four platters per drive, but IBM manages to squeeze a fifth platter into a standard 1-inch-high case. A couple of years ago, a platter could store only 5GB of data. That figure jumped to 10GB around January 2000, and 20GB platters were becoming standard by the fall of last year. (All the drives here pack approximately 20GB per platter, with the exception of IBM's 15GB-per-platter Deskstar 75GXP drives.) At press time, we learned that Western Digital had upped the areal density in its new WD Caviar drive to 30GB per platter.

Greater areal density allows manufacturers to reduce the number of components in drives of a given capacity, which lowers their cost. Packing data closer to-

Best Buys

MAXTOR'S SPEEDY, user-friendly drives win as Best Buys in both our 7200-rpm and 5400-rpm categories. The 7200-rpm, 60.5GB DiamondMax Plus 60 ($300) was the fastest drive in our tests. Maxtor's 40.9GB DiamondMax VL 40 ($180) beat nearly every drive in the 5200-rpm category (excluding its cousin, the DiamondMax 80) and also outperformed two of the 7200-rpm competitors. Each hard drive comes with a very good upgrade kit and offers ample storage at a moderate cost per gigabyte.

gether also speeds up performance, since read/write heads don't have to travel as far to find information. A year ago, a 20GB hard drive had to consist of two platters and two pairs of read/write heads (one head for each side of a platter). But 20GB drives using today's technology have just one platter and a single pair of heads.

Some industry analysts expect areal density to reach 40GB per platter toward the end of this summer. If that happens, we could see drives with capacities of 200GB by the end of the year. Those same pundits expect areal density to double again, to 80GB per platter, sometime in 2002. But hard drive makers say that 80GB per platter is close to the current limit, and that squeezing any more data onto one disk will require the integration of new and more-expensive technologies.

DELIVERING DATA FASTER

BEYOND THE PUSH to expand storage capacity, there's a genuine need to deliver the data faster, triggered by gigahertz-plus CPUs and data-hungry operations such as video processing. Several factors determine how quickly a drive can read or write data. One is rotational speed: Five of the drives we review spin their disks at 5400 revolutions per minute, the remaining five at 7200 rpm. A faster rotational speed lets the read/write heads cover more of the disk and read or write more data in the same amount of time. The 7200-rpm

drives we looked at usually outperformed the 5400-rpm units, but not always. In our time tests, the fastest 5400-rpm drives, like Maxtor's DiamondMax 80 and DiamondMax VL 40, outran the slower 7200-rpm models, such as Seagate's Barracuda ATA III. In addition to increasing the rotational speed, manufacturers can squeeze out better performance by fine-tuning the design of read/write heads and the algorithms that control them. It seems more than coincidental that the fastest 5400-rpm drives here come from the same vendor that produced the top-performing 7200-rpm model.

Performance also varies with the size of a hard drive's internal cache—memory used to store recently accessed data temporarily and to front-load adjacent data that an application may request next. In all cases, drives with a 2048KB cache outperformed those with only a 512KB cache.

Then there is the matter of how quickly a drive communicates with the rest of the system. Most PCs sitting on desks today use the Ultra DMA/66 (also known as Ultra ATA/66) flavor of the IDE interface, which can deliver data in bursts of up to 66MB per second. (In regular use, drives transfer data at well below the burst rate.) The newest PCs generally use the Ultra DMA/100 interface, with a maximum burst rate of 100 MBps. Industry analysts expect Ultra DMA/100 to remain the standard interface until the end of this year. Early in 2002, though, the next interface, Ultra DMA/133, is slated to appear.

All the drives reviewed here use Ultra DMA/100, and we tested them on a PC equipped with a matching interface, courtesy of an Ultra DMA/100 add-in card from Promise Technologies. We then retested the fastest 7200-rpm and 5400-rpm drives with a Promise Ultra DMA/66 card. Our informal tests of maximum burst rate showed that the drives performed a bit slower with the Ultra DMA/66 interface, but we found no significant difference in the PC World Test Center's real-world, application-based performance tests. That's not surprising. For years, the capacity of the Ultra DMA interface has outpaced the sustained transfer rate of a single hard drive. But the excess capacity present in the interface will be available to accommodate faster drives later on.

INTERFACE OF THE FUTURE

INTERFACE SPEED LIMITS will jump even more with the transition to Serial ATA, which is expected to debut late this year or early in 2002 and should raise the top transfer limit to 150 MBps. Next, the limit is expected to double to 300 MBps and eventually redouble to 600 MBps. In addition to being faster, Serial ATA looks

different from current IDE parallel connections. Instead of using 80-wire, flat-ribbon cables, it has a round cable about the size of your PC's mouse cord, with an eight-pin connector on each end. The smaller cables take up less space and allow

> ## The sweet spot where you get ample capacity for a reasonable price lies around 40GB.

cooling air to flow more freely through a PC's interior, theoretically permitting smaller, more innovative system designs.

When Serial ATA arrives, you can say good-bye to drive jumpers—those connectors that fit onto one of several sets of pins and tell the drive whether it should act as the main, or *master*, drive on a shared ribbon cable, or whether it should serve as the auxiliary, or *slave*, drive. With

Serial ATA's new *star topology*, individual cables will radiate from a central interface on the motherboard, each connecting to only a single, independent drive.

IS IT TIME TO UPGRADE?

BETTER, FASTER technology is always around the corner, so if you're considering upgrading now, you'll need to weigh some other factors—starting with how full your current drive is. If you constantly prune unneeded data and still have a drive that's more than 75 percent full, it's probably time for a step up. Even if you don't foresee filling that remaining space with permanent files, you'll need some wiggle room to accommodate the Windows swap file and other temporary files that your applications create.

Just how big a drive you should choose depends on what you do with your PC. If you work mainly with garden-variety applications such as a word processor or a spreadsheet program, you are unlikely to create large files that consume a lot of hard drive space, and you could probably opt for an inexpensive drive such as the 20.5GB version of IBM's Deskstar 40GV. But if you edit and save graphics, ▶

HARD DRIVE FEATURES COMPARISON

7200-RPM DRIVE	Street price (12/4/00)	Disk capacity	Cost per GB	Cache size	Performance [1]	Quality of upgrade kit [2]	Parts/labor warranty (years)	Support hours: weekday/Saturday/Sunday	Toll-free support	Tech support fee
IBM Deskstar 75GXP 888/426-5214 www.storage.ibm.com/deskstar	$240	46.1GB	$5.21	2048KB	Very good	Good	3/3	24/24/24	●	○
IBM Deskstar 75GXP 888/426-5214 www.storage.ibm.com/deskstar	$530	75.1GB	$7.06	2048KB	Very good	Good	3/3	24/24/24	●	○
Maxtor DiamondMax Plus 60 800/262-9867 www.maxtor.com	$300	60.5GB	$4.96	2048KB	Excellent	Very good	3/3	12/0/0	●	○
Seagate Barracuda ATA III 877/271-3285 www.seagate.com	$180	40GB	$4.50	2048KB	Good	Excellent	3/3	10/0/0	○[3]	○
Western Digital WD Caviar 800/275-4932 www.wdc.com	$169	40GB	$4.23	2048KB	Very good	Poor	3/3	9/8/0	●	○
5400-RPM DRIVE										
IBM Deskstar 40GV 888/426-5214 www.storage.ibm.com/deskstar	$99	20.5GB	$4.83	512KB	Fair	Good	3/3	24/24/24	●	○
Maxtor DiamondMax 80 800/262-9867 www.maxtor.com	$310	81GB	$3.83	2048KB	Very good	Very good	3/3	12/0/0	●	○
Maxtor DiamondMax VL 40 800/262-9867 www.maxtor.com	$180	40.9GB	$4.40	2048KB	Very good	Very good	3/3	12/0/0	●	○
Seagate U Series 5 877/271-3285 www.seagate.com	$145	40GB	$3.63	512KB	Poor	Excellent	3/3	10/0/0	○[3]	○
Western Digital WD Protégé 800/275-4932 www.wdc.com	$119	20GB	$5.95	2048KB	Good	Poor	1/1	9/8/0	●	●[4]

Best Buy   ● Yes ○ No   [1] See performance chart on page 114 for details.   [3] Only automated phone support is toll-free.
[2] Based on included hardware, software, and documentation.   [4] First 30 days free. Lifetime support available for an additional $15.

audio, or video files, your storage space can disappear quickly. For example, video from a digital camcorder can require up to 3.6MB per second. A 1-hour movie fills about 13GB of storage, and you'll need plenty of extra space for temporary files created during the editing process.

DOES SPEED MATTER?

IN ADDITION to the issue of available storage, there's the question of speed. The 5400-rpm hard drives are value leaders, but 7200-rpm drives generally deliver better performance. Here, as with capacity, your speed needs depend on the type of applications you run.

To evaluate a drive's performance, the PC World Test Center timed how long each drive took to perform common tasks (for details, see the test report on page 114). To begin, we copied 166MB of data, first as a collection of individual files and folders, and then as a single zipped file. Next we ran automated scripts that performed disk-intensive operations in Adobe Photoshop 5.5, Microsoft Access 97, and Corel Photo-Paint 8. Finally, we ran a find file operation that required searching through files on the entire hard drive for a string of text.

The range of scores varied from test to test. All drives performed quite similarly on Access 97 and Photoshop 5.5, for instance (differing by 2 percent and 7 percent, respectively). But we saw much bigger differences on the two file copy tests (about 170 percent and 250 percent, respectively) and on the find file test, where the speediest drive was almost three times faster than the slowest. So if you routinely move large amounts of data to and from your hard drive (as in video editing), the speed differences will matter. If you're a digital video professional (or a dedicated amateur), one of the largest, fastest drives on this list, such as Maxtor's Diamond-Max Plus 60 or IBM's 75.1GB Deskstar 75GXP, is worth the cost.

The fastest drives on the market today use SCSI interfaces: 10,000-rpm SCSI drives are common, and Seagate pro- ▶

Managing
Your Hard Drive

SO YOU'VE LAID DOWN the bucks for that brand-new giant hard drive. You're the ruler of a vast multigigabyte kingdom, but how will you govern it? Do you want one seemingly endless expanse of disk? Or should you divide it into smaller, logical drives, known in nerdspeak as *partitions*?

Each partition has its own drive letter (C:, D:, and so forth), and multiple drives can be a handy way to organize files. One strategy is to divide a disk into three partitions: one for the operating system, one for applications, and a third for data. This arrangement imposes some order and can save your bacon if a major operating system crash forces you to reformat the drive. You can safely wipe the OS partition without touching your data.

In the old days, altering partitions was a major, painful operation. Microsoft's Fdisk—which comes with Windows and used to be your only choice—requires wiping the disk clean in order to reallocate partitions. Today, two commercial utilities—PowerQuest's $70 PartitionMagic 6 (www.powerquest.com) and V-Communications' $30 Partition Commander 6 (www.v-com.com)—allow you to create, delete, or resize drive partitions without harming your data; both are solid products that *PC World* has recommended. (Of course, you should always play it safe and back up critical data before making a significant change to a hard drive.) You'll find our reviews of these two products online at www.pcworld.com/reviews/partition_magic and www.pcworld.com/reviews/partition_commander.

Partitioning becomes necessary if you use multiple operating systems, because each OS must reside in its own partition. And you may have

to format those partitions in different ways. Although Windows NT and Windows 2000 can use the FAT and FAT32 file allocation systems, they perform better in partitions using their native NTFS (NT File System) formatting. And if you install Linux in one of your partitions, you'll have to use its own special file system, known as Ext32. (Both PartitionMagic 6 and Partition Commander 6 include utilities that let you choose which of your operating systems to start up from.)
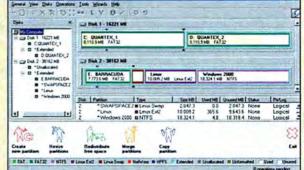
PACKING UP YOUR DATA

THE MORE YOU USE hard drives, the more fragmented they become, with bits of files scattered across the disk surfaces. Your drive's performance can slow down because the read/write heads have to travel all over the disk to pick up the requested data.

All versions of Windows come with basic disk-checking and defragmenting software, which you should set to run at least once a week using Windows' Task Scheduler. Commercial packages can do the job even faster and more efficiently. Advanced file check/repair programs and disk defragmenters are included in comprehensive utility packages such as McAfee Office ($69, www.mcafee-at-home.com), Norton SystemWorks ($60, www.symantec.com), and Ontrack SystemSuite ($60, www.ontrack.com). Another worthwhile option is Executive Software's Diskeeper ($50, www.diskeeper.com), a powerful stand-alone defragmenting utility.

—Stan Miastkowski

PARTITIONMAGIC 6 lets you create, delete, resize, or split partitions without losing data from your hard drive.

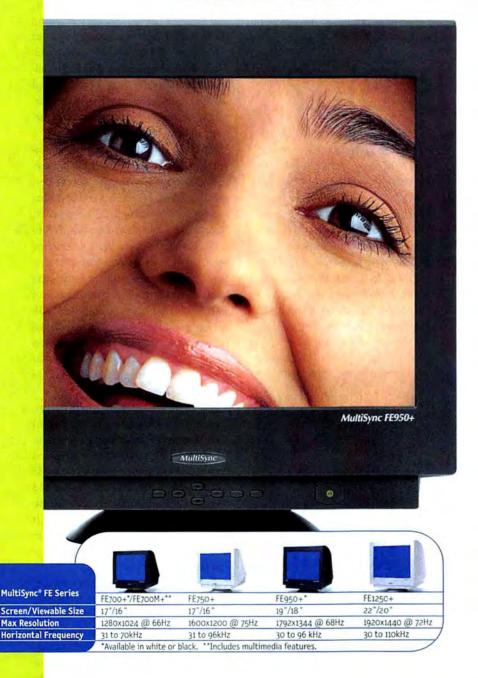duces a 15,000-rpm model. Such ultrafast drives are designed for use in busy, multi-user environments—such as heavily trafficked servers—and they cost about twice as much as current IDE drives of similar capacity. For both of those reasons, this review does not cover SCSI drives.

DRIVE RELIABILITY

HARD DRIVE FAILURES were common about a decade ago, but reliability has improved considerably since then. Most of today's drives are rated for many years of service, and in most cases the drives that do fail were damaged from a bump or a fall during shipping. Manufacturers have been working hard to protect drives from such hazards with shock-resistant designs and special packaging. Seagate's SeaShell, for example, is a plastic shell designed to offer extra bump-and-drop protection for a drive after you remove it from the foam packaging in its shipping box and before you install it in your PC.
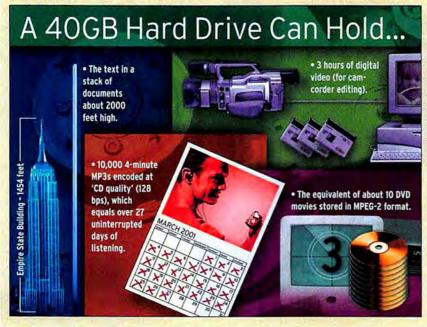
But don't let the improved reliability of today's hard drives lull you into complacency about backing up your data. Drives still fail, and accidents do happen. To learn all about backup devices, media, and strategies, see "Hassle-Free Backups" in our October 2000 issue (www.pcworld. com/oct2000/backup).

INSIDE THE BOX

IF YOU DECIDE to spring for a new hard drive, you'll probably have the pleasure of installing it yourself. Though the project isn't especially difficult, it does require patience, some tools, and intermediate-level familiarity with the innards of your computer. For step-by-step instructions, see our July 2000 *Upgrade Guide* (www. pcworld.com/july2000/upgrade).
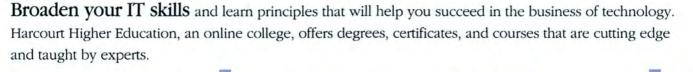
The manufacturers represented in our roundup package their drives in upgrade kits that include step-by-step installation instructions, mounting brackets, a cable, and software that automates formatting the new drive and transferring data from the old one. We applaud one new trend: Every drive we tested this year had its all-important jumper settings clearly marked on the unit. And Seagate goes a step further, printing basic installation instructions right on the drive.

All the upgrade kits we examined provided good to excellent setup software, though Maxtor and Seagate had the best setup utilities. Maxtor's MaxBlast Plus runs from a bootable DOS floppy disk; Seagate's DiscWizard runs within Windows. Both utilities analyze your existing setup before you physically install the new hard drive, and they print out installation instructions based on the configuration of your PC (for example, the number of IDE devices you have). After you've installed the new drive, the software partitions and formats it when you restart your PC. (For more on partitioning, see "Managing Your Hard Drive," page 110.)

Seagate and IBM use a customized version of Ontrack's (www.ontrack.com) Disk Manager DiskGo. The utility runs in Windows before you install the drive, and it provides both graphics and text to guide you through setup. Like the Maxtor and Seagate utilities, DiskGo finishes the job after you hook up the drive and restart your computer. DiskGo is effective, but Maxtor's and Seagate's setup utilities are still slightly easier to use.

Western Digital's installation software, dubbed EZ-Install, is adequate, but it's not as helpful as the utilities from the other drive makers. For example, EZ-Install doesn't perform any preinstallation analysis of your system, and it doesn't provide customized instructions. ►

How Big Is Big?

KILOBYTES, MEGABYTES, gigabytes...it's easy to get lost in the Greek of hard drive measurements. Here's a way you can translate huge numbers like 40GB into storage capacities you can visualize, to help you determine whether you could ever fill up one of today's monster hard drives.

First, consider the footprint of all your combined software. Figure on setting aside about half a gigabyte for an operating system: Windows Millennium Edition requires a minimum of 480MB, Windows 2000 demands at least 650MB, and a commercial Linux distribution, such as Red Hat Linux 7, takes up at least 500MB. Next, factor in your applications. The complete version of the Microsoft Office 2000 business suite, for example, consumes up to 626MB (and installing any software, be it an operating system or another application, requires room for temporary files that are created during the process). Even so, a couple of gigabytes should accommodate an average person's software complement. The rest of your disk space will be used for storing data such as documents, spreadsheets, images, video clips, and audio files. To judge how much room you'll need for your data files, consider what fits on a 40GB hard drive.

—Seán Captain

A 40GB Hard Drive Can Hold...

- The text in a stack of documents about 2000 feet high.

- 3 hours of digital video (for camcorder editing).

- 10,000 4-minute MP3s encoded at 'CD quality' (128 bps), which equals over 27 uninterrupted days of listening.

- The equivalent of about 10 DVD movies stored in MPEG-2 format.

Empire State Building – 1454 feet

MARCH 2001

HARD DRIVES

Maxtor's Drives Prove Fastest

The 7200-rpm DiamondMax Plus 60 and 5400-rpm DiamondMax 80 are first overall in each class.

HARD DRIVE	Disk capacity (GB)	Copy files and folders/Copy large file (seconds)	Photoshop/Access 97/Corel Photo-Paint/File find (minutes:seconds)	Overall performance
7200-rpm				
IBM Deskstar 75GXP	46.1	31 / 30	5:01 / 9:33 / 9:01 / 3:29	Very good
IBM Deskstar 75GXP	75.1	34 / 35	5:01 / 9:33 / 9:01 / 3:33	Very good
Maxtor DiamondMax Plus 60*	60.5	22 / 21	5:15 / 9:34 / 9:04 / 3:27	Excellent
Seagate Barracuda ATA III	40	31 / 31	5:08 / 9:34 / 9:05 / 5:43	Good
Western Digital WD Caviar	40	22 / 17	5:05 / 9:34 / 8:55 / 5:44	Very good
5400-rpm				
IBM Deskstar 40GV	20.5	59 / 58	5:13 / 9:42 / 10:35 / 5:12	Poor
Maxtor DiamondMax 80	81	26 / 22	5:19 / 9:39 / 9:26 / 4:02	Very good
Maxtor DiamondMax VL 40*	40.9	26 / 22	5:21 / 9:40 / 9:27 / 4:11	Very good
Seagate U Series 5	40	52 / 57	5:22 / 9:41 / 10:24 / 10:05	Poor
Western Digital WD Protégé	20	26 / 19	5:14 / 9:39 / 9:16 / 7:52	Good

*Best Buy

◄ Faster   ◄ Faster

HOW WE TEST We ran all tests on a Pentium III-450 PC with Windows 98 SE. For the file copy test, we copied approximately 166MB of files (30 folders with 146 documents in different file formats) from one folder to another on the test drive. We then combined the files into a single 166MB zipped file and copied it in a similar manner. We also ran automated scripts for disk-intensive operations in three applications: Adobe Photoshop 5.5, Microsoft Access 97, and Corel Photo-Paint 8 (the Access 97 and Photo-Paint 8 tests are components of our PC WorldBench 2000 test suite). Finally, we performed a file search for a specific text string that required searching the entire drive. For all tests, shorter times are better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

One caveat: If your computer was made before January 1998, its BIOS probably doesn't directly support drives larger than 8.4GB. Fortunately, the software packages with all the hard drives we tested include a driver that provides a workaround. Nevertheless, don't install this driver if you don't need it. The driver writes proprietary data to your Master Book Record and may prevent you from installing some other drive-management software, such as parti-

tioning utilities. It may also prevent drive-imaging utilities from working correctly.

In addition to software, we also evaluated the documentation that came with each hard drive. Western Digital provides a very thorough printed installation manual, and Maxtor includes a handy foldout poster. Seagate provides both an installation guide and a manual to complement the basic instructions printed on the drive, and 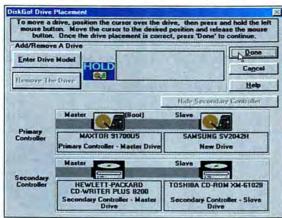IBM includes a richly illustrated and comprehensive setup manual as well as complete technical reference documentation (although most users likely won't need the detailed information it contains).

IF YOU GET STUCK

ALL THE HARD DRIVE makers have come a long way in providing Web-based support. But just as with installation software, Maxtor and Seagate lead the competition with gen-

erous online offerings, including step-by-step troubleshooting guides, detailed answers to frequently asked questions, and advanced technical documents. Both also offer downloads of diagnostic software you can run if you suspect something is wrong with your new drive. Seagate adds online troubleshooting and automated phone- and fax-based support.

If you really get stuck, you can always pick up the phone and call tech support. All the companies except Seagate offer toll-free phone assistance from a live person. Seagate's support calls are on your dime (its automated phone support is toll-free). With only one of these drives do you pay a fee for tech support: Western Digital provides just 30 days of free support for its $119 WD Protégé drive, but you can purchase lifetime coverage for an additional $15. Hours and days for tech support vary (see our features chart, page 109).

We gauged each company's tech support with two calls. First we asked what IDE cable we should install the drive on and how we should set the jumper. Then we purposely failed to fully insert the ▶

STEP-BY-STEP: DiskGo analyzes your PC's current configuration and creates customized installation instructions.

IDE cable and asked why the drive was not functioning. We were pleased to find that, without exception, we got through quickly and received accurate answers.

MAKING CHOICES

HOW DID WE CHOOSE our Best Buys? The PC World Test Center's extensive evaluations did detect some differences in drive performance. We also compared the hard drives' price, upgrade-kit quality, and tech support policies. There isn't a drive here that we wouldn't recommend. But for overall value, Maxtor's DiamondMax Plus 60 ($300) wins our Best Buy among 7200-rpm drives, offering excellent performance and a good user experience for a fair price. Maxtor wins again in the 5400-rpm drive category with its 40.9GB DiamondMax VL 40 ($180). Both drives also offer a reasonable cost per gigabyte.

But it would be hard to go wrong with any of these drives. While our test results vary, the drives are more alike than different: All use similar components and the same basic technologies, which have proved to be very reliable. As IDC senior analyst David Reinsel sums it up: "Everyone is building a good-quality drive."

Stan Miastkowski is a contributing editor and Seán Captain is an associate reviews editor for PC World. ∎

Expanding in a Small Space:
Upgrading Your Notebook Drive

PLENTY OF US DO some of our computing, or even all of it, on a notebook PC. And since our notebooks' drives are generally smaller than their desktop counterparts, they can fill up very quickly. Fortunately, do-it-yourself hard drive upgrades are now quite easy.

Unlike desktop hard drive vendors, notebook drive makers usually don't offer upgrade kits. In fact, the major vendors—Fujitsu, Hitachi, IBM, and Toshiba—sell very few drives directly to consumers. Instead, they supply them to other companies, which package kits for consumers. And while having a complete kit when upgrading a desktop is convenient, with a notebook it's essential.

The main challenge involves transferring data from the old drive to the new one. With a desktop, you can always leave your old drive attached (at least temporarily) to one of the system's IDE connections and simply use Windows Explorer to drag data files to the new drive. Or you can use a utility like PowerQuest's DriveCopy to make a perfect copy of your operating system, applications, and data. That's not true with notebooks, since they generally have only one hard drive bay and one IDE connection (although some models allow you to drop a second hard drive into a multipurpose expansion bay). Upgrade kits from vendors such as Apricorn, Kingston, and Simple Technology

APRICORN'S EZ-GIG upgrade kit for notebooks

solve the problem by using a PC Card to provide a second IDE connection.

I went through the surprisingly easy process using an IBM ThinkPad 600E notebook and an Apricorn (www.apricorn.com) Ez-Gig upgrade kit. Apricorn sent me a $446 kit containing the correct 12GB drive and the hardware and software I'd need.

STEP 1: TRANSFER DATA

FOLLOWING APRICORN'S written instructions, I first updated my notebook's BIOS (via a download from IBM's Web site) and got my old 6.5GB disk in shape by running Windows' Scandisk and Disk Defragmenter. Then I shut down the system, inserted the Ez-Gig PC Card, and attached it to the new drive via an included cable. Finally, I insert-

ed the Apricorn boot floppy and powered up the system. The software identified my source (old) drive and my destination (new) drive, and then asked if I'd like to begin the transfer process. Fifty minutes later, 2.5GB of data from my old drive was in the new one.
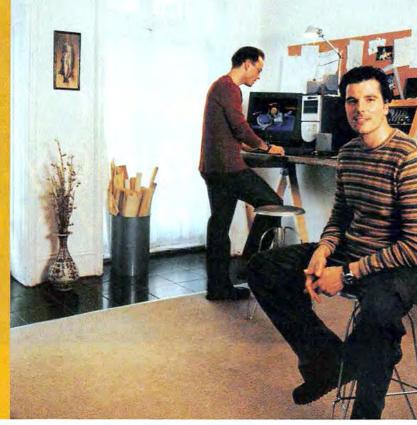
STEP 2: REPLACE THE DRIVE

NEXT IT WAS TIME for the physical transplant, which proved to be especially easy. My ThinkPad, like most newer notebook PCs, has an easy-to-access hard drive bay: I just removed one screw, popped off a plastic cover, and slid the old drive out (the IDE connector remained fixed inside the case). With older notebooks, you may have to open the entire unit to get at the drive. After snapping in the new drive, I powered up and saw my familiar OS, applications, and data. Nothing had changed, it seemed, except that now I had a new drive with almost twice the capacity of the old one. In fact, by incorporating my old drive, too, I netted almost three times the original storage space: Using the PC Card and cable from the transfer operation, along with an included plastic case to house my old drive, I gained an external hard drive.

All that extra storage will keep me content for a long time, I hope. Did I mention the notebook's stereo speakers and my burgeoning MP3 collection?

—Seán Captain

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- Internal 56K Capable⁶ FaxModem
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- Internal 56K Capable⁶ FaxModem
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- 4X AGP 32MB ATI Rage Mobility™-M4 3D® Video
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- 59WHr Li-Ion Battery ■ harman/kardon® Audio
- MS® Works Suite 2001 ■ MS® Windows® Me
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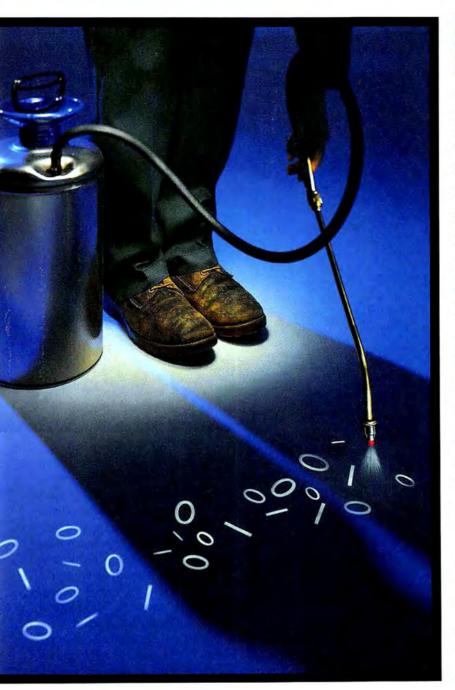
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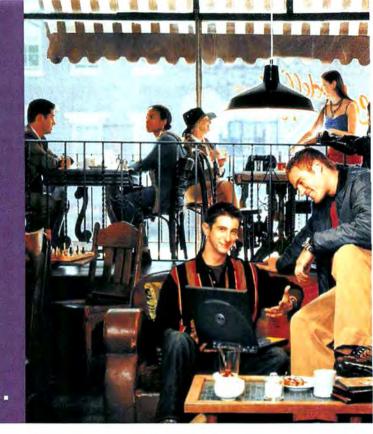Includes Windows Millennium Edition — the home version of the world's favorite software.
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BY STUART J. JOHNSTON

F OR KARL KASCA, it was the upgrade from hell. Kasca, an information researcher in Pasadena, California, thought installing a critical update to Windows 98 would solve a few annoying problems he'd experienced in Word and Outlook. Instead, bugs within the update caused countless new problems. For starters, during the installation process, the Office 2000 update began spitting out error messages. To get rid of them, Kasca followed the complex instructions in a Knowledge Base article, but he still couldn't open Word. Then after 3 hours on the phone with Microsoft tech support, Kasca finally got his PC working again. "By then we had mutual empathy like prisoners of war and their captors," he recalls.

Kasca still had to face repeated reinstallations of Office 2000, multiple rounds of editing Windows Registry settings, and endless reboots. But those efforts were just the beginning. (Don't get him ▶

PC PEST CONTROL

Exterminate your system's bugs with this essential toolkit.

started on the Outlook glitch.) "It took almost a day to get the problems sorted out, and even then things weren't working perfectly," says Kasca. "I'm the sole proprietor of my business, and any time I spend figuring out PC problems is time that I lose on work for clients."

THE BUG BLUES

KASCA'S EXPERIENCE, we're sad to say, is all too common. And we won't see an end to the bug problem anytime soon. For one thing, at *PC World* we continue to receive tons of complaints from you, day after day, about all kinds of computing snarls. (Keep those e-mail missives coming to bugs@pcworld.com.) It's clear to us that traditional bugs within programs—say, where your financial app makes wacky calculations—still happen. (See last month's *Bugs and Fixes*, www.pcworld.com/feb2001/bugs, for details about snafus in Microsoft Money 2001.)

You also have to factor in all the new things a PC is expected to do, along with the various devices we now hook up to it—a recipe for incompatibility headaches. Yet other problems are due to our being so tightly wired to the Web. Not only is our universe rampant with as many bad bugs as before, but the scope of the troubles is widening. Holes appear that can allow hackers to access your system remotely and run riot.

To find out why today's software is still so buggy, we talked to companies like Corel, Lotus, Microsoft, Network Associates, and Symantec. These companies feel, first of all, that the computing world is more complex than ever. They argue that they can't possibly predict every single hardware and software incompatibility or test how users will put their machines through their paces. In addition, some of them insist that problems happen partly because of consumers' lust for new and better features.

Software developers claim that the latest programming tools enable programmers to write considerably higher quality, cleaner code. And Microsoft feels that the buggy software situation is improving—

> **" I'm the sole proprietor of my business, and any time I spend** figuring out PC problems is time I lose on work for clients. "**

KARL KASCA, an information researcher based in Pasadena, California, upgraded his Office software—to his regret.

although Scott Culp, security program manager at Microsoft's Security Response Center, adds this caution: "You've got systems getting more and more complex at the same time that the tools and testing are getting better."

Certainly, today's programs provide many more features than before and allow us to do more stuff. For instance, most e-mail apps let you send a newsletter as an HTML page rather than as plain text. But do greater capabilities mean more bugs? Experts believe there are fewer bugs per line of code now than in the past. But there are many more lines of code, too, increasing the total number of bugs.

PAR FOR THE COURSE

AT THE OTHER END of the spectrum, some advocates for users believe we've become too complacent; we simply expect bugs to show up as a matter of course. According to Steve Gibson, security pundit and founder of Gibson Research, bugs should not exist in properly designed and tested software. "If the handle of your car came off, you'd be really upset, because [the defect is] inexcusable; but very similar, nonlethal things happen on your computer all the time, and you take it for granted," Gibson argues. "There's this responsibility put on the user [for problems] that aren't the user's fault."

At the technical level, Richard M. Smith, chief technology officer for the Denver-based Privacy Foundation, believes that many of the current problems users encounter have to do with drivers for USB devices—pieces of code that control devices like your scanner or DSL modem, for instance. These drivers usually come from the hardware manufacturer. "The quality control on many of these drivers is awful," Smith adds.

WITH THE EXPLOSIVE growth of the Internet, we report a lot of security flaws in *Bugs and Fixes* these days. Both Netscape Navigator and Internet Explorer are vulnerable to hackers eager to take advantage of every hole they can find.

How much should you worry about these new security bugs? Experts say it's important to keep your guard up. But they point out that most holes in browsers and e-mail products are theoretical weaknesses. In other words, most of them haven't been exploited by the bad guys by the time the flaws have been detected and patches for them released.

Steve Gibson blames the overheated software development schedule for a lot of the trouble with bugs. Ship dates are often based on arbitrary promises by the software company or on the business's need to pump up earnings in a given financial quarter. Such pressures, though, lead to mistakes by programmers who are just going too fast. But it doesn't have to be that way. "I contend perfection is absolutely achievable," says Gibson.

In the meantime, if you're having trouble with your operating system, your office suite, your browser, or any other applications you use, you'll find some practical solutions in these pages. At right, "Top Tips for Busting Bugs" lists ways to help keep your PC bug-free. On page 124, check out "Utilities to Keep Your System Humming." And on page 126, consult "Friends of the Infested" to discover some of the Web's best sources of useful advice about software and hardware bugs.

BUG-FREE FUTURE?

THE GLINT OF A long-term solution to our buggy world is visible in the distance. You've probably heard about application service providers (ASPs) and the development of Web-based software. With today's slew of services, you don't have to plonk down a few hundred bucks for a shrink-wrapped software package; instead, you have the option of going online to access an app for a monthly or yearly fee (or for free, in some cases). Right now, a bunch of Internet-based office suites, financial software, and project management programs are available. The idea is that we'll pay for software services just as we now

pay for phone service. (For a full discussion of ASPs and Web-based software, see "So Long Shrink-Wrap?" at www.pcworld.com/feb2001/shrink_wrap.)

Bugs can emerge in Web-based apps as well, but here's what happens: Instead of your having to download a fix, the ASP automatically updates the software on its servers. The downside? Apps continuously change outside your control. Plus, updates could introduce new bugs.

Web-based software has advantages, ▶

Top Tips for Busting Bugs

BUGS ARE DEVIOUS and relentless, but with a little foresight and some basic maintenance, you can keep infestations at bay.

BACK UP—AND RESTORE: Install a tape backup, Zip drive, or CD-RW drive—or dedicate a

BEFORE YOU INSTALL

second hard drive to back up your system. Practice restoring data; that way you'll learn the drill, and you'll know that the backup itself isn't corrupted.

DO THE HOMEWORK: You can find Internet discussions of virtually any piece of hardware or software that you plan to buy, as well as detailed commentaries on the problems they can cause. If your ISP provides direct access to Usenet

newsgroups, look under comp.* and alt.comp.*. If it doesn't, Deja.com (www.deja.com/usenet) is one excellent place to start looking for relevant sources of information. It offers access to more than 50 discussion groups.

HEED COMPANY WARNINGS: Sometimes computer companies and software publishers post information on their Web sites about bugs or incompatibilities (or as they like to call them, "known issues"). Visit company Web sites regularly to check for new drivers.

BE PREPARED: Don't just

hope for the best. Anticipate that a new program or device could cause problems. Make sure the maker or reseller offers a money-back guarantee. Have the appropriate tech-support phone numbers and e-mail addresses handy.

AVOID THE UPGRADE TREADMILL: Upgrading one program or system resource often necessitates upgrading something else. So if your system is working well with the old stuff and you don't need the features that differentiate the hot new version, play it safe and stick with the status quo.

UNINSTALL CAREFULLY: Dragging unwanted software to the Recycle Bin or deleting

AFTER YOU INSTALL

it in Windows Explorer leaves a lot of junk behind and fails to update the Registry files. Instead of taking this messy approach, run the program's own uninstaller; if it doesn't have one, use the Add/Remove program feature via Windows (select *Start•Settings•Control Panel•Add/Remove Programs*). If that procedure leaves your system out

of whack, call the software's manufacturer. And consider getting an uninstaller utility (consult "Utilities to Keep Your System Humming," page 124).

STAY INFORMED ON BUG FIXES: You paid good money for half-baked software, so check the company's Web site and other sources (see "Friends of the Infested," page 126) for new and improved versions. You might also want to wait a decent interval after a new patch comes out before installing it. Some patches introduce

almost as many bugs as they fix. Let other users be the guinea pigs.

COMPLAIN: Bad publicity has a way of straightening out a company's priorities fast. Contact the vendor immediately with complaints. You can also describe your PC problems in discussion groups on the Internet (see "Friends of the Infested")— you may even get help with a temporary workaround. And don't forget to tell us all about it (write to us at bugs@pcworld.com).

—Dan Littman

but not everyone views the arrangement optimistically. Richard M. Smith believes we will never be completely free of bugs. "Software is just too complicated [for companies] to get all the details right in every circumstance," he contends.

In any case, each vendor has a responsibility to fix bugs quickly and properly. And as far as we're concerned, the sorry state of software today reflects a continuing failure to meet that obligation. This means that for the immediate future our systems will remain susceptible to the kinds of problems that Karl Kasca endured. "We're able to play the programs in our Office suite like violins, but when they don't work, neither do we," says Kasca, "and when we get stuck in seemingly infinite loops, we despair."

Let's hope that someday soon we'll be playing more symphonies than dirges with our software. At present, however, the outlook remains rather bleak—and we don't plan on holding our breath while we wait for a rosier future to arrive.

Essential Fixes

IF YOU HAVEN'T HAD time in the past few months to deal with your PC's misbehavior, we've got you covered. Here's our PC Survival Guide, a collection of must-have fixes for operating systems, office suites, browsers, e-mail software, and other common applications.

OPERATING SYSTEMS

THE FOLKS at Microsoft are nothing if not consistent. No matter which Windows environment your PC has, you need some crucial fixes to keep your system running smoothly.

WINDOWS 98 The original Windows 98 is a fairly stable system, though it has minor problems with certain Plug and Play devices. To download Service Pack 1, which fixes these and other problems, go to windowsupdate.com, click *Product Updates,* and scroll down and select *Windows 98 Customer Service Pack.* Or go to www.microsoft.com/windows98/downloads. If you have Windows 98 Second Edition installed on your system, you don't need to get the Service Pack. SE includes the Service Pack as part of its release. That said, SE did carry its own small set of snafus, such as shutdown problems with networked drives on computers. For Microsoft's SE fixes, go to windowsupdate.com, click ▶

Utilities to Keep Your System Humming

BUGS CAN sneak up on you with little or no warning, so you need something that will watch your back. A handful of utility programs fit the bill.

BEHIND THE SCENES, Network Associates' $70 McAfee Office 3 and Symantec's $60 Norton SystemWorks 2001 install dozens of utilities that lock out bad bits on your hard disk, prevent applications from confusing your Registry, help banish unwanted software, and safely stash backups of deleted files in case you need them later on.

McAfee Office includes a bunch of different programs: Crash Protector helps prevent crashes and restarts a crashed application without wiping its data from memory; DiskMinder diagnoses and repairs disk problems; and Trash Guard lets you retrieve files that you wish you hadn't deleted so hastily.

Norton SystemWorks 2001 is equally comprehensive. Its Speed Disk reorganizes data on your hard drive to speed access; Disk Doctor examines your hard drive when you notice trouble; and System Doctor runs in the background to identify emerging problems. Registry Tracker retains information for restoring your PC to an earlier state; and UnErase lets you squirrel away deleted files for grabbing later.

Our recommendation? Both SystemWorks 2001 and McAfee Office take care of the most important tasks, but Norton's interface is generally better organized and easier to navigate, making it a bit less daunting for new users.

ONE STEP BACK

WHEN YOU SURF the Web or try out new software, it's handy to have a utility that can roll your system back to the condition it was in before any troublemaker showed up. Symantec sells its Clean-Sweep uninstaller for $40 (also included in System-Works 2001); Network Associates packs UnInstaller 6 in its $69 McAfee Office and sells it separately for $19. Roxio's $50 GoBack lets you return your PC's hard drive to a previous state if something goes wrong. GoBack works transparently in the background, keeping a log of every move that alters the hard drive. And by allowing you to restore your PC to a previous state, it lets you fix your system without knowing what the problem is—a solution that's sometimes a lot easier than going through the uninstall process.

—Dan Littman

WHERE TO BUY

• **McAfee Office,** Network Associates, www.mcafee.com, 972/308-9960
• **GoBack,** Roxio, www.goback.com, 408/259-7694
• **Norton SystemWorks 2001,** Symantec, www.symantec.com, 800/497-6180
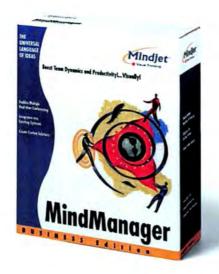
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Product Updates, and then select the patches available for Windows 98 SE.

WINDOWS ME If you upgraded to Windows Me—depending on your PC's configuration—the journey may have been rocky. Early adopters reported all kinds of frustrations with hardware incompatibilities, faulty modem connections, and Internet Explorer troubles. Microsoft has posted suggested solutions to a broad range of problems. Visit www.microsoft.com/windowsme/support, and click Solution Center. You can choose from a long list of help areas broken down by categories like printing, hardware, networking, and display. (For more details about the litany of problems with the new OS, see last month's news story "Life With Me: First 100 Days," at www.pcworld.com/feb2001/me.)

WINDOWS 2000 Users generally agree that Windows 2000 is far more stable and secure than other versions of Windows, but it's also very complicated to install and maintain. Windows 2000 Service Pack 1 fixes more than 250 minor bugs identified in the original February 2000 release. To obtain the download, go to www.microsoft.com/Windows2000/downloads/recommended/sp1/default.asp. Some bugs may not apply to your version of the operating system. To find out, visit support.microsoft.com/support/kb/articles/Q259/5/24.asp.

Even if you don't install SP1, you'll want the following security patch to ensure that you're surfing safely. The patch will prevent a malicious Web site operator from unleashing damaging code on your PC. Get it at www.microsoft.com/technet/security/bulletin/MS00-085.asp.

Every two or three months since Windows 2000 shipped, Microsoft has released updates that help popular games or other programs run under the operating system. So if you want to make sure your favorite apps work under Windows 2000, check out the latest list of programs Microsoft has available at www.microsoft.com/

Windows2000/downloads/deployment/appcompat/default.asp.

WINDOWS NT 4.0 Microsoft corrected more than 600 separate bugs on this slab of code—including a multitude of security glitches along with dual-booting and password problems—with six service packs. The latest version, Service

Pack 6a, accumulates all the bug fixes from previous service packs. You can get the download at www.microsoft.com/ntserver/nts/downloads/recommended/SP6/allSP6.asp. At 30MB, though, this patch downloads like several hours of Niagara Falls. If that doesn't sound like your idea of fun, consider coughing ▶

Friends of the Infested

BUGS GOT YOU DOWN? Can't chase them away? You're not alone. Fortunately, the Web is crawling with good Samaritans who offer information and advice—much of it at no charge.

BUGNET BugNet is a commercial service geared toward IS folk, but it provides a lot of free information about current bugs in hardware, software, and drivers, and tells you where to get the fixes. You can sign up to receive in-depth analyses and to gain access to the complete bug database; the cost per year is $65 for home users and $150 for small businesses. www.bugnet.com

COMPUTER HOPE Computer Hope maintains a vast searchable database of Q&A's and troubleshooting tips on hardware and software problems. It doesn't address specific bugs, but you can ask Computer Hope's staffers general questions about bugs and conflicts—or anything else computer-related—and get an answer online. In addition, it's all free. www.computerhope.com

COMPUTING.NET Though Computing.Net relies on self-appointed experts to answer questions for free, the experts are polite with newbies, so everyone feels welcome. The site's discussion groups focus on operating systems and hardware, downloads of up-to-date drivers, and lots of how-to advice. www.computing.net

SYMANTEC SECURITY CHECK Log on and let Symantec analyze your PC for security risks. The free service tells you where the weak spots are and suggests ways to toughen up your system. However, Symantec says your PC will receive the site's complete battery of tests only if you use Internet Explorer version 4.01 or later. And don't be surprised if you encounter some fairly bla-

tant marketing tactics: Symantec naturally recommends that you purchase and install only Symantec utilities to clean up and protect your computer. www.symantec.com/securitycheck

TECH SUPPORT GUY These folks provide detailed info about all kinds of puzzling problems—18 articles focus on Windows fatal exception errors alone. Plus, you can post questions on forums run by volunteer moderators and get answers from other visitors or from site staffers. www.helponthe.net

USER GROUPS

USERS ALL OVER the country gather in local member groups to play with new toys, grouse about vendors, and exchange tips and tricks. To find a group in your area or one that focuses on your concerns, check out the Network for Computer User Groups (www.user-groups.net), the Association of PC User Groups (www.apcug.org), and Microsoft's links to user group info (www.microsoft.com/mindshare/default.asp).

—Dan Littman

Computer Hope has a huge database of PC-related tips.

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WINDOWS 95 If you run an early version of Windows 95, make sure that you install Windows 95 Service Pack 1. To determine which version of Win 95 you have, select *Start*, select *Settings*, click *Control Panel*, and then double-click *System*. If the version number is anything below 4.00.950 A, your system is running an early version. (For additional information about your PC's version of Windows, check out Microsoft's posting at support.microsoft.com/support/kb/articles/Q158/2/38.asp.) Service Pack 1 fixes numerous annoying glitches and bugs, including file-saving problems with Office 95 applications, Windows 3.1 printer drivers, and some fuzzy math calculations. Later releases of Windows 95 already incorporate these fixes. If you have version Windows 95 A or later, you are in luck—you don't need SP1. You can find the service pack, along with many additional details about installing it, at support.microsoft.com/support/kb/articles/Q142/7/94.asp.

OFFICE SUITES

Having a gaggle of useful applications that work together in an office suite can be great. But it also creates more opportunities for bugs to sneak in. Here are our picks for the most-essential updates.

MICROSOFT OFFICE 97 AND 2000 If you're running Office 2000, you need Office 2000 Service Release 1a. It will restore Windows Registry settings for commonly used files. Get all the details at support.microsoft.com/support/kb/articles/q245/0/25.asp. You may not have the patience to sit through a 33MB download, though—it can take up to three hours. Consider ordering the free CD-ROM (you're charged for shipping) at support.microsoft.com/support/kb/articles/q245/0/25.asp#Topic6.

In addition to obtaining Office's SR1a, consider installing the latest security patches. These patches close up holes that could allow a malicious hacker on the Net to gain access to your machine, either to read your files or scramble your PC. To deal with Microsoft Word vulnerabilities that affect Office 97 and Office 2000, obtain the patch at www.microsoft.com/technet/security/bulletin/MS00-071.asp. To fix problems with HTML tagging, go to www.microsoft.com/technet/security/bulletin/MS00-056.asp. And to resolve another HTML-related problem affecting Office 2000 and PowerPoint 97, visit www.microsoft.com/technet/security/bulletin/MS00-049.asp.

OFFICE 97 ONLY Remember the Y2K bug? If you still have your trusty copy of Office 97, make sure that it's Windows 2000–compatible. Microsoft maintains a Web page to help you determine which release of Office 97 you're using (and whether your system already has Service Release 1 and Service Release 2 installed). The page also provides instructions for downloading and installing the necessary patches. Service Release 2b fixes the date ▶

Bug Awards: All-Time Hall of Shame

IT'S TOUGH TO CHOOSE the nastiest bugs from the busy hive of worthy candidates. Nevertheless, *PC World* crowns five products for their success at causing widespread panic.

THE PENTIUM PROBLEM After Intel launched the hot new Pentium chip in 1994, a math pro-

HOSTILE HARDWARE

fessor quickly noticed that it made subtle computational errors. Imagine that—a computer that couldn't do math. Intel replaced the algebraically challenged processor for anyone who requested it.

ZIP DRIVE CLICK OF DEATH Iomega's roomy Zip drive was designed to satisfy the removable-media storage needs of millions of floppy-phobes. Just one problem: The early Zip drive had a tendency to croak, taking your backed-up data with it. Owners of the early drive will never forget the sound: It made an ominous clicking noise just before it self-destructed.

INTERNET EXPLORER Microsoft's popular Web browser has re-

DISOBEDIENT SOFTWARE

quired more security patches than a pair of threadbare wool socks. Some 4.x and 5.x versions allowed hackers to spoof your cookies and pretend to be you. And until version 5.5, Internet Explorer permitted online marketeers to attach a secret spying tool to your computer that reported your every click.

IE versions 4.0 and 4.01 let Web sites stuff your machine with enough data to make it eventually crash.

NETSCAPE NAVIGATOR You probably didn't intend to allow Web site operators to snag your browser preferences, including your passwords. Well, with Netscape versions up to 4.05, they could. For their part, versions 4.05 through 4.74 permitted malicious operators to install a Java applet and read any file on your hard disk.

ALL WINDOWS You probably have the feeling that most of your computer's ailments involve Windows. Sure, the operating system's versatility improves with each release, but Microsoft also regularly launches less-than-perfect versions.

When Windows 2000 first shipped, it clashed with the BIOS on many computers; the first fix for Windows 2000—despite curing a number of ills—created conflicts with popular firewalls. And when Windows 98 first shipped, it didn't recognize the drivers for many peripherals already attached to a machine. Windows 95's touted Plug and Play capability left users wondering if the feature would ever work properly. And according to some readers, the new Windows Me doesn't recognize mice and keyboards made by—guess who?—Microsoft.

–Dan Littman

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problems, but you must install SR1 ahead of time. If you already have SR2 (but not 2b) installed, you may still need to download a separate patch for Outlook. But proceed with some caution: Microsoft admits that not all users have succeeded in installing the update. You can download the Office 97 updates from officeupdate.microsoft.com/downloaddetails/sr2off97detail.htm.

COREL WORDPERFECT OFFICE 2000 If you use WordPerfect Office 2000, you'll probably want to install either Service Pack 3 or Service Pack 4. SP4 is a multifaceted package: Besides fixing various bugs, it enables you to customize your keyboard with menu commands, improves the user interface, and makes other significant upgrades to the computing experience. SP4 includes all the fixes contained in the first three service packs. You have to order SP4 from Corel, however—it isn't available as a download. Call 800/772-6735, or visit corel.sbservices.com/coreleshare/custservice.asp. There is a $10 shipping charge. Corel says that SP4 is primarily designed for users with disabilities such as impaired vision, hearing, or mobility. In addition, prior to installing SP4, you must uninstall your current version of WordPerfect Office 2000.

SP3 includes all the patches released in SP1 and SP2. In addition, it fixes a number of annoying problems such as the original application's inability to import documents that were created using earlier versions of WordPerfect Office. You can pick up SP3 by surfing over to athena.corel.com/cfscripts/corelnews/corelnews_wp2000sp3_form.cfm.

WORDPERFECT 8 If you have been dragging your heels about upgrading to WordPerfect Office 2000, you'll need to do some preventive maintenance to keep your software bug-free. Download the latest service pack for WordPerfect Suite 8. Service Pack 7 fixes a number of small bugs, including situations in which the bullets and numbering toolbar override WordPerfect's Windows Menu function. It has the patches from all six earlier service packs and adds filters for importing other documents. Get SP7 at www.corel.com/support/ftpsite/pub/wordperfect/wpwin/8/wp8sp7_readme.htm.

BROWSERS & E-MAIL

BECAUSE browsers and e-mail applications act as gateways to your PC, they can leave your system in a vulnerable state. Consequently, keeping these programs up-to-date is especially important. Whether you use Netscape or Internet Explorer, the patches offered for these products should keep your computer safe from harm.
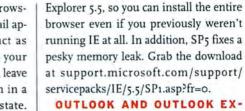
NETSCAPE COMMUNICATOR The long-awaited Netscape 6 is out, but we recommend that you wait awhile, until most of the bugs get shaken out. By the time you read this, Netscape may have released a fix or two. (At press time, Netscape had not issued any updates.)

While you're waiting, it's a good idea to upgrade to Communicator 4.75 to block any gate-crashers from attacking your machine over the Internet. Get the upgrade at home.netscape.com/download/archive/client_archive47x.html.

INTERNET EXPLORER Service Pack 5, the latest service pack for Internet Explorer, gives you the program's most recent bug fixes and security patches along with all the features of Internet Explorer 5.5, so you can install the entire browser even if you previously weren't running IE at all. In addition, SP5 fixes a pesky memory leak. Grab the download at support.microsoft.com/support/servicepacks/IE/5.5/SP1.asp?fr=0.

OUTLOOK AND OUTLOOK EXPRESS Recent viruses have shown the ability to infect your machine just by appearing in Microsoft Outlook's preview pane. So be sure to plug any holes an attacker might use as a way into the program. On the other hand, be aware that some of the fixes cause Outlook to block e-mail attachments at its default settings—and once you start the installation process, you can't back out of it. To get the latest security fix, hop over to www.microsoft.com/technet/security/bulletin/MS00-043.asp.

EUDORA For users of Qualcomm's Eudora 5.0 or 5.0.1, the company posted a patch (5.0.2) that eradicates a slew of problems. It ends crashes during system start-up and shutdown and when you click on a URL within the program. It also corrects problems with printing, the Find Message command, and the Mood-Watch feature, as well as many glitches with Eudora's address book. Get the fix at www.eudora.com/products/eudora/win_patches.html.

ANTIVIRUS SOFTWARE

VISIT your antivirus company's Web site regularly to detect conflicts with other apps (Windows Scan-Disk utility, for example). If your PC encounters a conflict, the simplest solution is to disable antivirus detection temporarily until your machine completes the disk scan or the download; afterward, you can reenable the antivirus detection feature.

NORTON ANTIVIRUS 2001 Symantec wastes no time in adding updates to its AntiVirus Research Center. For details on the latest killer viruses, surf over to service1.symantec.com/support/nav.nsf/docid/200009291111-3206 or www.symantec.com/avcenter.

MCAFEE VIRUSSCAN If you experience system conflicts, get a patch that makes VirusScan 5.x and Windows Me compatible. Pick it up at download.mcafee.com/updates/vs5me_update.asp.

Alternatively, you can upgrade to VirusScan 5.13 by downloading a patch that's posted at download.mcafee.com/updates/vs_update.asp.

Stuart J. Johnston and Dan Littman are both contributing editors for PC World. ■

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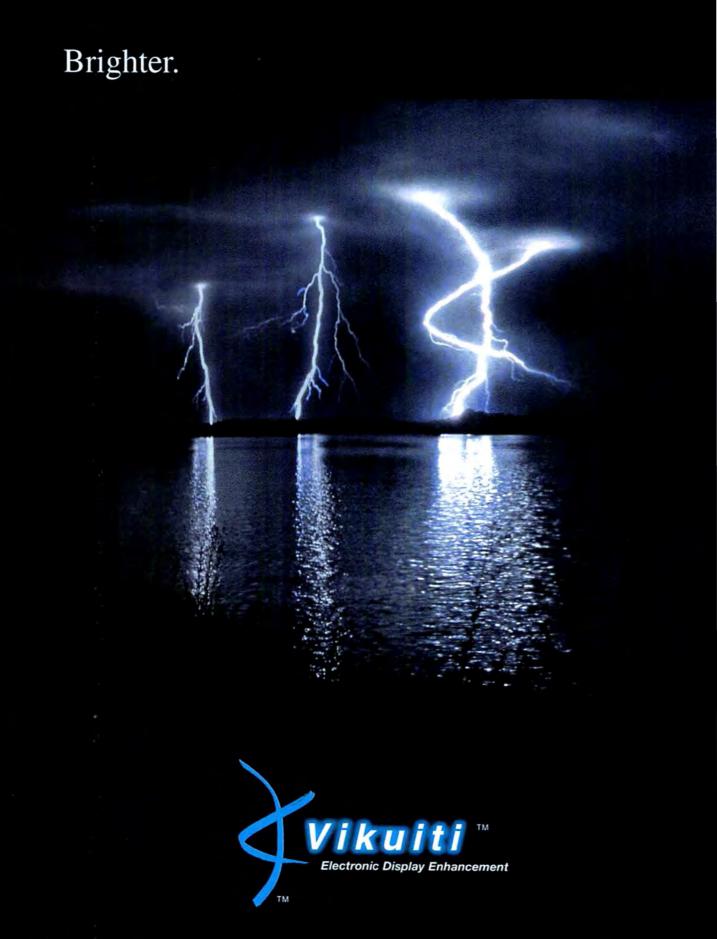
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Take a Walk *on the* Wireless Side

We compare four wireless services for your palmtop computer to determine which ones let you go mobile with confidence.

BY RICHARD BAGULEY

IMAGINE THIS: You're on the way home from work when you suddenly remember that you forgot to e-mail a colleague about a meeting early next morning. Or you're in a strange town on business and you need directions. Or you're stuck in line at the grocery and get a sudden urge to fly to Hawaii for vacation. No problem. You simply pull out your PDA, get onto the Net, and take care of everything right there. ▶

PHOTOGRAPHS BY CHIP SIMONS

The idea of having access to the Internet through a PDA—no matter where you are—is appealing. For anyone who travels for business or pleasure, it means staying in touch quickly and easily by e-mail without having to lug around a notebook (and without having to find a power source and a phone line to plug it into). Wireless access to the Net means access to stock prices, news headlines, flight information, and more, wherever you are. You can even read the news during boring business meetings, and everybody will think you're busily taking notes.

But how much of this Web-on-the-go works, and how much remains the stuff of science fiction? Can you look forward to browsing for campfire songs as you hike through the Sierra Madre or summoning your Webmaster to fix your Web site when you're halfway to Waikiki? To sort the facts from the hype, we took to the streets with our PDAs and tried to perform common tasks using a range of wireless-enabled PDA devices and Web portals. Our object: to see what they could do. We used Palm Computing's $369 Palm VII with its built-in modem and the Palm.Net service; a $698 Palm Vx with an OmniSky modem and the OmniSky service (the modem is also available for the Handspring and HP Jomada 540 PDAs); a $499 RIM Blackberry 957 with built-in modem and the Go.Web service from GoAmerica; and a $1047 Compaq IPaq Pocket PC with a PC Card expansion pack and a Sierra 300 AirCard modem and Mobile MSN service.

THE IPAQ (above) can browse the Web in color; Palm's Web Clipping Apps (right) get detailed flight info.

The mobile Internet access services we looked at charge between $40 and $55 per month for unlimited use, though two offer lower monthly charges with limited use. Of course, other wireless services are available for PDAs, including hundreds of free services for doing just about anything you can think of.

A number of PDA applications exist for particular enterprises as well, such as medical, customer service, and management. For a look at wireless PDAs in the workplace, see *PC World's* Special Report on Enterprise Technology (page 151).

Because a wireless connection on a PDA can't send and receive data fast enough to replicate the experience of browsing the Web on a PC with a 56-kbps modem or faster connection, these services concentrate on a subset of the Internet: e-mail and limited Web access. Both Palm-based PDAs use a system called Web Clipping Applications, a small program that runs on the Palm PDA and fetches the bare minimum of data from the Internet in text form. The Palm VII we looked at doesn't allow you to browse the Web; instead, it relies solely on the Web Clipping Apps. (At press time, Palm announced Web browsing through the MyPalm portal.) Mobile MSN is a purely text-based Web site, and the GoAmerica portal the Blackberry uses offers text-based versions of selected Web sites. By keeping to a minimum the data that must be transmitted, these arrangements deliver the info you want from the Internet in seconds, rather than in the minutes downloading images would take.

READING E-MAIL

MOBILE E-MAIL IS a great reason to buy a wireless PDA. The technology permits you to send and receive e-mail on the move, opening all sorts of possibilities (such as e-mailing your boss while you're on the way home). All the devices we used can send and receive e-mail, and the messages we sent were delivered quickly and without fuss, as long as we were within the coverage area (see "Mobile or Miserable?" page 135). But writing long messages on these devices proved frustrating: The only one to pass our crucial stuck-in-line-at-the-DMV test was the RIM Blackberry 957—entering text on its small QWERTY keyboard was far quicker and more accurate than using the Palm-style system of writing the shapes of letters with a stylus. Both Palms and the IPaq device allow you tap a keyboard on the screen, but doing this isn't much quicker than using their shorthand versions.

All the services we examined let you retrieve e-mail from any POP3 e-mail server (used by most ISPs), but remember to access your regular e-mail account with caution: Big file attachments will take ages to download and will quickly fill up your entire PDA. Fortunately, the e-mail programs on the devices that we reviewed allow you to filter messages from your regular e-mail

WIRELESS SERVICES | FEATURES COMPARISON

DEVICE/SERVICE	Portal used	Type of modem	Street price of PDA/wireless modem	Monthly access cost (unlimited use)	Monthly access cost (limited use)	Size with modem (H x W x D)	Weight (ounces)
Compaq IPaq Pocket PC 800/345-1518 www.compaq.com	Mobile MSN www.mobile.msn.com	Sierra AirCard and PC Card expansion pack	$648/$399	$55	$10 per 50KB	5.25 x 3.25 x 0.8	6.7
Palm Vx 800/881-7256 www.palm.com	OmniSky software www.omnisky.com	OmniSky	$399/$299	$40	Limited use not available	4.96 x 3.0 x 0.9	8.5
Palm VII 800/881-7256 www.palm.com	Palm.Net www.palm.net	Built-in	$369	$45	Limited use not available	5.25 x 3.25 x 0.8	6.7
RIM Blackberry 957 877/255-2377 www.blackberry.net	GoAmerica www.goamerica.net	Built-in	$499	$55	$20 per 500KB	4.6 x 3.1 x 0.7	5.3

Mobile or Miserable?

ACCESS TO the Internet on the road is incredibly useful but has some downsides. Two major problems with wireless technology are glacial speed and limited coverage. The modems we tested access the Net at speeds generously described as lethargic; if you go out of signal range, they are about as useful as a telescope in a coal mine.

Plan to Take It Slow

SPEED IS the first big issue. Most of these systems connect to the Net using the Cellular Digital Packet Data standard, which uses a cellular phone network and transmits data at a maximum speed of 19.2 kbps. V.90 modem transmissions are rated to download at 56 kbps and upload at 33 kbps. In informal tests, a sample Web page with images downloaded in 20 seconds on the Palm Vx using the OmniSky service, while the same Web page on a V.90 dial-up connection downloaded to a PC in 5 seconds.

To discourage you from directly accessing regular Web pages, most portals we looked at provide their own versions of Web pages, sans graphics. Palm.Net and OmniSky use Palm-based Web Clipping Applications that send and receive a minimal amount of data. But even with such well-conceived techniques, getting data on these systems often involves waiting a long time for things to happen.

This may change as new high-speed networks become available. OmniSky is working with Metricom to pair Metricom's Ricochet wireless service (running at a fairly speedy 128 kbps) with a Compaq IPaq. Trials start in mid-2001.

Run for Coverage

COVERAGE IS another key question. The services we tried have sufficient coverage in most large cities, but if you venture out of the United States or out of urban areas, all bets are off. OmniSky claims the CDPD network covers about 200 cities, including 43 of the 50 largest cities in the United States. This comprises about 167 million people—roughly 60 percent of the nation's population. But once you go outside the big cities, you'll probably lose your signal, since the CDPD network (which OmniSky uses) is primarily urban. Fortunately, all the providers we tested let you check coverage on their Web sites, and it is worth spending the time to ensure that you can use the services in places you travel to regularly.

You aren't guaranteed a strong signal even when you're in the city—especially if you're sitting in a car. As cellular phone users know, disconnections and dropouts aren't unusual, and all the services we tested lost signals occasionally when we used them in a car. Until coverage areas expand and signals improve, loss of signal is a fact of wireless life.

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account, leaving any that exceed a specified size on the server for you to retrieve later. The portals also give you an e-mail account on their service, although this setup may have limitations. The Palm.Net e-mail service, for example, refuses to accept any e-mail message larger than 51KB and bounces it back to the sender with a notice that the server can't accept it.

Various instant messaging services such as Yahoo Messenger (for Palm and PocketPC) and AOL Instant Messenger (for Palm) are now available for wireless Internet devices. We found them to be a nice alternative for shorter and more urgent messages.

BOOKING A FLIGHT

WHEN YOU'RE ON THE MOVE, you may wish to keep track of the next leg of your journey. For example, you'll want to know as soon as possible if your flight is canceled. All the portals we

looked at except GoAmerica can retrieve flight info. GoAmerica includes a link to Trip.com's Flight Tracker, but that utility allows you to track only flights that are already in the air—not particularly useful for checking the status of your upcoming flight. The others let you obtain details about flights by flight number or by selecting from a schedule, and the OmniSky and Palm.Net portals (both via the BizTravel Web Clipping App) let you book a flight directly from the PDA. If you want to book your flights through someone other than BizTravel, you'll run into problems. Unless you find sites that are optimized for mobile users, you'll struggle to connect to other travel sites' normal Web pages.

Most people will just want to learn the status of already-booked flights, and all the portals except GoAmerica permit this, either through the Travelocity Web Clipping App (on the Palm Vx and Palm VII) or through the Expedia section of Mobile MSN (on the IPaq). These services can tap into an itinerary of existing flights so you can check for any delays or problems. Furthermore, many airlines (including American, Continental, Delta, and United) have their own Web Clipping Apps for the Palm platform; these allow you to obtain information about delays and even check your frequent flier miles while you're waiting in the departure lounge.

GETTING DIRECTIONS AND FINDING THINGS

FEW EXPERIENCES ARE more frustrating than getting lost. Fortunately, all the portals we tested offer a way to get directions. They all work pretty much the same way: Enter a starting address and a destination, and you'll get textual driving directions ▶

Comments

The IPaq wireless requires adding a PC Card adapter and a modem, costing a hefty $1047.

The OmniSky modem can browse the Web, but the Web Clipping Applications service is an easier way to access the Internet.

The Palm VII with Palm.Net service offers wireless access in one slim package, though it can't browse the Web directly.

With a QWERTY keyboard and a large screen, the Blackberry works well for e-mail and instant messaging.

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along the lines of 'Step 1: Turn SHARP LEFT onto ELM ST. Step 2: Turn RIGHT onto MAIN ST.' The MapBlast service on the GoAmerica and OmniSky portals creates maps from an address, which is handy but underscores the problem with maps on a PDA: On a small screen they're difficult to read and often omit details (in my case, the street I live on). The Palm VII doesn't include a Web browser, but the Palm.Net portal provides services such as the Etak Traffic Touch Web Clipping Application, which lists major problems on the roads in your area, and a Starbucks locator for finding the nearest branch outlet of the ubiquitous coffeehouse.

STOCKS AND BANKING

ALL THE PORTALS we tried allow you to get simple stock prices and business headlines for checking what the markets are up to—but that is the only thing Mobile MSN offers. The others provide more financial tools. GoAmerica and OmniSky maintain text-based versions of a range of financial news sites such as Fox Market Wire and The Motley Fool. The Palms take this step further by letting you manage your stock portfolio wirelessly through Web Clipping Apps produced by brokers such as DLJ Direct, ETrade, and Fidelity. Anyone who wants to browse news and stock quotes has access to all these services except Ameritrade, which restricts entry to Ameritrade users. You can use these services to buy and sell stocks, check real-time prices, and read research reports, and if you have an account with the ETrade bank, you can check your account balance. All of the Web Clipping Apps are installed as a standard feature of the OmniSky portal; they can be downloaded for the Palm.Net portal.

If you need to get some cash quickly, Web Clipping Apps can help you find the nearest ATM that handles accounts with Visa, MasterCard, and some banks and credit unions. The Bank of America also supplies a Web Clipping App to check your account, transfer money, and pay bills, but it can't find an ATM.

A WONDERFUL WIRELESS WEB?

WIRELESS NET ACCESS is still in its infancy, and though the idea of mobile Internet access is exciting, its real-world execution leaves something to be desired. Downloading information can be slow and unpredictable, and using more-traditional methods continues to be easier in many instances. Let's face it: If you get lost, it's probably a lot quicker to roll down the window and ask someone for advice than to ferret out directions on your PDA.

OmniSky's Elan Amir, chief technology officer, says that the two chief uses of its service are to send mobile e-mail and to check financial information. It's easy to see why these capabilities would be quite useful for the roaming business professional or trader. Mobile e-mail can be invaluable, especially when you combine it with a PDA's other functions, such as the notepad and the appointment book. You could take short notes at a meeting and e-mail them immediately to colleagues, or send a quick e-mail request to a coworker without interrupting an ongoing meeting.

Though the excellent screen and the built-in Internet Explorer Web browser of the Compaq IPaq Pocket PC show most Web pages very well, waiting for them to download will test your patience. Plus, the fully loaded IPaq costs a hefty $1047. The IPaq looks cool, but it doesn't work as well as as some of the other devices, and Mobile MSN has the narrowest range of features of the four portals.

If you want just e-mail and some basic PDA functions, the Blackberry 957 is the best option. The device is easy to use and has a fairly large screen and a QWERTY keyboard. If you don't mind waiting, you can use Blackberry to browse the Web; lots of varied information is available via the GoAmerica portal.

For more than mobile e-mail, the Palm Vx with OmniSky has the best overall package, though the Palm VII isn't far behind. Browsing the Web on any PDA is very slow, but it's nice to have it as an option, and the Palm VII doesn't. OmniSky's bundling of a wide range of Web Clipping Apps and an excellent e-mail program makes the whole Palm Vx package work very well.

Whichever wireless PDA and service you choose, get ready to compromise. People's expectations for these devices and services, especially as Web browsing tools, are still ahead of the reality.

Richard Baguley is a senior associate editor for PC World. ∎

In Road Mode				
NOT ALL of the wireless PDAs performed our tasks equally well.				
	Device/portal			
TASK	**IPaq Pocket PC/ Mobile MSN**	**Palm Vx/ OmniSky software**	**Palm VII/ Palm.Net**	**Blackberry 957/ GoAmerica**
Send/receive e-mail	Good	Good	Good	Excellent
Get flight info	Adequate	Excellent	Excellent	Can't do
Get financial info	Adequate	Good	Good	Good
Get directions	Good	Good	Good	Adequate
Browse the Web	Adequate	Adequate	Can't do[1]	Adequate

[1]Palm now offers a downloadable update that it says allows Web browsing.

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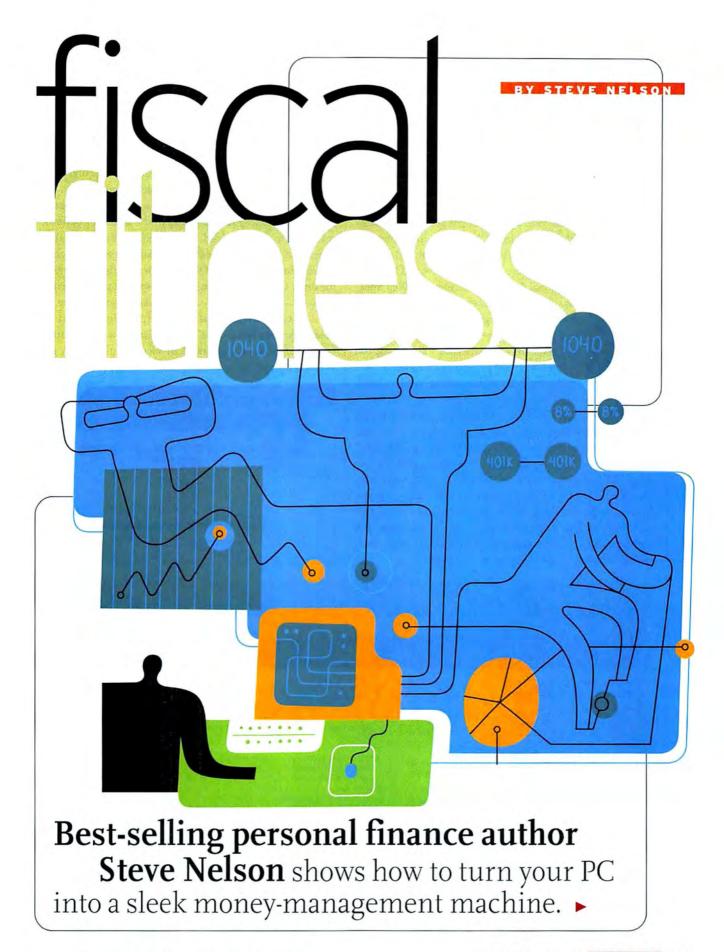
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BY STEVE NELSON

Best-selling personal finance author Steve Nelson shows how to turn your PC into a sleek money-management machine. ▶

What's your million-dollar dream?

Early retirement to a Kauai beach house? An open-ended world tour? College tuition for the triplets? You could trust your dreams to good fortune, but most of us

Key

Retirement

Investment

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prefer to take our financial fate into our own hands. That's where PCs come in. Few people realize the potential of the financial software and services available on their desktops. You may use Quicken or Money to balance your checkbook, and you might go online to follow your mutual funds, but many other financial-planning tools lie at your disposal, and some of them are free. The table below and the table "Personal Financial Management Web Sites" on page 142 identify useful packages and sites and list their strengths and weaknesses. When you've gathered the combination of resources you need, the tips that follow will help you use your PC to create a true financial plan.

There's no time like tax time to take a good, hard look at where you are financially, where you would like to be, and how you intend to get there. Microsoft Money 2001 and Intuit's Quicken 2001—and their online counterparts, Money Central and Quicken.com, respectively—offer integrated financial-planning tools that can help you reach your short- and long-term goals. Of course, many other useful online resources are available to help you make your financial plans, and we profile the best of these. Our tips focus on four areas: retirement, taxes, investments, and debt reduction. (For reviews of this year's top tax-preparation software packages, see this month's *New Products*.)

Boost Your Mutual Fund Returns by $150,000

The most important predictor of mutual fund returns is the expense ratio—the ratio of the fund's expenses to its average net assets. The lower the ratio, the higher your net return, so high expense ratios hurt: A 1 percent increase in expense ratio for a $2000-per-year IRA investment will lose more than $150,000 over 30 years. To find a cheaper fund that's just as good, use Quicken.com's Mutual Fund Finder (www.quicken.com/investments/mutualfunds/finder).

Click the *Full Search* hyperlink, select a relevant Morningstar fund category (see **FIGURE 1**), and in the Expenses options, select *none* in the Front Load, Deferred Sales Charge, and 12b(1) Fees fields. Don't worry about redemption charges—they actually discourage the riffraff of the investment world from joining the fund. Click *Show Results*. In the Display box, indicate that

FIGURE 1: Quicken.com's Mutual Fund Finder could help you add hundreds of thousands of dollars to your retirement savings.

you want to see expense information. Set the Sort By boxes to show funds sorted in ascending order by expense ratio percentage.

Money Smarts: What Financial Software Packages Have to Offer

PRODUCT	Price	Debt reduction	Taxes
Microsoft Money 2001 Standard 800/624-9400 www.microsoft.com/money	$35 (before $10 mail-in rebate)	Lets user schedule debt reduction payments to get out of debt as quickly as possible	Includes a tax estimator
Microsoft Money 2001 Deluxe 800/624-9400 www.microsoft.com/money	$65 (before $20 mail-in rebate)	Same as Standard version	Same as Standard version, plus tax-withholding estimator, deduction finder, integration with Kiplinger TaxCut, tax export review/report
Microsoft Money 2001 Deluxe for Business 800/624-9400 www.microsoft.com/money	$85 (before $20 mail-in rebate)	Lets user create a prioritized action plan and schedule payments to reduce debt	Same as Deluxe version, plus Tax Holdings Calculator (to estimate W4 allowances required for desired refund) and Tax Line Manager (to track taxes and map expense data to IRS forms)
Quicken 2001 Deluxe 650/944-6000 www.intuit.com	$60, $40 upgrade (before $20 mail-in rebate)	Loan management and spending/savings tracker, Debt Reduction Planner	Tax estimators for itemized deductions and withholding, Tax Alerts, Taxlink transfers data to TurboTax, Capital Gains Estimator integrated with Tax Planner
Quicken 2001 Home & Business 650/944-6000 www.intuit.com	$80 (before $20 mail-in rebate for previous Quicken users)	Same as Deluxe version	Same as Deluxe version, plus expense tracking and assignment of Schedule C and other small-business tax categories
Quicken 2001 Suite 650/944-6000 www.intuit.com	$100 (before $20 mail-in rebate)	Same as Deluxe version	Same as Deluxe version, plus TurboTax Deluxe for 2000 and one free state TurboTax State download

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Quicken doesn't have a single, all-purpose financial planner, but its powerful Retirement Planner, College Planner, Home Purchase Planner, and Debt Reduction Planner wizards help you build a personal financial plan. You can select any of these wizards from Quicken's Planning menu.

Pay Off Your Credit Card Debt

Quicken's Investment Savings Calculator can help you eliminate your credit card debt. Start Quicken and choose *Planning•Financial Calculators•Savings.* Enter your credit card balance in the Opening Savings Balance box of the Investment Savings Calculator, the credit card interest rate in the Annual Yield box, and **0** in the Ending Savings Balance box. Select *Months* in the 'Number of' box, and enter the number of monthly payments you will make in the box to the right. Choose *Regular Contribution* in the Calculate For area, and click *Calculate.* You'll see the monthly payment required to the right of Contribution Each Month.

You can also accomplish this with Microsoft Money's Debt Reduction Planner. Open the program and choose *Planning•Debt Reduction Planner.* Then follow the instructions for entering the debts you want to pay off. Be sure to repay the credit cards with the highest interest rates first.

Repay Your Mortgage Early

Early mortgage repayment is easy money. With a 30-year, $150,000 mortgage at 8 percent interest, paying an extra $25 a month saves $24,780 in interest over the course of the loan. Quicken makes it easy to figure out how much you can save through early repayment.

Start Quicken and choose *Planning•Financial Planners•Savings.* Select *Ending Savings Balance,* and enter your current loan balance as a negative value in Opening Savings Balance. Enter the principal and interest payment (including the extra principal amount you're willing to pay) in Regular Contribution, and enter the mortgage interest rate in Annual Yield.

Now comes the tricky part: Experiment to find the value in the Number of Months box that produces an Ending Savings Balance near or equal to zero—that's your goal.

Check Your Social Security Benefits

Claims to the contrary notwithstanding, the Social Security system is not going bankrupt anytime soon. The system as currently administered will work until roughly 2039. And even if no reform occurs, Social Security receipts at that point will still be sufficient to pay 72 percent of promised benefits. For an estimate of what your benefits will be (before any reduction), use one of the benefit calculators at the Social Security Administration's Web site (www.ssa.gov/planners/calculators.htm). **FIGURE 2** shows the site's Quick Calculator (not the assumptions listed). The average monthly benefit is $845 in today's dollars. ▶

FIGURE 2: Estimate your retirement benefits using the Quick Calculator on the Social Security Administration's Web site.

Investment	Retirement	Comments
Minimal financial prioritization and investment forecasting	Lets user set up 401(k) accounts and download 401(k) statement details from supported providers	Advisor FYI offers custom financial tips; Budget Maintenance; tracks employee stock options; adds cash-flow projection
Same as Standard version, plus investment asset allocation wizard, inline Portfolio expansion; links to MSN MoneyCentral investment communities	Same as Standard version, plus 401(k) Manager, Lifetime Planner	Same as Standard version
Same as Deluxe version, plus capital gains estimator; IPO Advisor links to MSN MoneyCentral for information on initial public offerings	Same as Deluxe version	What-if scenarios; major-purchase advisor; Smart Internet Connection
The new 401(k) Advisor provides customized fund recommendations and lets user download 401(k) information, including holdings, transactions, and total and vested balance; Portfolio View adds 30 new investment indicators	Life Event Planning Center includes retirement module	Activity Centers summarize and filter financial information
Same as Deluxe version	Same as Deluxe version	Customized invoices; accounts payable; estimates and bids; job tracking; integrated payroll service
Same as Deluxe version	Same as Deluxe version	Adds Quicken Family Lawyer 2001

Retirement Calculator

Retirement Information
Current Savings:	0.00
Annual Yield:	10.000%
Annual Contribution:	316.01
Current Age:	30
Retirement Age:	65
Withdraw Until Age:	95
Other Income (SSI, etc.):	0.00
Annual Income After Taxes:	3,000.00

Inflation
Predicted Inflation: 3.000%
☑ Inflate Contributions
☑ Annual Income in Today's $

Calculate For
○ Current Savings
● Annual Contribution
○ Annual Retirement Income

Tax Information
● Tax Sheltered Investment   Current Tax Rate: 28.000%
○ Non-Sheltered Investment   Retirement Tax Rate: 15.000%

To develop a complete retirement plan, use the Retirement Planner in the Planning Center.

Done | Help | Calculate | Schedule...

Supplementing Social Security

If you don't want to count on the government to underwrite your retirement (and you shouldn't—unless you'd be happy living out your golden years on $845 a month), Quicken lets you calculate what you need to save to counter a possible 28 percent drop in Social Security benefits. Determine your estimated benefit by visiting the Social Security Web site (see the preceding item), then subtract 28 percent. The average drop is $236 a month, or $2832 a year. Use Quicken's Retirement Calculator to figure out how much you must save to offset the decline in available Social Security funds that some experts predict.

Choose *Planning•Financial Calculators•Retirement*, and select *Calculate for Annual Contribution*. This opens the Retirement Calculator (see **FIGURE 3**). Enter **0** in Current Savings and again in Other Income, then enter your age, your anticipated retirement age, and your "Withdraw Until" age. Set the Annual Yield box to whatever return you expect your investments to deliver (probably 9 or 10 percent). In the Annual Income After Taxes box, enter your annual drop in Social Security benefits (as calculated above). Select *Annual Contribution* in the Calculate For area, and click *Calculate*. The amount shown is what you should save to compensate for the possible 28 percent Social Security shortfall (the average amount is $16 a month).

FIGURE 3: Prepare for a possible shortfall in Social Security benefits with Quicken's Retirement Planner.

How Much Life Insurance Do You Need?

Quicken's Investment Savings Calculator (see **FIGURE 4**) can determine whether you have enough life insurance to protect your family. It does this by calculating the value of the income your family will lose if they lose you. Choose *Planning•Financial Calculators•Savings*; then select *Make Calculation for Opening Savings Balance*, and enter the number of years you want your life insurance proceeds to support your family in the Number of Years box. Enter the annual income that you want to replace through life insurance proceeds as a negative value in the Contribution Each Year box. Choose *Opening Savings Balance* in the Calculate For area, and then click *Calculate*. This will yield the amount of insurance needed to replace your income. And to show them you care, round up.

Investment Savings Calculator

Savings Information
Opening Savings Balance:	268,403.26
Annual Yield:	8.000%
Number of [Years]:	10
Contribution Each Year:	-40,000.00
Ending Savings Balance:	0.00

Inflation
Predicted Inflation: 4.000%
☐ Inflate Contributions
☑ Ending Balance in Today's $

Calculate For
● Opening Savings Balance
○ Regular Contribution
○ Ending Savings Balance

Done | Help | Calculate | Schedule...

FIGURE 4: Use Quicken's Investment Savings Calculator to compute the life insurance you need.

When Does Refinancing Make Sense?

Refinancing is complicated. You want to replace a mortgage bearing a high interest rate with one that carries a lower interest rate. That's the simple part. You also need to make sure that the refinancing fees don't eat up the interest-rate savings, and that you'll actually end up paying less interest. This is where it gets complicated. Fortunately, Microsoft Money's Loan Worksheet can help. Select *Go•House Center•Compare the Cost Of the Loan Or Compare Two Loans*. In the Loan A boxes on Money's Loan Worksheet Web page, enter your current mortgage payment, interest rate, balance, and repayment term. Then, in the Loan B boxes, enter the new mortgage's payment, interest rate, balance, and repayment term. Refinancing makes sense if the new loan's annual percentage rate is lower than the old loan's interest rate and if you will be paying less in total interest and fees on the new loan.

Get Practical Advice on Building a Portfolio

Want to build a portfolio of individual stocks? Join the Motley Fool Web site, and visit its discussion boards at boards. fool.com. Here, other Fools gladly share their investment experiences and their analyses of individual stocks; just remember to take the

Personal Financial Management Web Sites

WEB SITE	Planning tools/features
Financial Engines www.financialengines.com	Includes retirement goals overview and goal planner worksheet; Guided Advice includes Advice Action Kit.
Motley Fool www.fool.com	Calculators for credit, budget, retirement, and savings.
Onmoney.com www.onmoney.com	Features debt consolidation strategies, estate and retirement planning guides, and a guide to investing to pay for college.
PCWorld.com www.pcworld.com	Helps you find financial and accounting shareware; links to Web-based personal finance advisors.
Quicken.com www.quicken.com	First-rate retirement planner and 401(k) guide; more than a dozen tax calculators.
Social Security Administration www.ssa.gov	Retirement planner features American Savings Education Council's Ballpark Estimator.

advice of strangers, even seemingly knowledgeable ones, with a grain of salt. Some of the site's investor education resources are useful, but the Motley Fool's premise that individual investors can beat the market by applying a simple formula is dubious.

Use Your Marginal Income Tax Rate to Make Smarter Decisions

Both Quicken and Money include Tax Planner calculators that let you estimate your taxes precisely. One useful bit of information these tools provide is your marginal income tax rate—the tax rate on your highest possible amount of taxable income. Knowing this tax rate allows you to calculate the savings you'll harvest from tax deductions, IRA and 401(k) plan contributions, and municipal bonds.

To calculate your marginal income tax rate using Quicken's Tax Planner, choose *Taxes•Tax Planner* and then follow the on-screen instructions. To use Microsoft Money's Tax Planner, choose *Tax•Tax Estimator*.

Once you have determined your marginal income tax rate, you can calculate your tax savings from deductions and retirement plan contributions by multiplying that tax rate by the total deduction amount. For example, if your marginal rate is 28 percent, a $2000 IRA contribution will save you $560 (that's the product of 0.28 times $2000) in income taxes.
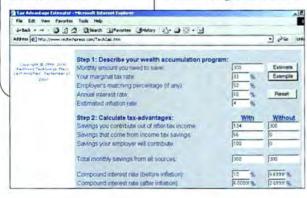
Get Free Money for Investing

Knowing your marginal income tax rate lets you calculate what you save in taxes from your retirement accounts, too. If your marginal income tax rate is 28 percent and you put $100 into a retirement account, you'll pay $28 less in taxes. So in effect the government is paying $28 into the account and you're paying $72. The tax savings compound when combined with employer matching contributions in some 401(k) plans and similar retirement accounts. You get the match on

FIGURE 6: What will it take to become a millionaire? Find out with OnMoney.com's calculator.

FIGURE 5: "Free" money is available for investing in retirement accounts; this calculator estimates how much.

the $72 you pay and the $28 the government pays, so a 50 percent match on $100 of savings is actually $150, less than half of which ($72) would stay in your pocket if you didn't use a retirement account. To determine the amount you'll gain, you can use the calculator I created at www.redtechpress.com/TaxACalc.htm (see FIGURE 5). The results may surprise you.

Who Doesn't Want to Be a Millionaire?

The OnMoney Web site (www.onmoney.com) maintains a great collection of easy-to-use financial calculators. One of the most interesting for people saving for their own retirement is the What Will It Take to Become a Millionaire? calculator at www.onmoney.com/banking/saving/become_a_millionaire.asp (see FIGURE 6). After you register, you can experiment to your heart's content. Getting to $1 million isn't as hard as you might think—especially if you apply some of our other tips.

Measure Your Investment Risk

Over long periods, the stock market's average return is 10 percent per year, but some years it returns more, and some years less. Interest rates and inflation fluctuate as well. To factor these variables into your planning, use the services of Financial Engines (www.financialengines.com).

Founded by Economics Nobel Laureate William F. Sharpe, the site takes your existing and potential investment plans and passes them through thousands of scenarios to calculate how fluctuating returns, interest rates, and inflation may affect your long-term financial picture (see FIGURE 7).

The forecasting tools at the Web site are available for free, but tapping into the

FIGURE 7: Factor long-term variables into your financial plans using Financial Engines' Forecast & Analysis tools.

site's advisory tools costs $15 per quarter. In return, you get very useful suggestions about how to tailor your portfolio to your investment needs and your sensitivity to risk.

Steve Nelson has written many personal-finance books, including Quicken 2001 for Dummies *(IDG Books, 2000).* ∎

POWER USER

PRESARIO 7000T-1.4

$2299‡

As low as $64 per month†

Intel® Pentium® 4 Processor, 1.4 GHz
128 MB PC800 RDRAM
30.0 GB (7200 rpm) UltraDMA Hard Drive
16X DVD-ROM Drive
8X CD-RW Drive
56K ITU V.90 Modem
Creative Labs 1373 Audio with 128 Voices
JBL Platinum Speakers with Digital Audio Port
32 MB SDR Creative 3D Blaster GeForce2 MX
Compaq CV735 17" Monitor (16.0" VIA)

Personalize by choosing:
Compaq CV935 19" Monitor (18.0" VIA): Add $140
DVD-R Drive: Add $356

MUSICIAN

PRESARIO 7000T-1.0

$1499‡

As low as $42 per month†

Intel Pentium III Processor, 1.0 GHz
128 MB 133 MHz SyncDRAM expandable to 384 MB
20.0 GB (7200 rpm) UltraDMA Hard Drive
48X Max CD-ROM Drive
56K ITU V.90 Modem
SoundBlaster® Live! Value Audio
JBL Platinum Speakers with Digital Audio Port
32 MB nVidia TNT2 M64 Pro Graphics
Compaq CV735 17" Monitor (16.0" VIA)

Personalize by choosing:
8X CD-RW Drive: Add $149
Klipsch ProMedia V.2 400 Watt Speakers: Add $224

PHOTO ENTHUSIAST

PRESARIO 5000T-866

$1299‡

As low as $37 per month†

Intel Pentium III Processor, 866 MHz
128 MB 100 MHz SyncDRAM—up to 11 MB Shared for Video
30.0 GB UltraDMA Hard Drive
16X DVD-ROM Drive
8X CD-RW Drive
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 CV735 17" Monitor (16.0" VIA)

Personalize by choosing:
Klipsch V2.1 Speakers: Add $155
Compaq CV935 19" Monitor (18.0" VIA): Add $140

POWER USER

PRESARIO 1800T-800

$2249‡

$2349 - $100 Instant Rebate** = $2249
As low as $63 per month†

Intel Pentium III Processor, 800 MHz,
featuring Intel SpeedStep™ Technology
15.0" TFT SXGA+ Active Matrix Display
128 MB SyncDRAM
15.0 GB UltraDMA Hard Drive
8X DVD-ROM Drive
ATI Mobility M3 with 16 MB Video Memory
56K ITU V.90 PCI Modem
Integrated 10/100 BaseT Network Port

Personalize by choosing:
CD-RW Drive: Add $150
32.0 GB (5400 rpm) UltraDMA Hard Drive: Add $250

TRAILBLAZER

PRESARIO 1800T-700

$2149‡

$2249 - $100 Instant Rebate** = $2149
As low as $60 per month†

Intel Pentium III Processor, 700 MHz,
featuring Intel SpeedStep Technology
15.0" TFT XGA Active Matrix Display
128 MB SyncDRAM
20.0 GB UltraDMA Hard Drive
8X DVD-ROM Drive
ATI Mobility M3 with 16 MB Video Memory
56K ITU V.90 PCI Modem
256 KB Integrated "On-chip" Cache
Integrated 10/100 BaseT Network Port
Microsoft® Windows® 2000 Professional

Personalize by choosing:
Compaq Global Case: Add $79
15" SXGA+ Panel: Add $100

JET SETTER

PRESARIO 1700T-700

$1649‡

$1749 - $100 Instant Rebate** = $1649
As low as $46 per month†

Intel Pentium III Processor, 700 MHz,
featuring Intel SpeedStep Technology
14.1" TFT Active Matrix Display
64 MB SyncDRAM
10.0 GB UltraDMA Hard Drive
8X DVD-ROM Drive
ATI Mobility Hardware Accelerated 3D Graphics
with 8 MB Video Memory
56K ITU V.90 PCI Modem
Hi-Capacity LiIon Battery
256 KB Integrated "On-chip" Cache

Personalize by choosing:
Integrated Network Card: Add $49
Additional A/C Adapter: Add $49

Includes Windows® Millennium Edition — the home version of the world's favorite software.

FAMILY CHAMPION

PRESARIO 5000T-866

$999‡

As low as $28 per month†

Intel Pentium III Processor, 866 MHz
128 MB 100 MHz SyncDRAM — up to 11 MB Shared for Video
20.0 GB UltraDMA Hard Drive
48X Max CD-ROM Drive
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)

Personalize by choosing:

Compaq CV735 17" Monitor (16.0" VIA): Add $70
8X CD-RW Drive: Add $149

WEB SURFER

PRESARIO 5000T-700

$799‡

As low as $23 per month†

Intel Celeron Processor, 700 MHz
64 MB 100 MHz SyncDRAM — up to 11 MB Shared for Video
10.0 GB UltraDMA Hard Drive
48X Max CD-ROM Drive
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)

Personalize by choosing:

Upgrade to 16X DVD-ROM Drive: Add $59
Compaq CV735 17" Monitor (16.0" VIA): Add $70

ADVENTURER
EDDIE BAUER™ SPECIAL EDITION
PRESARIO 1400T

$1860‡

As low as $52 per month†

Intel Pentium III Processor, 700 MHz
13.3" TFT Active Matrix Display
64 MB SyncDRAM
6.0 GB UltraDMA Hard Drive
8X DVD-ROM Drive
Trident CyberBlade Hardware Accelerated 3D Graphics
56K ITU V.90 PCI Modem
USB External Floppy Drive
Eddie Bauer Color Package
3-Year Warranty

Personalize by choosing:

10.0 GB UltraDMA Hard Drive: Add $47
128 MB SyncDRAM: Add $183

WEB SURFER

PRESARIO 1200T-700

$1199‡

As low as $34 per month†

Intel Celeron Processor, 700 MHz
12.1" TFT SVGA Display
64 MB SyncDRAM
6.0 GB UltraDMA Hard Drive
24X Max CD-ROM Drive
Trident CyberBlade Hardware Accelerated 3D Graphics
56K ITU V.90 PCI Modem
NiMH Battery
128 KB Integrated "On-chip" Cache

Personalize by choosing:

APC Notebook Surge Protector: Add $29
Compaq Carrying Case: Add $39

HDD SHERIFF:

SAVING SYSTEMS in DISTRESS

Jungsoft's hardware-based backup and restore application targets heavily trafficked, multi-user environments

nstructors at the Dr. Martin Luther King, Jr. Community Center in San Mateo, Calif., face the same conundrum as educators everywhere else: How do they share new technology with young people who are prone to making mistakes when they work on the computer, inadvertently causing damage or losing data? Indeed, until recently, things were not going well at the center. "With so many different people using the computers, we were always being forced to go in and restore each system, step-by-step," says Anthony Robinson, an IT professional who designed the center's computer lab.

Jungsoft's HDD Sheriff restores lost data, files and programs through a simple reboot.

Last year, Robinson installed on many of the lab's PCs HDD Sheriff, a hardware-based backup and restore application from Jungsoft USA, Inc., San Francisco. HDD Sheriff has already proven especially useful in other, heavily trafficked, multi-user environments (like schools and community centers). "You don't have to have a deep technical background to

use these tools," says Jungsoft America Vice President Michael Oh. "When students and teachers are finished in the classroom, they simply have to reboot the systems for the next class."

HDD Sheriff instantly restores lost data, files and programs—even operating systems—all through a simple system reboot. Its innovative file management and compression technology uses just 5 percent of a computer's hard disk to store and restore critical data. And HDD Sheriff guards against unwanted changes and modifications to system settings by automatically restarting and restoring the machine to its previous mode of operation.

In addition, HDD Sheriff prevents users from corrupting data through MS-DOS; but it doesn't stop students from getting the best use of their machines. Instead of barring them from accessing the applications and files they need, HDD Sheriff repairs any "damage" students may have done, after they have finished working.

For administrators who need even broader network controls, Jungsoft's Net Sheriff can reboot client computers at any time, and from a single location. Net Sheriff's file management functions streamline network maintenance processes, while its "file broadcast" and "image copy" controls transfer command files and other data to the entire network. The application's "mode change" function, meanwhile, lets administrators install or remove programs on client computers.

'NET PROTECTION

As it has in many workplaces, the Internet has created security challenges at the community center. Now, HDD Sheriff provides computer lab users at the community center with complete virus protection, by restoring all data and every system setting at startup. HDD Sheriff also shields Internet-connected PCs from unwanted cookies and 'Net downloads.

Robinson can also count on Jungsoft to store, organize and restore all of his 'Net applications and data. Another of Jungsoft's hardware-based tools, Data Sheriff, backs up and restores entire folders or specific files according to their file types, or by the dates and times when they were created or last modified.

Data Sheriff lets its users set the size of the applications' total storage capacity, and tailor their backup schedules to meet the requirements of individual projects. Data Sheriff can automatically run backups on any changed data, and can be programmed to back up data while computers are idling in screen saver mode.

Robinson says that Jungsoft has made his work at the center a lot easier. "I've enjoyed using [HDD Sheriff] so much," he says, "that I'd recommend it to just about anyone." Adds Robinson, who works at a major computer manufacturer, "I plan to introduce it at work soon."

PC WORLD'S
ENTERPRISE TECHNOLOGY

Selecting equipment for an enterprise-scale company has never been easy. There's the technology itself to worry about, for starters—meaning, will it perform as advertised? But in a medium-size to large business, you have other concerns too: Will the new equipment integrate with existing systems? Will it be costly to maintain? Will it scale to meet demand? Most critically, will it serve current and future business objectives? Starting this month, *PC World* casts a critical eye on hardware, software, and services that target the large corporate client, in order to answer such questions. Each month, *Enterprise Technology* will scout for e-business products that pay off in profits, productivity, cost reduction, or strategic advantage. We hope you find the new section useful. Send your comments to eddir@pcworld.com.

ePad INTERLINK ELECTRONICS

Real Wireless on the Go

WHEN YOUR PASSENGERS pay $1870 an hour, you
want to keep them happy. Flexjet's Jon Maxfield says
that's why the company uses wireless handhelds to
poll customers of its time-share private jets.

Wireless handhelds can help your company gather critical data from people in the field, but only if the devices are used properly. Here are three examples of how to do it right. **By Eric Knorr**

THE PROBLEM WITH palmtop computers is that they're throwbacks, really. Just as desktop PCs were once maverick, un-networked little islands of information, today's ubiquitous Palms, Handsprings, Pocket PCs, and similar devices have snuck into the enterprise through the back door—and they remain mostly deaf to its servers and systems. No one has yet invented a wire long enough to tether them to the corporate network.

No one needs to. Over the next few years, managers and experts say, wireless communications will lasso these last vestiges of stand-alone computing and drag them into the enterprise. In today's post–Web-boom era, no one suggests investing in wireless fantasy projects. But where there's a chance for real benefit, exploring wireless options today can help prepare for a future when handhelds join the front line of business information systems.

TAKING TO THE AIR

A FEW FORWARD-LOOKING companies have already made the move. For example, Flexjet's Jon Maxfield, manager of owner services, uses wireless Palm VIIs to collect data from passengers who fly aboard the company's time-share private jets. Pam Bryson at Ingram Micro, the big computer supply house, offers key customers Web-enabled cell phones to use in placing and tracking orders.

What unites these pioneers is their willingness to employ palmtops and the wireless Web to gather or disseminate time-sensitive data. Of course, *pioneer* is probably the right word. As anyone who has used a wireless device to tap the Internet knows, performance tends to be slow, connections get dropped, and even the most spacious palmtop screen reveals only about a thirtieth of the information a typical desktop monitor can display.
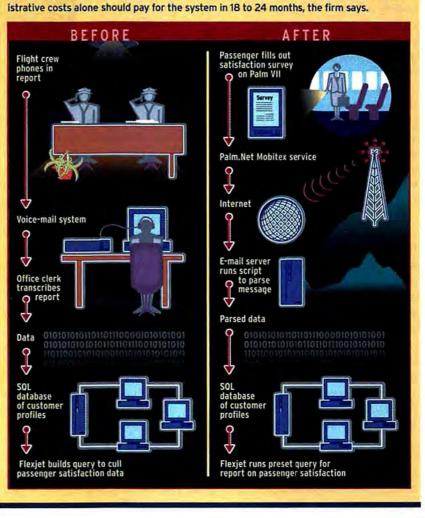
Yet the demand for connectivity is increasing. By 2004, International Data Corporation predicts, the United States

will be home to 55 million mobile and remote workers, defined as those who spend more than 20 percent of their time away from the office. That's a 41 percent jump from today's figure of 39 million. Meanwhile, the pace of business—as well as the pace of business data flow—continues to accelerate. These factors ratchet up the pressure on device manufacturers, wireless providers, and corporations to devise better access for on-the-go people.

For most companies, the first step in improving access is to use the Palm and its brethren for e-mail. The RIM Black-Berry wireless e-mail appliance has attracted almost a cult following among mobile managers; the Palm VII and even the Handspring Visor and Microsoft Pocket PC outfitted with wireless mo- ▶

Case Study: Flexjet

THIS PRIVATE-JET OPERATOR USED HANDHELDS to automate a cumbersome manual task, saving both time and money. Under the former system (left panel), flight crews would phone in customer feedback after every flight, which staff would then have to key into the SQL database manually. Today, the customer fills out a simple Palm-based survey, and the device transmits it to Flexjet after the plane lands. Savings in administrative costs alone should pay for the system in 18 to 24 months, the firm says.

BEFORE

- Flight crew phones in report
- Voice-mail system
- Office clerk transcribes report
- Data 010101010110110111000010101010010101010101010101101101110010101010110110010101010010101010101010
- SQL database of customer profiles
- Flexjet builds query to cull passenger satisfaction data

AFTER

- Passenger fills out satisfaction survey on Palm VII
- Palm.Net Mobitex service
- Internet
- E-mail server runs script to parse message
- Parsed data 010101010110110111000010101010010101010101010101101101110010101010110110010101010010101010101010
- SQL database of customer profiles
- Flexjet runs preset query for report on passenger satisfaction

dems have attracted users as well (for a hands-on critique of devices and service providers, see "Take a Walk on the Wireless Side," page 133).

But though e-mail promises immediate benefits, it doesn't bring handhelds fully into the fold. Neither do wireless LANs, also in their infancy, even though short-range protocols like Bluetooth and IEEE 802.11 promise high-bandwidth wireless within company walls (see "Bluetooth Brings Cable-Free Networking to Small Devices," in January's *Top of the News*, www.pcworld.com/jan2001/bluetooth).

REALITY CHECK

TO GET MEANINGFUL mileage out of wireless handhelds, your company must have an urgent need to transmit up-to-the-minute enterprise data to or from customers, suppliers, or employees in the field—information that can't wait for a landline connection. Don't expect a return on the investment anytime soon (though at least one of the firms profiled here expects to show a profit right away). Currently, the technology is too new and the systems are too experimental to justify themselves based on ROI. Still, if your company is likely to need this technology when wireless data systems mature in a few years, now is a good time to start an experimental pilot project. That way, you'll be ready to exploit the technology fully when it catches up with demand.

Be prepared for obstacles, however—especially bandwidth problem. A lucky few companies whose employees fall within the limited coverage area of Ricochet's wireless service can enjoy a wireless data transfer rate of 128 kbps for about $80 per remote unit per month. That's twice the speed you'd get from an ordinary dial-up connection, though it's well short of the high-speed bandwidth that most businesses employ for desktops. The next-best option is a Cellular Digital Packet Data service of the type that AT&T Wireless and OmniSky offer; these connections can reach speeds of up to 19.2 kbps. Failing that, you will have to accept the more conventional wireless data transfer rate—which runs around 9.6 kbps.

Authorities disagree about the best ar-

chitecture for corporate wireless applications. One camp, which includes Brad Wilson, vice president of product marketing for Epiphany, a company that sells customer relationship management (CRM) software, argues that the handheld client should be as small as possible. "All of Epiphany's products are browser-based, so it's pretty trivial for us to go wireless. We've always had a paper-thin HTML interface," Wilson explains.
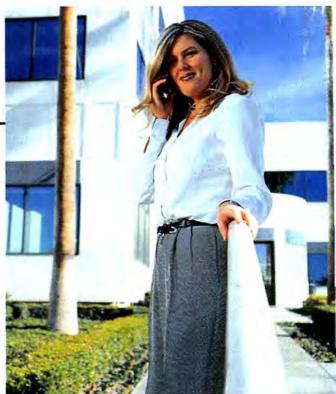
The other camp argues for a wireless version of the old client-server model, in which the remote device can continue to function when connectivity is lost. "Take sales-force automation," says David Finder, director of strategic alliances for mobile software developer Centura. "When salespeople have connectivity, they can be accessing inventory in real time, placing orders in real time. But if there isn't connectivity, they can keep working"—if they have a full-featured client application installed on their handheld computers. In cases where mobile personnel must input multiple pages of information, a "fat" client can batch that data and transmit it all in a single wireless burst.

To help you decide the best approach for your circumstances, we surveyed three companies that use wireless handhelds, plus a fourth that has adopted a more conventional wired approach (see page 156). We also diagrammed two typical installations (see pages 153 and 157). These examples remain in the pilot stage, but they're working well for the companies involved, and they point the way toward more comprehensive solutions to come.

JET-FAST CUSTOMER FEEDBACK

FLEXJET SELLS private jets—shares in them, actually. A subsidiary of Bombardier Aerospace, which manufactures Learjets, Dallas-based Flexjet has catered to the rich—and in some cases the famous—since 1995, selling what amount to flexible time-shares on private aircraft. In a typical package, a customer pays $1.5 million up front for one-eighth of a Learjet 60, plus $11,000 per month for maintenance and $1870 per hour of flight time. In return, the customer can fly anyone anywhere in the contiguous 48 states, on as little as 4 hours' notice.

Given that sky-high tab, Flexjet has to keep its customers happy. But Maxfield, owner services manager, was not content with the firm's existing method of surveying customer satisfaction, which involved having crews leave a voice-mail report after each flight. Crew time was expensive, the administrative time required to transcribe the report was not productive, and the quality of the data was questionable because the customer was not responding directly.

In late 1999, Justin Lacey, Flexjet's director of business planning and devel- ▶

opment, decided to deploy wireless Palm VIIs to handle this job. When a flight landed, he wanted the survey information transferred immediately; that way, if anything was amiss, the passengers could be contacted—and compensated or otherwise appeased—promptly.

A company called NHand Solutions, an Austin, Texas–based developer of handheld software, got the contract to build the survey application. The firm couldn't write it for the Palm VII's proprietary Web Clipping environment, which demands a continuous wireless connection—obviously not possible in flight. Instead, the company created a simple Palm OS appli-

cation that batches survey responses and dumps them into an e-mail message that gets transmitted wirelessly after the flight touches down. Then, at the receiving end, a script parses the data and imports it into Flexjet's SQL database (see the diagram on page 153). A simple content management system allows managers to revise the survey periodically, although the task of updating individual handhelds still requires a manual download.

The system cost roughly $50,000 to develop, and Lacey expects to break even within 18 to 24 months, thanks to a reduction in administrative costs. The real benefit, however, is in customer retention.

If immediate feedback and redress keeps just one high-flying customer from jumping ship, the system has paid for itself. Next wireless project: Flexjet may implement its Web-based flight reservation system on Palm VII handhelds, which would help simplify the real-time challenge of juggling travel plans for 550 owners of 110 aircraft on short notice.

MOBILE ORDER-TAKING

THE FINANCIAL HEALTH of Ingram Micro, the world's largest computer distributor, rests with the tens of thousands of resellers that actually market the products Ingram supplies. The resellers range from big chains like CompUSA to small, so-called value-added resellers (VARs) that serve niche markets. Ingram works hard to help them move product.

Last fall, for example, Ingram launched Partnership America, a Web exchange for VARs that serve the education and government markets. By December, it had set up 20 storefronts on the Web to function as commerce service providers so the VARs' customers could order Ingram products directly online.

The logical next step was to go wireless. So Pam Bryson, Ingram's vice president of business development, called on wireless application provider Brience to create an e-commerce system accessible by Palm devices as well as by cell phones that use the Wireless Application Protocol (WAP), a specification enabling a secure wireless data connection. Using a simple main menu, Partnership America customers can compare product prices, check on availability, place an order, and track its status until the goods arrive (for details, see the illustration on page 157). To jumpstart the program, Sprint gave away 50 WAP phones to preferred VARs, who passed them along to key customers.

Technologically, the most interesting part of the system is something Brience calls its Experience Delivery Server (EDS). When a page request comes in, this server detects the type of device used to submit it—phone, PDA, or regular desktop browser—and delivers the page accordingly. The mix of technology means that customers can use different modes of ac-

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The Wired Alternative: ParkStone Medical

Staying in Sync for Better Health Care

DOCTORS, LAWYERS, engineers, and other professionals often need mobile access to their data and thus are excellent candidates for handheld applications. But these apps needn't be wireless to be effective.

Consider **ParkStone Medical Information Systems.** The company—formed by internist Glenn Parker, M.D., and software designer Lewis Stone—makes software that helps doctors manage medications, referrals, diagnostic tests, and documentation for their patients.

Last fall, ParkStone rolled out a new Pocket PC product through IBM's Global Healthcare channel. By the end of the year, roughly 2100 physicians nationwide were using it to check on-the-spot whether a medication they wanted to prescribe was covered by a patient's health insurance. They could also investigate whether the drug might interact with foods or with other drugs.

The heart of the system is an SQL Server database that consolidates constantly updated information from health plans and pharmaceutical companies. On the handheld end is a homegrown mobile application—

"as easy to use as a microwave oven," Stone says—that can be synced with the server periodically.

Doctors receive the service at no charge, since insurers and pharmaceutical companies foot the bill. The insurance companies like the program because it streamlines their review process. Drug makers appreciate the fact that it provides physicians—who drive 85 percent of the nation's health

care costs—with detailed information on all of the company's latest medications.

NEXT STEPS

NOW STONE and Parker plan to go wireless. Aether Systems, a provider of wireless and mobile data products in Owings Mills, Maryland, created a wireless version of the product that is slated to enter beta testing this year. It supports true client-server architecture, meaning that the Pocket PC and the server swap messages only when the handheld client requests it. Otherwise, the Pocket PC works without a wireless connection, storing tens of thousands of patient medication histories locally.

"The great thing about the system," says Aether's corporate vice president of health care solutions Steve Bass (no relation to *PC World*'s columnist), is that by identifying potential drug interactions, "it's out there saving lives every day."

cess for different purposes. If they need to place lengthy or detailed orders, for example, they'll probably stick with the desktop. But for other purposes, the wireless network offers a convenient alternative. "If you're a technology buyer," Bryson explains, "you're going to place a lot of repeat orders. And it's easy for you to go in [on a PDA or phone] and type the SKU numbers or order numbers you'd like to look up." To address the problem of dropped connections, Brience keeps the input screens small and simple so the task can be finished in a few minutes—minimizing the user's risk of losing the link and having to start over.

BUILDING THE FUTURE
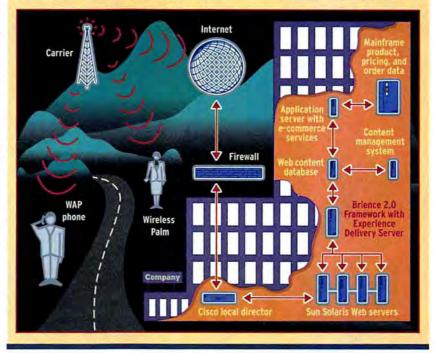
FOR BUILDSCAPE, an e-commerce portal that serves the construction industry, the challenge was not the restrictions of wireless but the limitations of its clientele's work habits. Buildscape offers a Web-based supply-ordering service for home builders and lumberyards. The builders can create their own home pages complete with customized materials lists for quick ordering. The suppliers are charged a small percentage (negotiated individually) of whatever they sell through the system. But Buildscape CEO Steve Wilson knew that builders spend about 90 percent of their time in the field. How could he keep them at their desktops long enough to use his site?

He didn't have to. In 1999, shortly after the Palm VII came out, the company began using the Palm's Web Clipping Applications technology to make portions of its site accessible by handheld. More recently, Buildscape expanded the system to serve WAP phones, Pocket PCs, two-way pagers, and—the device most builders prefer—Nextel phones with two-way radio and HDML (non-WAP) clients.

Currently about 150 builders use wireless devices to trigger delivery of the materials they specified earlier. Buildscape did much of the initial development in-house. But more recently it partnered with AvantGo, which created a client application that can serve Palm OS, Windows CE, or WAP devices using the firm's wireless application architecture. The

INGRAM'S PARTNERSHIP AMERICA e-commerce system lets important customers order anything from anywhere. The key to the system, diagrammed below, is something wireless applications provider Brience calls its Experience Delivery Server. This server examines incoming requests for data to determine what type of device they originated from—a desktop PC, a handheld, or a WAP-enabled phone—and also the bandwidth of the connection. The Brience software then uses XLS style sheets to format content specifically for that device. Ingram customers typically use a desktop to enter an original lengthy order, but they can place simple repeat orders from any of a range of wireless devices.
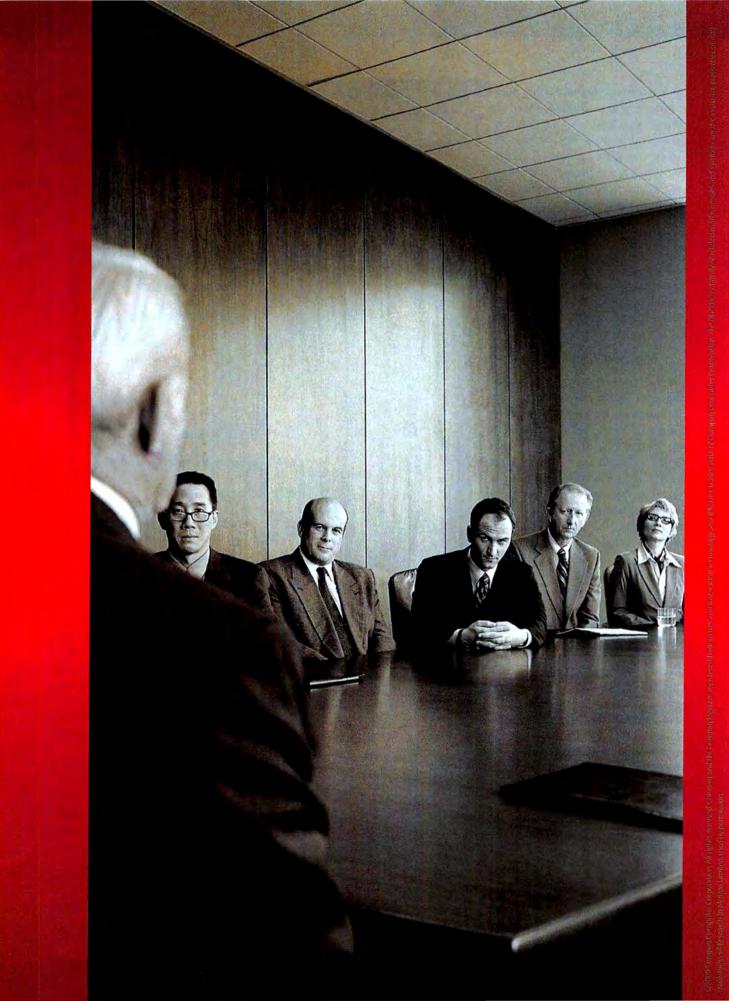
AvantGo client has a key advantage: It can serve pages without a connection, so a builder can browse catalogs and create orders offline and then send in the orders when a connection is reestablished.

The system remains in pilot mode because even users—like Leon Sekunda, president and CEO of Seabreeze Construction in Pensacola, Florida—say that it's sometimes faster just to phone the orders in. But Sekunda places orders on his Palm VII anyway, just to save himself some paperwork. "I can order materials from the job site, check their status, [and] check pricing," he says. "To me that's leaps and bounds beyond anything else out there at the moment."

THE ENTERPRISE UNSTRUNG

THOUGH PROJECTS LIKE Buildscape's are limited in scope today, that won't last long. Most observers expect digital wire-

less performance to improve dramatically in the next 18 months. By late this year, for example, U.S. carriers should start rolling out wireless services that offer always-on connections at speeds of up to 384 kbps. So businesses like Ingram Micro that operate in environments where timely remote information is critical have little to lose in creating pilot programs with marketing sizzle.

It's not too early to consider the possibilities in your own organization. Identify where mobile employees suffer most from lack of connectivity, observe how handhelds are being used in your business today, and take a close look at the wireless extensions now being added to enterprise applications. As Epiphany's Brad Wilson puts it: "We'll have 12 months or so of everybody saying, 'Will it take off? Will it take off?' And then suddenly everyone will want it yesterday." ▶

Rules of Thumb to **Strengthen Security** for Your Firm's Data

CLEVER HACKERS may get all the attention, but the most serious security threat at most enterprises is plain old password theft: Somebody gets hold of a valid user name and password, plus the right URL or dial-up number, and uses them to plunder your sensitive data. Or somebody steals a corporate notebook and, armed with the password, simply copies your secrets off the hard drive.

Increasingly, companies are turning to *biometrics*—technology that allows identification through fingerprint reading, face recognition, voice authentication, and so forth—to guard against such theft. Judging by the flurry of new devices that have appeared, you might think biometrics provides a foolproof defense. Many laptops now come with optional fingerprint readers (see *Top of the News*, page 60, for a review of the latest Compaq and Acer models with this capability). And IBM recently bundled Visionics face-recognition software with its UltraPort video camera, an option for the company's A, T, and X series ThinkPads. Mindful of products such as these, International Data Corporation expects annual sales of biometric devices to jump from $300 million this year to $1.8 billion by 2004.

Even if that forecast proves optimistic in the face of today's slowing economy, it's clear that biometrics is on the rise. But that does not mean that biometric devices will solve your security woes, experts warn, and your company should proceed

PORTABLE SECURITY Identix says its BioTouch PC Card fingerprint reader can protect any laptop from unauthorized entry.

cautiously if it plans to buy. Here are some pointers from consultants, manufacturers, and users to keep in mind:

Choose a mature technology. Currently, that probably means fingerprint readers, because some of the other technologies are less user-friendly or require considerable hardware, says Charles Kolodgy, research manager for IDC. For traveling execs, devices like laptop fingerprint scanners may do the trick. For those in the office,

YOU ARE WHAT YOU TOUCH Digital-Persona provides a fingerprint reader as well as an online identification service.

the solution may be fingerprint-protected hard drives from a manufacturer such as Loqware, or the new ID Mouse from Siemens, which has a fingerprint scanner built into its shell. Keep in mind, though, that as many as 3 to 4 percent of people have fingerprints that may be unreadable by the current generation of devices.

Don't kiss passwords good-bye. Every time a biometric device reads your fingerprint, face, signature, or voice, the data it produces is slightly different. If the recognition software can't account for that fluctuation, you'll never get past the gate—which is why you need to tweak the sensitivity until the system recognizes

SIGN ON THE GLOWING LINE Cyber-Sign bundles the Interlink EPad as an option with its Dynamic Signature Verification package.

the right person even on bad days while keeping the wrong people out. Given today's technology, that involves striking a delicate and imperfect balance. So think of biometrics as an added layer of security to be combined with standard passwords for especially sensitive data. That way, even if someone manages to steal your password, the thief will still need your fingerprint or face to get in.

Make sure that your system includes an old-fashioned manual override. Any data-protection scheme carries with it the risk of a malfunction that keeps out people who should get in. So you need a backup plan you can resort to if the fingerprint reader refuses to recognize you, or if the executive with sole biometric-protected access gets hit by a bus (or—perhaps more realistically—quits and resurfaces at the competition). The simplest safeguard is to make sure that every biometric-equipped device is accessible by at least two employees. But some experts advise that you implement another, ultrasecret password layer that circumvents biometric security altogether—just in case.

—*Caroline Jones* ▶

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Broadband Flights Face Delays

WHEN YOU FLY, do you suffer from Internet separation anxiety? Boeing has waged a high-stakes bet that you and millions of others do. Since 1996, the company has been developing an in-flight broadband system dubbed Connexion, which can deliver Internet access at T1 speeds via fuselage-mounted antennas, a network of communications satellites, and RJ45 ethernet ports that are built right into the seats.

Everyone seems to like the plan, at least in theory. Boeing's own surveys show that about 70 percent of business users carry laptops. And with an estimated 840,000 laptop-bearing business passengers currently in the sky every day, Boeing predicts a $38 to $40 billion international market for airborne Internet access by 2009; other analysts place demand as high as $70 billion during that same time. "On most planes, people don't use the phones [for Internet access] due to high cost or low bandwidth," says Ken Dulaney, vice president for wireless at the Gartner Group. "The Connexion initiative is pretty exciting."

The barriers to acceptance, however, appear sky-high. Although Boeing began promoting Connexion to the public a year ago and has tested the system on private jets, a Boeing spokesperson says that there is "nothing we can announce" about pending deals with—or even testing by—U.S. carriers. And the cost to passengers may be a sticking point: Boeing says the service will be sold at "cell-phone rates," but that could work out to $75 for a continuous broadband connection on a flight from Seattle to Miami.

Dulaney thinks customer resistance will help keep prices down-to-earth. "I would not be surprised if the cost was only $10 per flight, which would be very reasonable," he says. "And I think they have sufficient bandwidth to do a good job of providing this service." Boeing says its goal is to try to get the system into at least some commercial planes by early 2002. Until then, in-flight movie anyone?

—Stephanie Bruzzese

The **Storage Wars** Heat Up

E-BUSINESS is all about the ability to adjust scale quickly. In hardware terms, that may mean adding terabytes of storage to your network fast. Prompted by an influx of new players, competition among network storage vendors has reached a fever pitch, promising lower costs for big storage—but also raising questions about how best to proceed.

A year ago, the dominant names in network storage were clear. Network Appliance held sway in the Network-Attached Storage (NAS) market. NAS systems, exemplified by the company's popular Enterprise Filer series, can be plugged in, almost like an appliance, to a local area network, adding storage capacity without requiring a cumbersome upgrade. Thanks to snazzy cross-platform software, the new box full of hard disks instantly becomes available to the entire network. Meanwhile, EMC dominated the high end of the market, selling towering beasts such as its wardrobe-size, mainframe-compatible Symmetrix Enterprise Storage Systems. EMC concentrated on providing the hardware, software, and services needed to set up multimillion-dollar Storage Area Networks (SANs), which typically rely on the superfast Fibre Channel to connect storage behemoths.

More recently, though, the market has become a free-for-all. EMC recently introduced the Clariion IP4700, which starts at $82,000—roughly half the price of comparable Network Appliance storage servers. Network Appliance countered by announcing support for mainframes and databases made by EMC's biggest high-end rival, IBM. Just a few months earlier, IBM had joined with Compaq to create an alternate SAN standard that encroached on EMC's turf. Not to be left behind, Dell

NAS AND EASY STORAGE Dell's PowerVault 705N offers high-capacity network storage at an unusually low price point.

Computer announced that it would sell its PowerVault line of NAS servers at prices well below those of both EMC and Network Appliance. Subsequently, Hewlett-Packard, Sun, and Hitachi have upped the ante, widening and deepening their own competing lines. And more than 20 top storage providers have banded together to compete against the complicated Fibre Channel pathway by offering high-speed SANs over conventional networks.

What's a company to do? "Stay open-ended," advises Dan Tanner, senior analyst for storage and storage management at Aberdeen Group. "NAS and SAN are slowly converging. So consider storage systems with hardware or software commonalities that will permit eventual reuse in a converged infrastructure."

—Stephanie Bruzzese ■

BIG BOX ON THE NETWORK The F820 Enterprise Filer from Network Appliance is a popular Network-Attached Storage device.

PC AMERICA:
INVENTORY MANAGEMENT AT POINT OF SALE

www.pcamerica.com

The home page for PC America speeds you to the point-of-sale products you need.

While many motorists in Dimondale, Mich. say the family-owned Windmill Truck Stop is a home away from home, its controller, Kevin Edelmann, says it's been more like a house of accounting horrors. Besides monitoring retail fuel sales in the truck stop's "truckers only" area, he also has to keep an eye on commuters' and travelers' purchases in the king-sized complex's convenience store, family restaurant, motel, and auto service center. "Keeping track of all of that inventory has been a nightmare," Edelmann says.

The Point of Sale (POS) system that the Windmill had been using since 1982 did a fine job of ringing up sales, but it couldn't tell store managers anything about what was on the shelf. "The system only broke sales down by department," Edelmann says. "So it couldn't tell the difference between a tube of toothpaste and a bottle of shampoo."

Edelmann found only a few POS solutions that were easy to use, Microsoft Windows-based, and able to support multiple input devices. And none of them could manage the 20,000-plus items in the Windmill's convenience store and restaurant. "We desperately needed a solution that could bring all of these components of our business together," he says.

PC AMERICA

Things finally turned around at the Windmill once Edelmann deployed PC America's Cash Register Express (CRE 2000), a Windows-based POS program that works with ordinary PCs and peripherals, as well as barcode scanners, receipt printers, and pole displays (which show charges at the checkout counter). Now all of the Windmill's cashiers can use touch screens and barcode scanners to enter orders and update inventory. And setting up CRE 2000 could not be easier, says Edelmann. "PC America did

an excellent job pulling all of the hardware together initially. But the great thing about their software is that I can grab any component I want off the shelf and throw it together in no time. This is one slick program."

The Windmill has processed more than half a million transactions with CRE 2000 and PC America's Restaurant Pro Express (RPE 2000) since October 1999. And Edelmann predicts that PC America will continue to develop the software he needs to keep things running smoothly. "PC America is constantly improving upon their products," he says.

Now PC America is helping retailers like the Windmill to move beyond the sale itself to increase revenues. A new feature in CRE 2000 gives businesses the ability to print coupons on the bottom of sales receipts on an Epson TM-T88II receipt printer. They can use the coupons to advertise specials on slow business days (e.g., "10 Percent Off All Purchases Every Tuesday"), or to give their customers discounts on overstock items (e.g., "Get a Free Six-Pack of Pepsi on Your Next Visit").

CRE 2000's couponing feature promises retailers an excellent route to a crucial dimension in retail sales. "Repeat business is the most important aspect of any business," says PC America's president, Howard Gosman. "With this addition to our POS package, we are giving our customers a quick and easy-to-use method for creating it."

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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
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"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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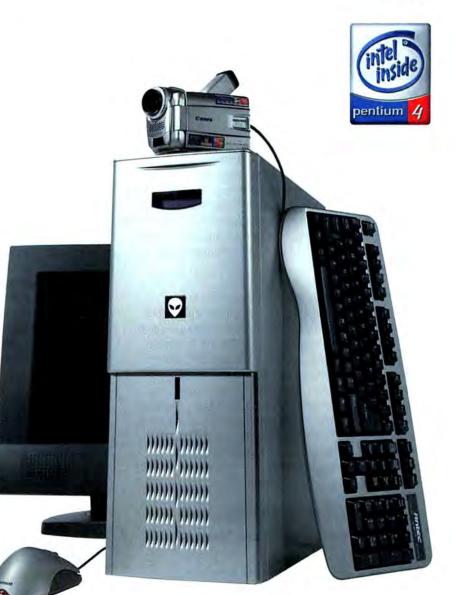
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TheBancorp.com is not the largest financial institution in the world, but on the web, it can take on just about any bank. The web site offers FDIC-insured checking accounts, online bill payment, car loans, and other options to individuals and businesses—all with just 70 employees in its Delaware and Pennsylvania offices. Until recently, while TheBancorp was extending a warm hand to its online customers, the bank itself was getting the cold shoulder from B-to-B marketplaces that have shunned small and midsize businesses.

Pete Chiccino, TheBancorp's vice president for networking and security, had already been cultivating a strong, long-standing friendship with firstsource.com, which builds B-to-B e-commerce solutions for small and midsize companies and Internet resellers. When firstsource announced its new e-procurement service, firstsourceconnect, Chiccino made sure TheBancorp would be among the first companies to try it. "Because of our excellent track record with firstsource," he says "we figured that this new service deserved a closer look. As it turns out, connect was a perfect match for our procurement requirements."

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Business Purchasing. Made Smart.℠

firstsourceconnect streamlines and economizes purchasing: it reduces paperwork and research, operation costs, and purchase cycle time. It also tightens controls over employee purchases and eliminates so-called "maverick" buying problems. TheBancorp uses connect to gauge product prices and availability, customize its pricing templates and billing reports, establish budgets, and enforce workflow procedures. Chiccino uses connect to sign off on purchases initiated by any of TheBancorp's 70 employees. "Every time someone places an order, I automatically receive an e-mail through connect,

requesting my approval," he explains. "I can then respond with an approval, or send the purchaser an explanation of why I am declining the purchase."

Through connect, TheBancorp has 24x7 access to firstsource's massive knowledge base, featuring more than 1.2 million products and services in ten categories, including computer hardware and software, consulting, and financing services. And firstsource saves TheBancorp time and money with real-time stock status information (no surprise back-order delays), and lists of top-selling items and weekly specials. "We're always able to buy everything from print consumables to computers in one place, and at an excellent price," Chiccino says.

While connect relies on firstsource's proprietary FSP platform, inpowr, to join TheBancorp with multiple B-to-B product distributors, the connection is nearly transparent for connect users. firstsource customized TheBancorp's portal to blend seamlessly with its own internal procurement systems. "firstsource matched the look and feel of our own web pages almost exactly," says Chiccino. firstsource can configure and launch new customized client portals within 15 days. Since the portals are web-based, updates occur on the client side automatically—no new downloads and reconfigurations are required.

Chiccino thinks that connect is the next evolutionary step in firstsource's support for small and midsize clients. "We're used to receiving a high level of customer service from our firstsource account executive," he says. "And connect is an extension of that service. We will now be doing most of our procurement over the web, but we'll still have access to real service representatives for technical assistance, or when we want to make changes to our ordering system."

Avoid white collar crime.

Don't spend $158 for an $8 stapler.

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TOP 100

Take Your Best Shot

Edited by Kalpana
Narayanamurthi

CAMEDIA
DIGITAL CAMERA
D-360L

OLYMPUS
OLYMPUS
LENS
5.5mm 1:2.8

1.3 Megapixel

EPSON

PhotoPC
3000Z

EPSON DIGITAL CAMERA LENS

f=7-21mm 1:2.0-2.5

FIRE AWAY:
Olympus's D-360L
(left) and Epson's
Photo PC 3000Z
earned the Best Buy
spots this month.

DIGITAL IMAGERY
or old-fashioned film
photography? Choos-
ing between the two
can be tough. Film
provides better-quali-
ty prints in most cases,
but digital images can be more
convenient, more immediate, and

cheaper in the long run (because you don't have to pay to get prints made).

If you're leaning toward digital imaging, our new *Top 10 Digital Cameras* chart will help you find the right camera.

Why digital cameras? Because the technology is changing rapidly and has generated a phenomenal level of interest. Our chart is divided into two categories: The top five cameras priced at $500 and up, and the top five costing under $500. If you take your photography seriously, you'll want to investigate the high-end models, which offer sharper resolutions and manual settings. The less-expensive units are ideal for a casual photographer seeking a point-and-shoot camera.

Taking top honors in the $500-and-over group, Epson's PhotoPC 3000Z combines superior picture quality and long battery life for $899. It's easy to use, too, with intuitive LCD buttons that change function as you switch between automatic, manual, and program modes.

For folks on a leaner budget, Olympus's $289 D-360L might fit the bill. It offers extras rarely found at this low price point: You can shoot at speeds of up to 2 frames per second and take panoramic pictures. With its advanced features and affordable price, this camera would make a good choice for beginning users looking to learn the basics plus a little more.

To find out more about digital cameras, look up our December 2000 story "Sharp Shooters" (www.pcworld.com/dec2000/shooters). PCWorld.com carries all our latest reviews of digital cameras, too, at www.pcworld.com/t10cameras.

OTHER CHANGES ARE AFOOT

SHARP-EYED READERS will notice that our business desktops charts look somewhat different this time around, too. If you've followed the Top 100 month after month, you know that in past months we divided our business desktops into three charts: Power, Midrange, and Budget. Starting this month, however, we're keeping the *Top 10 Power PCs* chart but consolidating the Midrange and Budget charts into one, the *Top 10 Value PCs*.

We've made this change for several reasons. First, many *PC World* readers are more interested in systems with the latest components than in PCs that cut costs by leaving out desirable extras. Changing the charts also gives us the flexibility to add product categories such as digital cameras to the Top 100.

One other change is a bit more subtle: We used to define the systems that qualified for our Power chart based on price alone. This method occasionally made for odd-duck categorizations of systems that had a high price but lacked power components (slow but relatively expensive all-in-ones with flat-panel displays, for example). Henceforth, a PC's price and overall configuration—fast processor, big hard drive and monitor, higher-end graphics, and so on—will determine whether it's a candidate for the Power chart. Everything else will go into the Value category.

Let us know how you like the change.

This month, just one new system, the ABS Performance Ultra, earned a place among the *Top 10 Power PCs*. Meanwhile, not surprisingly, combining the Midrange and Budget charts yielded many changes. A new system, the Gateway E-3400, earns the top spot, thanks to its wealth of management features. Other new systems on the chart include Micro Express's Micro-Flex 11A, Sys's TaskMaster 800D, and Tiny's T-Bird Business Edition.

Freelance writers Richard Jantz, Dan Littman, Joel Strauch, and Carla Thornton, along with PC World *editors Richard Baguley, Tracey Capen, Seán Captain, Lisa Cekan, Rebecca Freed, Kalai Murugesan, and Alan Stafford contributed to the articles in this month's Top 100. Testing was performed by Curt Buehler, Ulrike Diehlmann, Matt Halloran, Robert James, Elliot Kirschling, Jeff Kuta, and Thomas Luong of the PC World Test Center. See page 16 for contact information.* ▶

AN IMPRESSIVE performer, Gateway's speedy Select 1200 lands at number two in the power section of the *Top 15 Home PCs* chart.

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, scanners, 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

	POWER SYSTEM	Month tested	★ Overall rating	Street price (12/8/00)	PC WorldBench 2000 performance score[1] ▶Faster		Base configuration
1	**Dell OptiPlex GX300** 800/388-8542 www.dell.com	Nov 00	85	Average: $2463	Good	179	**Good:** Pentium III-866, 128MB of RDRAM, 256KB L2 cache, 20GB hard drive, 19-inch monitor, Windows 2000
2	**Dell Dimension 8100** 800/388-8542 www.dell.com	Feb 01	84	Very expensive: $3646	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	83	Average: $2450	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	Sys Performance 1100T 800/613-9963 www.sys.com	Dec 00	82	Average: $2296	Very good	229	**Good:** Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows NT 4.0
5	Xi Computer 1100K MTower SP 800/432-0486 www.xicomputer.com	Jan 01	82	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
6	Tangent Medallion Pro 800/342-9388 www.tangent.com	Jan 01	81	Inexpensive: $1995	Outstanding	201	**Good:** Pentium III-1000, 256MB of SDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 2000
7	ABS Performance Ultra 800/876-8088 www.abspc.com	(NEW)	80	Average: $2499	Very good	196	**Outstanding:** Athlon-1100, 256MB of SDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
8	Premio Apollo 820R 800/677-6477 www.premiopc.com	Dec 00	79	Average: $2304	Very good	168	**Good:** Pentium III-1000, 128MB of RDRAM, 256KB L2 cache, 41GB hard drive, 19-inch monitor, Windows 98 SE
9	HP Vectra VL400 800/752-0900 www.hp.com/desktops	Oct 00	79	Average: $2499	Good	188	**Good:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows 2000
10	Kingdom Royale PIII-933 800/385-3436 www.kingdomcomputers.com	Sept 00	73	Very expensive: $3199	Satisfactory	171	**Satisfactory:** Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 27GB hard drive, 15-inch LCD monitor, Windows 2000
	Best Buy	Percent of overall rating ▶		Price: 15 percent	Performance: 20 percent		Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 171.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

DELL SYSTEMS continue to hold on to the chart's top two spots. The managed OptiPlex GX300 remains at number one for a fourth month, and Dell's Pentium 4–powered Dimension 8100 moves up a few notches to snag the number two spot. The lone new system on the chart this month, the number seven ABS Performance Ultra, parlayed its Athlon-1100 processor into an impressive PC WorldBench score; it comes loaded with many multimedia extras.

1 DELL OPTIPLEX GX300

WHAT'S HOT: With a price trimming of $103, the OptiPlex GX300 retains top billing. This Pentium III-866 system earned a PC WorldBench 2000 score of 179—about 6 percent above the average for similarly configured systems running Windows 2000. Opening the wide midsize tower case is simple, thanks to a release button on the front of the system. A swing-out power supply affords easy access to the three open, tool-

less drive bays, and the five open PCI slots are obstruction-free. Dell's 19-inch Ultra-Scan P991 flat-screen CRT monitor produces bright, rich colors and crisp text at all resolutions, including 1600 by 1200.

WHAT'S NOT: The OptiPlex GX300 comes with 128MB of RDRAM, an expensive type of memory that can make upgrades quite pricey. Moreover, the performance benefits of RDRAM have been unimpressive in the tests we've run to date.

WHAT ELSE: The bundled Microsoft Nat-

ural Keyboard allows comfortable, quiet typing for those who like one-piece ergonomic-style keyboards. (Dell offers other keyboard choices as well.) The 8X/4X/32X CD-RW drive adds a fairly speedy option for backing up data. A case lock, chassis-intrusion detection, a network interface card (with Wake-on-LAN), and the included OpenManage Client remote-administration software round out the corporate features.

BEST USE: For businesses looking for a fast, managed Windows 2000 system, this OptiPlex offers substantial power.

2 DELL DIMENSION 8100

WHAT'S HOT: The Dimension 8100 is the first Pentium 4 system we've tested for the Top 100, and Dell assembled a fine supporting cast of components for it. The cutting-edge 12X/8X/32X CD-RW drive lets you burn discs in a flash. A Dell NVidia GeForce2

Extra features	Design and expandability [f]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Very good: Dell NVidia GeForce+ NV10 graphics card with 32MB of SDRAM, 8X/4X/32X CD-RW drive, network card, Microsoft Natural Keyboard, OpenManage Client, case lock	**Good:** tool-less slots and bays; midsize tower; 3 open drive bays, 5 open slots	Outstanding	Good/ Outstanding	24/7, toll-free	3/3
Very good: Dell NVidia GeForce2 GTS graphics card with 64MB of DDR SDRAM, 12X DVD-ROM drive, 12X/8X/32X CD-RW drive, V.90 modem, network card, Microsoft 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
Good: Creative Labs Tech GB0040 graphics card with 64MB of SDRAM, 4X/4X/24X CD-RW and 4X DVD-ROM combo drive, network card, Lotus Smart Suite Millennium Edition	**Good:** roomy interior; midsize tower; 3 open drive bays, 3 open slots	[3]	Fair [3]/ Good	24/7, toll-free	3/5
Good: Matrox Millennium G400 Max graphics card with 32MB of SGRAM, 8X/4X/32X CD-RW drive, network card	**Very good:** cluttered but roomy case; mid-size tower; 5 open drive bays, 3 open slots	[3]	Good [3]/ Good	24/7,[4] toll-free	Varies [5]/5
Good: Hercules 3D Prophet II GTS graphics card with 64MB of 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	[3]	Fair [3]/ Outstanding	24/7, toll-free	3/3
Good: Gainward CardExpert NVidia GeForce2 MX graphics card with 32MB of SDRAM, 12X DVD-ROM drive, network card	**Good:** difficult to access interior; midsize tower; 5 open drive bays, 5 open slots	[3]	Fair [3]/ Outstanding	24/7, toll-free	3/3
Very good: Creative Labs 3D Blaster Annihilator 2 Ultra graphics card with 64MB of 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	[3]	Fair [3]/ Fair	9/5, toll-free	3/lifetime
Very good: ELSA Gladiac-32 graphics card with 32MB of SGRAM, 12X DVD-ROM drive, 8X/4X/32X CD-RW drive, network card, Microsoft Office 2000 SBE	**Good:** plenty of expansion room; midsize tower; 4 open drive bays, 3 open slots	[3]	Fair [3]/ Fair	10/5, toll-free	3/3
Good: Matrox Millennium G400 graphics card with 16MB of SGRAM, 4X/4X/32X CD-RW drive, network card, HP's ProtectTools 2000, EDiagTools, TopTools management software	**Good:** easy to access memory; midsize tower; 2 open drive bays, 5 open slots	Good	Fair/ Good	24/7, toll call	3/3
Very good: Cardex NVidia TNT2 M64 graphics with 32MB of SDRAM, 40X–52X CD-ROM drive, LS-120 drive, V.90 modem, Microsoft Office 2000 Professional, McAfee VirusScan	**Good:** good expansion possibilities; midsize tower; 3 open drive bays, 4 open slots	[3]	Good [3]/ Fair	12.5/6,[4] toll-free	Varies [7]/1
Extra features: 10 percent	**Design and expandability: 15 percent**	**Reliability: 15 percent**	**Support and warranty: 15 percent**		

[3] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech-support quality, this rating may also depend on our anonymous support-quality calls.
[4] Support hours drop to 9 hours Monday–Friday after one year.
[5] Six years on CPU and main RAM, three years on other parts.
[6] Ten hours on Saturday.
[7] Five years on CPU and main RAM, one year on other parts.

GTS graphics card with 64MB of DDR SDRAM handles high-resolution graphics and provides digital video output for connecting to some flat-panel monitors. This system 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) of all vendors.

WHAT'S NOT: You'll pay for the wealth of features—the Dimension 8100 will set you back an eye-popping $3646. Because the system uses Rambus memory, future RAM upgrades may be especially costly. **WHAT ELSE:** Running Windows 2000, this system earned a 194 score on our PC WorldBench 2000 tests—20 points higher than a comparable 1-GHz PIII system recorded, but not greatly impressive given that the P4 has a 50 percent higher clock

speed. 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-less access to drive bays, a swing-out power supply, and tool-less case opening make working on the 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 for expansion.

BEST USE: This solid PC has the goods for any power user seeking the latest technology at any price.

New on the Chart

7 ABS PERFORMANCE ULTRA

NEW **WHAT'S HOT:** Using an Athlon-1100 processor bolstered by 256MB of RAM, this powerhouse jetted to a 196 score on our PC WorldBench 2000 tests.

STRONG PERFORMANCE and impressive corporate features keep Dell's OptiPlex GX300 at the top.

That's 2 points higher than the Dell Dimension 8100 (our number two Best Buy) achieved. On top of that, the ABS more than matches the Dell in multimedia extras: The ViewSonic E790 19-inch monitor delivers rich colors and sharp, legible text—even at its maxi- ►

THE ABS PERFORMANCE ULTRA offers powerful performance and a wealth of multimedia extras.

mum resolution of 1600 by 1200. The Creative Labs 3D Blaster Annihilator 2 Ultra graphics card with 64MB of DDR SDRAM can easily handle any heavy-duty graphics task you throw at it; meanwhile, on the audio side, Creative Labs' Sound Blaster Live Platinum sound card complete with Live Drive (featuring seven additional audio outputs) provides true Dolby 5.1 sound. A 12X/10X/32X CD-RW drive rounds out the list of fancy goodies. **WHAT'S NOT:** Lifting off the side of this gray-and-beige midsize tower requires

using a screwdriver to remove two screws. ABS's support hours are meager: 9 hours per day, on weekdays only.
WHAT ELSE: Even with all of the system's components packed in, the Performance Ultra maintains a tidy interior, thanks to bundled cables that leave the space in front of the three open PCI slots and two open bays clear of tangle. ABS provides its usual large binder to organize the discs and documents for the software bundle, which includes Microsoft Office 2000 Small Business Edition. The system's merely adequate manual contains a lot of generic information; fortunately, it also has a thorough troubleshooting section. A Microsoft Internet keyboard with ten programmable hot keys permits smooth and comfortable typing.
BEST USE: Experienced power users should appreciate this fast Athlon-1100 system. You'll want to add a network card for most small office applications, however. And in light of the short support hours, you should look elsewhere if your

business will suffer if the PC suddenly goes haywire while you're working late some evening or over the weekend.

Also of Note

AS A RESULT of the changes to the Top 100 this month, you might have expected to see more changes to our *Top 10 Power PCs* chart. But the chart retains most of the key players from last month. One big change: Dell's Dimension 8100 moved from number five to number two, earning Best Buy recognition for the first time.

Polywell's Poly 830K7-1100 stays in third place for a second month, thanks to impressive marks on our PC WorldBench 2000 tests. It also has 256MB of RAM and plenty of space for upgrades.

Following a huge $522 price drop, Sys's Performance 1100T moves from number six to number four, while Xi Computer's 1100K MTower SP retreats from number four to number five.

The bottom half of the chart remains almost unchanged. Premio's Apollo 820R moves up a notch to eighth place, while HP's Vectra VL400 and Kingdom's Royale PIII-933 round out the list. ▶

Does It Matter if You Have a Speedy DVD-ROM Drive?

TECH TREND YOU'VE TRICKED OUT your PC with the fastest DVD-ROM drive you could find. But does it affect how fast your applications run or how well movies play? Well...yes and no. Few PC applications are currently packaged in DVD-ROM format. Movies still make up the majority of available DVDs, and all of them are formatted to play at 1X. So when you watch a movie, a 16X DVD-ROM drive won't provide additional benefits. "It's just like playing music on a CD-ROM drive," explains Wolfgang Schichtling, research manager of removable storage at International Data Corporation. "The disk simply will not spin faster."

So was paying extra for your fast DVD-ROM drive a waste of cash? Not necessarily. DVD-ROM drives also read CD-ROMs, and they can install applications and access data faster than their speed rating implies.

According to Schichtling, the difference in CD-ROM and DVD-ROM speeds continues to confuse many users. "There might be a misperception out there," he says. People may ask, "Why should I buy a 12X DVD-ROM drive when I could get a 48X CD-ROM drive?" The confusion lies in the fact that DVD and CD transfer rates aren't commen-

surate. The X in a CD-ROM drive's speed signifies the transfer rate of 150 kilobytes per second, whereas the X in a DVD-ROM drive's speed equals roughly 1.4 megabytes per second. Therefore, a 1X DVD-ROM drive runs faster than an 8X CD-ROM drive.

Adding to the confusion is the way manufacturers report drive speed. A CD-ROM drive's speed is stated as a range—16X-40X, for example—because the CD-ROM spins at a constant speed, and the drive therefore reads data at different rates depending on whether the data lies on the inner or outer area of the disc. In contrast, a DVD-ROM drive's speed is usually reported with one number, such as 12X. If you're lucky, the drive's specs will identify a higher number that represents the CD-ROM speed. Some manufacturers even combine the numbers—for example, 12X-40X—where the first number is the DVD transfer rate and the second denotes the maximum CD-ROM rate. Again, however, those two X ratings represent very different transfer rates. So the next time you're thinking of upgrading your system with the latest and greatest DVD-ROM drive, remember to check the fine print.

Hearing the phrase
"essential resource"
makes most people think of water.

We think of printers.

Color printers to be exact. Maybe we're obsessive, but consider the upside. Who better to buy a printer from than a fanatic.

Case in point: the **MINOLTA-QMS** magicolor® 2200 desktop color laser printer. It prints color and monochrome in one printer, 20 ppm monochrome and 5 ppm in color, and offers multiple language support. The magicolor® 6100 also prints monochrome and color, plus it can print in 11"x 17" and larger. And both the 2200 and the 6100 come with Crown® II, a patented technology that improves printing performance and reduces network traffic.

We do obsess about printers so you probably don't want to get stuck in an elevator with us. But you'll certainly appreciate what a little obsession has done for our product. To learn more, call: **1-800-49COLOR** or visit us online at: **www.minolta-qms.com**

The essentials of imaging

MINOLTA
QMS

TOP 10 VALUE PCs

	VALUE SYSTEM	Month tested	★ Overall rating	Street price (12/8/00)	PC WorldBench 2000 performance score [1] ▶ Faster	Base configuration
1	Gateway E-3400 800/846-2106 www.gateway.com	(NEW)	86	Average: $1561	Outstanding 190	Outstanding: Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 2000
2	Dell Dimension L800r 800/388-8542 www.dell.com	Jan 01	84	Very inexpensive: $849	Good 143	Good: Pentium III-800EB, 128MB of SDRAM, 256KB L2 cache, 10GB hard drive, 17-inch monitor, Windows Millennium Edition
3	NuTrend Athlon Special 2 888/482-6678 www.nutrend.com	Jan 01	83	Inexpensive: $1069	Very good 152	Very good: Athlon-850, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows Me
4	Micro Express MicroFlex 11A 800/989-9900 www.microexpress.net	(NEW)	83	Inexpensive: $1199	Outstanding 175	Outstanding: Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 98 SE
5	ABS Multimedia System 2 800/876-8088 www.abspc.com	Jan 01	82	Average: $1489	Very good 152	Outstanding: Athlon-900, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows Me
6	Sys TaskMaster 800D 800/613-9963 www.sys.com	(NEW)	81	Inexpensive: $1160	Very good 172	Very good: Duron-800, 128MB of SDRAM, 64KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 2000
7	Tiny T-Bird Business Edition 888/818-8469 www.tiny.com/us	(NEW)	81	Average: $1599	Outstanding 160	Outstanding: Athlon-1000, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows Me
8	IBM NetVista A40 6578-PBU 800/426-2968 www.ibm.com/pc	Jan 01	80	Inexpensive: $1195	Very good 168	Very good: Pentium III-866, 128MB of SDRAM, 256KB L2 cache, 20.4GB hard drive, 17-inch monitor, Windows 2000
9	Compaq Deskpro EX 800/345-1518 www.compaq.com	Nov 00	79	Average: $1480	Good 193	Outstanding: Pentium III-733, 128MB of SDRAM, 256KB L2 cache, 15GB hard drive, 19-inch monitor, Windows NT 4.0
10	PC Connection Epiq BVS 4000 800/800-0011 www.pcconnection.com	Feb 01	78	Inexpensive: $1099	Good 139	Very good: Pentium III-800EB, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 98 SE
	Best Buy	Percent of overall rating ▶		Price: 17 percent	Performance: 18 percent	Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 171.

[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).

FINE PERFORMANCE and an easy-to-service design help Gateway's E-3400 win the top spot. Three AMD-based PCs also debut: The Micro Express MicroFlex 11A has an Athlon-1100 CPU; Sys's TaskMaster 800D uses a Duron-800 processor; and Tiny's T-Bird Business Edition is powered by an Athlon-1000.

1 GATEWAY E-3400

WHAT'S HOT: This PIII-933–based model blazed to a score of 190 on our PC WorldBench 2000 tests— NEW ten points higher than the average for similarly configured Windows 2000 systems. The E-3400 is loaded with such corporate features as a network interface card (with Wake-on-LAN), Intel LANDesk Client Manager remote administration software, and chassis-intrusion detection. A sensor on the motherboard enables you 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: 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 take it off. The case side comes off after you loosen a single thumbscrew, but reattaching it takes some fiddling. Though the 17-inch Gateway EV700 monitor rendered vibrant colors, text looked blurry at 1024 by 768 resolution and was nearly illegible at the maximum resolution of 1280 by 1024.

WHAT ELSE: The E-3400 packs Iomega's Zip 250 drive for backing up data, but it's next to the nearly identical floppy drive, inviting disk mix-ups. An 8X/4X/32X CD-RW drive supports fairly speedy CD burning. 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 or launching applications.

BEST USE: The E-3400 would suit any medium-size to large business looking for a powerful PC with management options.

2 DELL DIMENSION L800R

WHAT'S HOT: Number two on last month's Budget chart, this $849 PC holds the same ranking on our new Value chart. The 17-inch Dell M781S monitor displays vibrant colors and produces crisp text at 1024 by 768 resolution,

Extra features	Design and expandability [2]	Vendor's system reliability	Tech support quality/policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Outstanding: ATI Rage Fury Pro 2000 graphics card with 16MB of SDRAM, 8X/4X/32X CD-RW drive, network card, Iomega Zip 250 drive, Intel LANDesk Client Manager, Wake-on-LAN	**Satisfactory:** tool-less hard drive removal; desktop; 0 open drive bays, 3 open slots	Good	**Fair/Outstanding**	24/7, toll-free	3/3
Good: integrated Intel 810 graphics with UMA, 17X–48X CD-ROM drive, V.90 modem, Microsoft Works Suite 2000, Norton AntiVirus	**Satisfactory:** cramped interior; minitower; 1 open drive bay, 2 open slots	Outstanding	**Good/Good**	24/7, toll-free	3/1
Very good: Leadtek WinFast 3D S325 graphics card with 32MB of SDRAM, 12X DVD-ROM drive, V.90 modem, network card, Corel WordPerfect Office 2000	**Good:** open bays easily accessible; midsize tower; 4 open drive bays, 2 open slots	[1]	**Fair [1]/Good**	9/5, toll-free	3/lifetime
Outstanding: ELSA Gladiac 32 graphics card with 32MB of SGRAM, 12X DVD-ROM drive, 4X/4X/24X CD-RW drive, V.90 modem, network card	**Good:** loads of expansion room; midsize tower; 3 open drive bays, 4 open slots	[1]	**Fair [1]/Outstanding**	24/7, toll-free	4/4
Outstanding: Leadtek WinFast GeForce2 MX graphics card with 32MB of SDRAM, 16X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem, network card, WordPerfect Office 2000	**Good:** well-organized interior; midsize tower; 3 open drive bays, 2 open slots	[1]	**Fair [1]/Fair**	9/5, toll-free	3/lifetime
Very good: integrated NVidia TNT2 M64 graphics with 32MB of SDRAM, 22X–50X CD-ROM drive, network card	**Good:** limited expansion possibilities; minitower; 2 open drive bays, 2 open slots	[1]	**Good [3]/Good**	24/7,[4] toll-free	Varies [5]/5
Outstanding: PMC PixelView GeForce2 MX graphics card with 32MB of SDRAM, 8X–40X CD-ROM drive, 4X/4X/24X CD-RW drive, V.90 modem, network card, Microsoft Office SBE	**Satisfactory:** crowded interior; minitower; 1 open drive bay, 1 open slot	[1]	**Good [3]/Good**	24/7, toll-free	3/1
Very good: integrated Intel 815 graphics with UMA, 20X–48X CD-ROM drive, network card, IBM Universal Manageability	**Satisfactory:** tool-less case removal; desktop; 1 open drive bay, 2 open slots	Good	**Good/Good**	24/7, toll-free	3/3
Outstanding: Mitac NVidia TNT2 M64 graphics card with 16MB of SDRAM, 20X–48X CD-ROM drive, network card, 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: integrated Intel 815 graphics with UMA, 22X–52X CD-ROM drive, V.90 modem, network card, Corel WordPerfect Office 2000, Wake-on-LAN	**Satisfactory:** tool-less drive bay removal; midsize tower; 4 open drive bays, 1 open slot	[1]	**Fair [1]/Outstanding**	24/7, toll-free	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.

with only slight blurring at the maximum resolution of 1280 by 1024. You can open the generic beige minitower without tools. A sturdy cardboard box houses a thick reference and troubleshooting manual, a setup poster, and a quick-setup guide. In our latest reader survey, Dell received an Outstanding grade for system reliability.

WHAT'S NOT: The minitower lacks a reset button, and reattaching the tower's flexible plastic side takes a lot of maneuvering. The PC has to share its 128MB of RAM with the Intel 810 integrated video. Systems with shared memory run slower than those with dedicated video RAM when handling demanding 3D graphics.

WHAT ELSE: Using a Pentium III-800EB processor and running Windows Me, the Dimension L800r earned a PC World-Bench 2000 score of 143—average for its configuration but impressive for such a low-cost system. Microsoft Works Suite 2000 and Norton AntiVirus are bundled

with the PC. The sturdy Dell Quiet-Key keyboard allows smooth but not especially quiet typing. Two open PCI slots and one open drive bay reserve minimal expansion options. **BEST USE:** The Dimension L800r offers ample performance for any cost-conscious small-business user.

New on the Chart

4 MICRO EXPRESS MICROFLEX 11A

NEW **WHAT'S HOT:** $1199 is a low price for a PC powered by an Athlon-1100 processor. You also get a quick-setup poster and thorough documentation for the individual components.

WHAT'S NOT: Though it delivered lively colors, the 17-inch Impression Vienna Pro 7SF monitor rendered blurry text at 1024 by 768 and higher resolutions, up to the unit's 1600 by 1200 maximum. If you

FAST, FLEXIBLE, and business-friendly: The Gateway E-3400 earned a PC WorldBench 2000 score of 190.

order from Micro Express, get a monitor upgrade. Other drawbacks: integrated sound, weak Pro Juster Air-Wave AW-371 speakers, and a rather slow 4X/4X/24X CD-RW drive. Recent complaints about Micro Express's service bear watching. **WHAT ELSE:** Running Windows 98 ▶

SE, the MicroFlex 11A posted a PC World-Bench 2000 score of 175—average for systems with the same configuration, but impressive for the price. To open the gray-and-beige midsize tower, you remove a single thumbscrew. The top then pops off, so you can remove each side smoothly. Four open PCI slots and three open bays provide abundant expansion room in the neat interior. Typing on the Microsoft Natural Keyboard Elite was a pleasure. **BEST USE:** The MicroFlex 11A will suit would-be power users on a strict budget.

6 SYS TASKMASTER 800D

NEW **WHAT'S HOT:** The first Duron-800–based system we've seen, the Task-Master 800D earned a high mark of 172 on our PC WorldBench 2000 tests—only three points below the average for PIII-800 systems running Windows 2000. **WHAT'S NOT:** The TaskMaster 800D lacks a reset button. No system manual comes in the box, though the documentation for individual components is thorough. **WHAT ELSE:** The 17-inch Optiquest Q71 monitor delivered rich colors, but text looked fuzzy at 1024 by 768 resolution and blurred considerably at the maximum resolution of 1280 by 1024. Though the 800D uses integrated graphics, its NVidia TNT2 chip set with 32MB of SDRAM has plenty of memory for a business PC. The TaskMaster's tool-less, beige minitower case contains two open bays and two open slots for future expansion. A loop-style case lock enhances security, and the unit's flexible side goes off and on smoothly after you remove two thumbscrews. The

THE DURON RUNS: The Sys TaskMaster 800D carries a peppy Duron-800 CPU—the first we've looked at.

Display Cache With Intel's 815 Chip Set

TECH TREND SYSTEMS WITH integrated graphics, such as those with Intel 810 or 815 chip sets, use their main (or system) RAM instead of carrying additional, dedicated memory for graphics. The result is a less-expensive system that compromises 3D performance.

To overcome this difficulty, various PC vendors include a 3D display cache of a few megabytes (4MB or so) on a graphics performance accelerator card. The cache aids the system's graphics performance by acting as dedicated RAM for some complex 3D calculations. Most GPA cards hold 4MB of display cache and fit into

SYSTEMS WITH the Intel 815 chip set can use a graphics card (top) or a display cache card.

a special slot on the motherboard of Intel 810-based systems. In contrast, the 815 chip set supports 4X AGP and has an AGP slot, so you can install a separate graphics card and disable the integrated graphics, if you wish. Or you may use the 4MB display cache.

If you have an Intel 815-based machine that contains one of these small cards in its brown AGP slot, you can replace the display cache with a stand-alone graphics card to enhance 3D performance. Graphics cards, with their dedicated memory and graphics coprocessors, deliver far better performance than the display cache adds.

800D's standard Sys keyboard offers buttons for sleep, wake-up, and power, and permits smooth and quiet input. **BEST USE:** This fast Sys would work well in any small business. We recommend spending $120 extra to upgrade to a 19-inch Optiquest Q95 monitor, however.

7 TINY T-BIRD BUSINESS EDITION

NEW **WHAT'S HOT:** This T-Bird earned a 160 score on our PC WorldBench 2000 tests—average for an Athlon-1000 system running Windows Me, and one point above the average mark for Pentium III-1000 systems running the same OS.

WHAT'S NOT: Reset buttons sit somewhat inconveniently at the top of the minitower, and they got pushed accidentally during our tests. Removing the case side requires using a screwdriver to take out two screws. You'll need the screwdriver again to remove the plastic cover protecting the top of the expansion slots. The cramped interior has only one open PCI slot and one open bay. The RAM slots are difficult to reach, and the 5.25-inch drives are set next to the power

supply, making them very hard to remove. **WHAT ELSE:** Tiny says shipping T-Birds will have 19-inch Goldstar 19C monitors instead of the excellent 19-inch Tiny B1996NSL monitor on our test system. A 4X/4X/24X CD-RW drive is a nice extra. Tiny's thick system manual explains how to burn CDs and packs lots of color illustrations—but also some generic information and extraneous tips. A color setup poster and the system's color-coded rear ports simplify assembly. The keyboard features 14 multimedia buttons and programmable hot keys. Typing was fairly smooth, despite some clacking. Microsoft's Office 2000 Small Business Edition came bundled with our test unit. **BEST USE:** The speedy T-Bird Business Edition would fit well in a small office that doesn't require expansion options. ▶
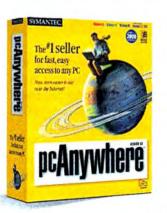
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TOP 15 NOTEBOOK PCs

	POWER NOTEBOOK: $2700 AND OVER	Month tested	★ Overall rating	Street price (12/8/00)	PC WorldBench 2000 performance score ▸ Faster	Base configuration
1	Dell Latitude CPx J750GT 800/388-8542 www.dell.com	Sept 00	89	Inexpensive: $2848	Good 153	Very good: Pentium III-750/600, 14.1-inch active screen, touch-pad, eraserhead, 128MB of SDRAM, 20GB hard drive, Win 2000
2	Dell Inspiron 8000 800/388-8542 www.dell.com	(NEW)	89	Average: $3254	Good 159	Outstanding: Pentium III-850/700, 15-inch active screen, touch-pad, eraserhead, 128MB of SDRAM, 20GB hard drive, Win 2000
3	IBM ThinkPad A21p 888/746-7426 www.ibm.com/thinkpad	Feb 01	88	Very expensive: $4049	Outstanding 182	Very good: Pentium III-850/700, 15-inch active screen, track-point, 256MB of SDRAM, 32GB hard drive, Windows 2000
4	IBM ThinkPad T20 888/746-7426 www.ibm.com/thinkpad	Sept 00	88	Average: $3249	Satisfactory 136	Satisfactory: Pentium III-700/550, 14.1-inch active screen, eraserhead, 128MB of SDRAM, 12GB hard drive, Windows 98 SE
5	Acer TravelMate 737TLV 800/733-2237 www.acer.com/aac	Dec 00	86	Inexpensive: $2899	Satisfactory 132	Good: Pentium III-700/550, 15-inch active screen, touchpad, 128MB of SDRAM, 18GB hard drive, Windows 98 SE
	MIDRANGE NOTEBOOK: $2000 TO $2699	Percent of overall rating ▸		Price: 14 percent	Performance: 20 percent	Base configuration: 5 percent
1	Dell Inspiron 4000 800/388-8542 www.dell.com	(NEW)	89	Average: $2199	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	87	Inexpensive: $2128	Good 147	Good: Pentium III-650/500, 14.1-inch active screen, touchpad, 128MB of SDRAM, 10GB hard drive, Windows 2000
3	Acer TravelMate 602TER 800/733-2237 www.acer.com/aac	Sept 00	85	Average: $2400	Good 127	Very good: Pentium III-650/500, 13.3-inch active screen, touch-pad, 128MB of SDRAM, 12GB hard drive, Windows 98 SE
4	WinBook Si 800/128 800/965-9349 www.winbook.com	Dec 00	82	Average: $2199	Very good 144	Good: Pentium III-800, 14.1-inch active screen, touchpad, 128MB of SDRAM, 10GB hard drive, Windows 98 SE
5	HP OmniBook XE3 800/752-0900 www.hp.com	Jan 01	82	Average: $2249	Satisfactory 133	Good: Pentium III-700/550, 15-inch active screen, touchpad, 64MB of SDRAM, 10GB hard drive, Windows 2000
	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	94	Inexpensive: $1299	Good 113	Satisfactory: Celeron-600, 12.1-inch active screen, touchpad, eraserhead, 64MB of SDRAM, 5GB hard drive, Windows 98 SE
2	Dell Latitude CPt S600ST 800/388-8542 www.dell.com	Feb 01	93	Average: $1499	Good 113	Satisfactory: Celeron-600, 12.1-inch active screen, touchpad, eraserhead, 64MB of SDRAM, 6GB hard drive, Windows 98 SE
3	Micro Express NP4800B 800/989-9900 www.microexpress.net	(NEW)	84	Expensive: $1799	Outstanding 139	Outstanding: Pentium III-800/650, 14.1-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 98 SE
4	Gateway Solo 1150cl 800/846-2000 www.gateway.com	Dec 00	84	Inexpensive: $1299	Satisfactory 96	Satisfactory: Celeron-550, 12.1-inch active screen, touchpad, 64MB of SDRAM, 6GB hard drive, Windows Me
5	Acer TravelMate 350TE 800/733-2237 www.acer.com/aac	(NEW)	81	Expensive: $1999	Satisfactory 104	Very good: Pentium III-650/500, 13.3-inch active screen, touch-pad, 64MB of SDRAM, 10GB hard drive, Windows Me
	Best Buy	Percent of overall rating ▸		Price: 20 percent	Performance: 14 percent	Base configuration: 5 percent

¹ Unless otherwise noted, all notebooks come with a lithium ion battery. ² Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive. ³ Due to insufficient data from survey, score is based on responses to anonymous calls for tech support. ⁴ Insufficient data to give a rating.

IF YOU KEEP SENSITIVE data like hush-hush sales figures on your laptop, you're probably paranoid about prying eyes. Acer's $1999 TravelMate 350TE, one of four new notebooks on our Top 15 this month, guards against would-be snoops and thieves with a built-in Smart Card reader—one of the few we've seen in a notebook. To gain access to the 350TE, you must insert the microchip-equipped Smart Card (about the size of a credit card) into the reader slot and supply a PIN—a tougher scheme to defeat than a hard drive password. Ultra-portable at 3.8 pounds (minus add-ons) and equipped with a PIII-650/500 CPU, the 350TE is light, fast, and stylish.

Another new 3.8-pound ultraportable, HP's $3149 OmniBook 500, fell just short of joining our Power list. The 500's keyboard is unusually solid-feeling and comfortable for a small notebook. This Omni-

Extra features [1]	Design and ease of use	Battery life (hours:min)	Travel weight (pounds) [2]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Good: multipurpose bay, 10X-24X CD-ROM drive, PC Card modem	**Outstanding:** dual pointing devices and a smorgasbord of possible add-ins	Good/ 3:15	Average/ 8.6	Good	Good/ Good	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
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: multipurpose bay, 6X DVD-ROM drive, built-in modem and network interface	**Very good:** travel ThinkPad adds Bluetooth port, network jack, and great electronic manual	Good/ 3:21	Light/ 6.5	Good	Good/ Fair	24/7, toll-free	3/3
Good: multipurpose bay, 6X DVD-ROM drive, built-in modem and network interface, Microsoft Works 2000	**Very good:** holds a second hard drive, but DVD playback quality could be better	Outstanding/ 5:34	Average/ 8.2	Good	Good [3]/ Fair	24/7, toll-free	1/1
Extra features: 5 percent	**Design and ease of use: 10 percent**	**Battery life: 8 percent**	**Weight: 8 percent**	**Reliability: 20 percent**	**Support and warranty: 10 percent**		
Good: multipurpose bay, 10X-24X CD-ROM drive, built-in modem, Microsoft 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
Good: multipurpose bay, 4X/2X/20X CD-RW drive, built-in modem and network interface, Microsoft Works 2000	**Very good:** LAN-ready lightweight with soft, quiet keys; CD-RW instead of floppy drive	Very good/ 4:21	Light/ 6.7	Good	Good [3]/ Fair	24/7, toll-free	1/1
Satisfactory: 6X DVD-ROM drive, built-in modem	**Satisfactory:** boxy unit has Web and mail-launch buttons, uses desktop version of CPU	Satisfactory/ 2:57	Average/ 8.1	Fair	Good [3]/ Fair	13/6, toll-free	3/3
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 [3]/ Poor	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**		
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
Good: multipurpose bay, 10X-24X CD-ROM drive, built-in modem	**Excellent:** dual pointing devices; modular bay holds eight different peripherals	Very good/ 4:19	Average/ 8.3	Good	Good/ Good	24/7, 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	[4]	Fair [3]/ Fair	24/7, toll-free	2/2
Limited: 10X-24X CD-ROM drive, built-in modem	**Satisfactory:** sleek iBook-like design; built-in speakers offer boom-box sound	Satisfactory/ 2:27	Average/ 7.8	Fair	Fair/ Good	24/7, toll-free	3/3
od: 10X-24X CD-ROM drive, built-in modem and network interface, Microsoft Works 2000, Smart Card security	**Very good:** clunky external CD-ROM/floppy drive combo, but big screen and nice keyboard	Satisfactory/ 2:27	Average/ 6.9	Good	Good [3]/ Fair	24/7, toll-free	1/1
Extra features: 5 percent	**Design and ease of use: 10 percent**	**Battery life: 8 percent**	**Weight: 8 percent**	**Reliability: 20 percent**	**Support and warranty: 10 percent**		

Book can hold three power packs at once for more than 9 hours of operation (although you'll have to put two of them in the included 1.6-pound media slice).

Don't need cutting-edge? The $1799 Micro Express NP4800B, our new number three budget choice, is this month's Blue Light special. Though on the heavy side, it packs a heap of goodies for the price, including a Pentium III-800/650 processor and a DVD-ROM drive.

Contributing Editor Carla Thornton covers notebooks for PC World. ▶

THE DELL Inspiron 8000's 15-inch screen can hit 1600 by 1200 resolution.

TOP 15 HOME PCs

	POWER SYSTEM: $2000 AND OVER	Month tested	★ Overall rating	Street price (12/12/00)	PC WorldBench 2000 performance score [1] ◀ Faster ▶		Base configuration [2]
1	Dell Dimension 8100 800/388-8542 www.dell.com	NEW	90	Very expensive: $3048	Good	157	Very good: Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 40GB hard drive, midsize tower, 19-inch monitor, Windows Millennium
2	Gateway Select 1200 800/315-2536 www.gateway.com	NEW	85	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	HP Pavilion 9720 800/752-0900 www.hpshopping.com	Feb 01	83	Inexpensive: $2269	Very good	162	Satisfactory: Athlon-1200, 128MB of SDRAM, 256KB L2 cache, 30.7GB hard drive, tower, 17-inch monitor, Windows Me
4	Compaq Presario 7000T 800/345-1518 www.compaq.com	Dec 00	82	Average: $2650	Good	155	Very good: Pentium III-1000, 128MB of SDRAM, 256KB L2 cache, 75GB hard drive, midsize tower, 19-inch monitor, Windows Me
5	ABS All-U-Can 800/876-8088 www.buyabs.com	NEW	80	Inexpensive: $2249	Good	153	Very good: Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 40GB hard drive, midsize tower, 19-inch monitor, Windows Me
	MIDRANGE SYSTEM: $1200 TO $1999	Percent of overall rating ▶		Price: 10 percent	Performance: 20 percent		Base configuration: 10 percent
1	Dell Dimension 4100 PIII-933 800/388-8542 www.dell.com	Feb 01	93	Expensive: $1769	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.tiny.com	Feb 01	88	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	ABS Multimedia System 2 800/876-8088 www.buyabs.com	Dec 00	86	Inexpensive: $1339	Very good	160	Very good: Athlon-950, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
4	HP Pavilion 8720I 800/752-0900 www.hpshopping.com	Oct 00	86	Expensive: $1799	Good	154	Good: Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 40.8GB hard drive, midsize tower, 17-inch monitor, Windows 98 SE
5	Polywell Poly 830KR-1000 800/999-1278 www.polywell.com	Dec 00	85	Expensive: $1888	Outstanding	167	Outstanding: Athlon-1000, 256MB of SDRAM, 256KB L2 cache, dual 30GB SCSI hard drives, midsize tower, 19-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	96	Average: $969	Very good	144	Good: Pentium III-866, 128MB of SDRAM, 256KB L2 cache, 10.2GB hard drive, minitower, 17-inch monitor, Windows Me
2	Polywell Poly 700KD 800/999-1278 www.polywell.com	Oct 00	79	Expensive: $1050	Good	131	Very good: Duron-700, 128MB of SDRAM, 64KB L2 cache, 20GB hard drive, midsize tower, 17-inch monitor, Windows 98 SE
3	IBM NetVista A20I 227670U 800/426-2968 www.ibm.com	Feb 01	78	Inexpensive: $838	Satisfactory	104	Satisfactory: Celeron-600, 64MB of SDRAM, 128KB L2 cache, 10.2GB hard drive, minitower, 17-inch monitor, Windows Me
4	NuTrend Athlon Force2 888/482-6678 www.nutrend.com	Feb 01	78	Expensive: $1149	Outstanding	161	Outstanding: Athlon-900, 128MB of SDRAM, 256KB L2 cache, 20.5GB hard drive, midsize tower, 17-inch monitor, Windows Me
5	Gateway Essential 866 800/315-2536 www.gateway.com	NEW	74	Average: $999	Very good	140	Good: Pentium III-866, 128MB of SDRAM, 256KB L2 cache, 10.2GB hard drive, compact, 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 171.

[2] Vertical cases are towers (over 20 inches), midsize towers (15.5 to 20 inches), or minitowers (under 15.5 inches). Horizontal cases are desktops (5 inches or taller) or compacts (under 5 inches).

THE FIRST PENTIUM 4 system on *PC World's* home PCs chart comes in with a bang: The Dell Dimension 8100, based on a 1.5-GHz P4 chip, lands in the top spot. However, despite having the highest CPU clock speed, the system isn't the fastest on our chart. That honor goes to Gateway's new Select 1200, with a 1.2-GHz Athlon CPU; it achieved a superior PC WorldBench score of 169, 8 percent faster than the Dell. But we don't rate systems purely on per-formance: The Dell unit's impressive list of extras and the company's outstanding showing in our Reliability and Support surveys are enough to earn the Dimension 8100 its Best Buy ranking.

Meanwhile, the new Profile 3cx from Gateway failed to make the midrange chart. Like most systems that use LCD monitors, it costs more than a comparable system with a CRT monitor. But it is an

Extra features	Setup/ease of use	Graphics	Reliability/support	Comments
Outstanding: NVidia GeForce2 Ultra graphics board with 64MB of DDR SDRAM, 12X DVD-ROM drive, 12X/8X/32X CD-RW drive, NIC, V.90 modem	Outstanding/ Good	Very good	Outstanding/ Outstanding	**PRO:** Loaded with extra features. **CON:** Disappointing WorldBench performance, given expensive P4 processor.
Good: NVidia GeForce2 Ultra graphics board with 64MB of DDR SDRAM, 16X DVD-ROM drive, V.90 modem	Good/ Good	Good	Fair/ Fair	**PRO:** Easy to access drive bays, excellent frame rates. **CON:** No CD-RW drive or network card.
Outstanding: Asus AGP-V7700 graphics board with 64MB of DDR SDRAM, 16X DVD-ROM drive, 8X/4X/32X CD-RW drive, NIC, V.90 modem	Satisfactory/ Good	Good	Fair/ Fair	**PRO:** Lots of extra features and room for expansion. **CON:** Gigantic case could be a tight fit for home offices.
Outstanding: Creative Labs 3D Blaster GeForce2 GTS graphics board with 64MB of SDRAM, 16X DVD-ROM drive, 8X/4X/32X CD-RW, NIC, V.90 modem	Good/ Good	Very good	Poor/ Fair	**PRO:** $166 price cut this month for fully loaded system. **CON:** Poor reliability and only Fair support; comes with second-rate speakers.
Very good: ATI All-In-Wonder Radeon graphics board with 32MB of DDR SGRAM, 16X DVD-ROM drive, 12X/10X/32X CD-RW drive, V.90 modem	Good/ Good	Good	³/Fair ⁴	**PRO:** Impressive sound and DVD playback. **CON:** Some game graphics did not appear properly.
Extra features: 10 percent	Setup/ease of use: 5 percent	Graphics: 15 percent	R & S: 30 percent	
Outstanding: NVidia GeForce2 GTS graphics board with 64MB of DDR SDRAM, 12X DVD-ROM drive, V.90 modem	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: MVGA-NVG11A graphics board with 32MB of SDRAM, 8X DVD-ROM drive, 4X/4X/24X CD-RW drive, V.90 modem, scanner, ink jet printer	Satisfactory/ Very good	Good	³/ ⁴	**PRO:** Fast family PC with extra peripherals and software; $150 price cut. **CON:** Dark DVD movie playback; limited expansion room; low-end printer and scanner.
Good: Leadtek WinFast 3D S325 graphics board with 32MB of SDRAM, 10X DVD-ROM drive, V.90 modem	Satisfactory/ Satisfactory	Good	³/Fair ⁴	**PRO:** Speakers and subwoofer deliver full, rich sound. **CON:** Low frame-rate scores on game tests; DVD movies appear dark.
Outstanding: NVidia GeForce2 GTS graphics board with 32MB of DDR SGRAM, 16X DVD-ROM drive, 8X/4X/32X CD-RW drive, NIC, V.90 modem	Good/ Good	Very good	Fair/ Fair	**PRO:** Provides handsome display quality. **CON:** Very limited room for expansion; sound system lacks a subwoofer.
Very good: Leadtek WinFast GeForce2 GTS graphics board with 32MB of DDR SGRAM, 8X/4X/32X CD-RW drive, V.90 modem	Good/ Good	Good	³/Fair ⁴	**PRO:** $111 price cut, dual SCSI hard drives in RAID configuration. **CON:** No DVD-ROM drive; minimal documentation.
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, NIC, V.90 modem	Outstanding/ Good	Limited	Outstanding/ Outstanding	**PRO:** $160 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: Micro-Star MS-8808 graphics board with 32MB of SDRAM, 10X DVD-ROM drive, V.90 modem	Very good/ Satisfactory	Good	³/Fair ⁴	**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, V.90 modem	Satisfactory/ Good	Limited	Good/ Fair	**PRO:** Better-than-average monitor and upgrade options for a budget system. **CON:** Very weak graphics performance.
Satisfactory: Leadtek WinFast 3D S325 graphics board with 32MB of SDRAM, 12X DVD-ROM drive, NIC, V.90 modem, multimedia keyboard	Satisfactory/ Good	Satisfactory	³/ ⁴	**PRO:** PC's speed redefines budget performance; handsome multimedia keyboard. **CON:** Posted lackluster frame rates in our gaming tests.
Good: integrated Intel 810e graphics with UMA, 20X-40X CD-ROM drive, V.90 modem	Good/ Satisfactory	Limited	Fair/ Fair	**PRO:** Compact system with high-quality monitor makes an excellent package. **CON:** Poor game performance.
Extra features: 10 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 30 percent	

³ Insufficient data to give a rating.   ⁴ Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.

attractive package that will fit into even the smallest spaces in the home—the system itself measures a mere 4 inches deep.

Gateway claims a spot on the budget chart with its Essential 866. This $999 PC boasts an 866-MHz Pentium III processor, an excellent monitor, and a strong software bundle. However, its games performance was lackluster, with low frame rates in our test games. The system also depends exclusively on USB ports for connecting peripherals, so you can't hook up an older printer or modem without buying an adapter. ▶

FAST AND pricey: Dell's Dimension 8100, the Ferrari of the PC world.

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TOP 10 PRINTERS

	COLOR LASER PRINTER	Street price¹ (12/15/00)	Overall rating	Speed for plain text/full-page graphics (ppm)	Print quality for text/color graphics	Comments
1	**Minolta-QMS Magicolor 2200 GN** (NEW) 800/523-2696 www.minolta-qms.com	$2799	85	9.8/1.3	**Excellent/ Very good**	**FEATURES:** Rated 20 ppm monochrome/5 ppm color. Standard 128MB of RAM, 1200-by-1200-dpi maximum resolution, 650 pages input, 500 output. **SUMMARY:** Fast at printing text, great print quality, and lots of extra features put the Magicolor 2200 GN at the top of our chart. Graphics appear especially smooth and rich compared with those of many color lasers.
2	**Lexmark Optra C710N** 800/539-6275 www.lexmark.com	$2199	83	9.5/1.6	**Very good/ Excellent**	**FEATURES:** Rated 16 ppm monochrome/3 ppm color. Standard 32MB of RAM, 1200-by-1200-dpi maximum resolution, 300 pages input, 250 output. **SUMMARY:** Moving into the Best Buy slot, the Optra C710N offers outstanding color quality and fast text printing for a moderate price. Toner cartridges could be a little easier to install, but that's a minor quibble.
3	Brother HL-2400CeN 800/276-7746 www.brother.com	$1999	82	9.4/1.1	**Very good/ Good**	**FEATURES:** Rated 16 ppm monochrome/4 ppm color. Standard 32MB of RAM, 2400-by-600-dpi maximum resolution, 250 pages input and output. **SUMMARY:** The HL-2400CeN's text-printing speed is near the top of the chart, and it creates crisp text and rich, detailed graphics for the lowest price on the chart. Its biggest negative is a confusing control panel.
4	Minolta-QMS Magicolor 6100 DeskLaser 800/523-2696 www.minoltaprinters.com	$2804	81	5.6/0.9	**Very good/ Good**	**FEATURES:** Rated 24 ppm monochrome/6 ppm color. Standard 32MB of RAM, 1200-by-600-dpi maximum resolution, 250 pages input and output. **SUMMARY:** This entry-level version of the 6100 series has strong print quality, an intuitive design, and top-notch support. The price is a bit higher than average, however, and performance could be better.
5	Tektronix Phaser 750N by Xerox 877/362-6567 www.xerox.com/officeprinting	$2295	81	7.3/1.4	**Good/ Very good**	**FEATURES:** Rated 16 ppm monochrome/5 ppm color. Standard 64MB of RAM, 1200-by-600-dpi maximum resolution, 350 pages input, 500 output. **SUMMARY:** The Phaser 750N offers middle-of-the-road text and graphics speeds but strong print quality. Added benefits include a user-friendly control panel and a comprehensive online manual.
6	Lexmark Optra Color 1200n 800/539-6275 www.lexmark.com	$4449	81	7.8/2.1	**Good/ Adequate**	**FEATURES:** Rated 12 ppm on both monochrome and color. Standard 32MB of RAM, 1200-by-1200-dpi maximum resolution, 350 pages input, 250 output. **SUMMARY:** Lexmark's LED model performs well, printing graphics especially fast. It also offers a wealth of features—including the capability of producing tabloid-size pages (11 by 17 inches)—for a steep price.
7	IBM Infoprint Color 8 800/358-6661 www.ibm.com/printers	$2238	80	5.5/1.9	**Very good/ Good**	**FEATURES:** Rated 8 ppm on both monochrome and color. Standard 32MB of RAM, 600-by-600-dpi maximum resolution, 500 pages input, 250 output. **SUMMARY:** The Infoprint Color 8 drops $634 this month, moving it up the chart. Graphics print quickly, and text and graphics are clear and detailed, but text speed is too slow for busy offices.
8	Tektronix Phaser 850N by Xerox 877/362-6567 www.xerox.com/officeprinting	$2495	78	6.8/2.4	**Very good/ Adequate**	**FEATURES:** Rated 8 ppm on both monochrome and color. Standard 32MB of RAM, 450-by-800-dpi maximum resolution, 200 pages input, 500 output. **SUMMARY:** Using heated wax instead of a laser, the Phaser 850N prints graphics more quickly than other models here. Those fast-printing images are grainy, however, and lack detail.
9	HP Color LaserJet 4550DN (NEW) 800/613-2222 www.hp.com	$3769	77	8.1/1.6	**Very good/ Good**	**FEATURES:** Rated 16 ppm monochrome/4 ppm color. Standard 128MB of RAM, 2400-by-2400-dpi maximum resolution, 900 pages input, 250 output. **SUMMARY:** Strong print quality and reasonably fast text speeds mark HP's expensive new color laser. The high-end model we tested includes lots of extra features, such as an automatic duplexer and extra RAM.
10	Kyocera Mita Ci1100 800/222-6482 www.kyoceramita.com	$2649	76	7.0/1.2	**Very good/ Good**	**FEATURES:** Rated 16 ppm monochrome/4 ppm color. Standard 48MB of RAM, 1200-by-1200-dpi maximum resolution, 350 pages input, 500 output. **SUMMARY:** Dark, readable text and a good array of features round out this reasonably priced model. Unfortunately, the Ci1100's weak documentation and confusing control panel can be frustrating.

Best Buy

For reviews of printers we tested this month, visit www.pcworld.com/t10printers.

HOW WE TEST The overall rating for color laser printers is based on print quality (25 percent), price (25 percent), features (15 percent), ease of use (15 percent), speed (10 percent), and service and support (10 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved. ¹ All street prices include a network card.

MINOLTA-QMS replaces its previous Best Buy with the new $2799 Magicolor 2200 GN. It shows crisp text and some of the best color images we've seen from a color laser, and it prints text quickly.

HP also adds a model to the chart this month. The $3769 HP Color LaserJet 4550DN hits number nine and includes an automatic duplexer. Print quality is quite good, but the unit is expensive. Xerox's $4799 Phaser 1235DT just misses the chart. ▶

THERE ARE LOTS OF GREAT REASONS TO WORK AT HOME.

COLLATING ISN'T ONE OF THEM.
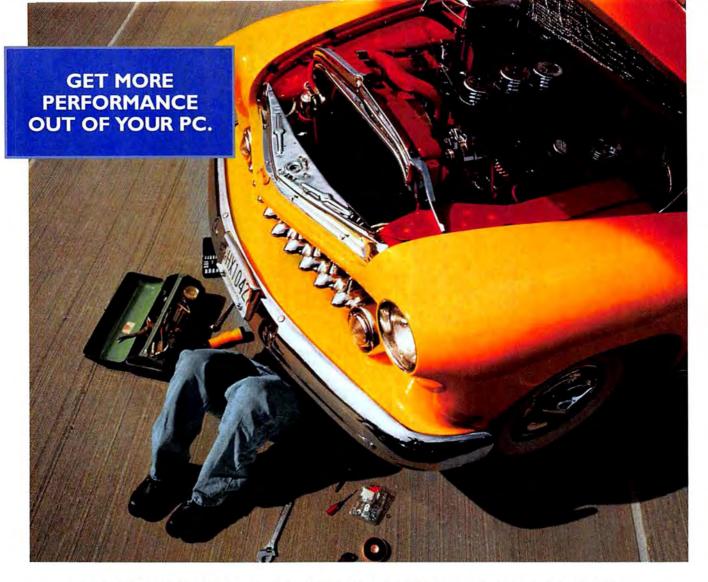
TOP 10 MONITORS

	19-INCH MONITOR	Month tested	Street price (12/8/00)	Overall rating	Quality of text/ graphics	Comments
1	ViewSonic GS790 800/888-8583 www.viewsonic.com	Aug 00	$389	82	Good/ Very good	**FEATURES:** 18.1-inch viewable area, .26mm dot pitch tube, up to 116-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Vibrant colors in photos and on Web pages make this model a good choice for graphics pros. Around-the-clock tech support is also a plus, especially for SOHO users.
2	NEC-Mitsubishi MultiSync FE950 888/632-6487 www.necmitsubishi.com	Aug 00	$449	80	Good/ Very good	**FEATURES:** 18-inch viewable area, .25mm–.27mm varying stripe pitch,[3] up to 119-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Displays vibrant colors on Web pages and in photographs, as well as crisp text in documents. Includes advanced on-screen controls.
3	Optiquest Q95 800/843-6784 www.optiquest.com	Aug 00	$279	79	Good/ Good	**FEATURES:** 18.2-inch viewable area, .27mm dot pitch tube, up to 107-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** $30 price drop keeps this model easily the least expensive on the chart. That affordability makes the Optiquest appealing, despite its less-than-stellar image quality.
4	MGC 997SN 877/428-9642 www.mgcusa.com	Aug 00	$369	79	Very good/ Very good	**FEATURES:** 18-inch viewable area, .25mm dot pitch tube, up to 120-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Displays sharp text on spreadsheets and offers lively graphics, but lack of weekend tech support might make it a better choice for business users.
5	ADI MicroScan G910 800/228-0530 www.adiusa.com	Aug 00	$418	78	Very good/ Good	**FEATURES:** 18-inch viewable area, .24mm–.26mm varying stripe pitch,[3] up to 137-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Produces dense, sharp text, but colors appear pale, especially on Web pages. Good choice for people who work primarily on word processing documents and spreadsheets.
6	Acer P911 800/733-2237 www.acercm.com	(NEW)	$449	76	Good/ Good	**FEATURES:** 18-inch viewable area, .25mm stripe pitch,[3] up to 130-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Good all-around monitor with respectable, though not breathtaking, quality on both text and graphics. Single knob for screen adjustments is confusing and clumsy to operate.
7	Cornerstone Technology p1450 800/562-2552 www.monitorsdirect.com	Dec 00	$419	76	Very good/ Good	**FEATURES:** 18-inch viewable area, .26mm dot pitch tube, up to 110-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, five-year warranty, 24-hour weekday toll-free support. **SUMMARY:** Produced very clear text, even at small point sizes, but was less impressive on graphics. Provides comprehensive advanced controls and comes with an extra-long warranty.
8	HP P920 800/752-0900 www.hp.com	(NEW)	$529	76	Very good/ Good	**FEATURES:** 18-inch viewable area, .24mm dot pitch,[3] up to 130-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 11-hour weekday toll-free support. **SUMMARY:** Earns high marks for text quality and also renders respectable graphics. Features intuitive controls with easy one-touch access to brightness and contrast settings; expensive.
9	Sony CPD-E400 800/352-7669 www.sony.com/displays	Dec 00	$499	76	Very good/ Good	**FEATURES:** 18-inch viewable area, .24mm–.25mm varying stripe pitch,[3] up to 110-Hz refresh rate,[1] Plug and Play ready,[2] TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** The CPD-E400 produced crisp text and rich, realistic colors, especially in photos. But you can find similar quality at a lower price.
10	Iiyama I90A 800/394-4335 www.iiyamadirect.com	Dec 00	$479	75	Very good/ Good	**FEATURES:** 18-inch viewable area, .25mm–.27mm varying stripe pitch,[3] up to 143-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 8-hour weekday toll-free support. **SUMMARY:** Crisp text makes this a good choice for word processing. Not the best option for SOHO use, as skimpy tech support is available only on weekends.

Best Buy ⬛ ⬛ For reviews of products that didn't make the chart, visit www.pcworld.com/t10monitors.

HOW WE TEST Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on text and graphics quality (25 percent each), price (25 percent), features and ease of use (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by PC World Test Center. All rights reserved. [1] Maximum refresh rate at 1024 by 768 resolution. [2] Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play. [3] Uses an aperture grille whose parallel wires near the sides of the screen are strung farther apart than those at the middle.

TWO NEW 19-INCH MONITORS debut on our chart this month: Acer's P911 and HP's P920 combine solid text and graphics quality to provide good all-around performance for office use. New models from Hitachi, KDS, Mitsubishi, and ViewSonic failed to crack the Top 10 lineup; our judges found the quality of their graphics unimpressive, and text quality also fell somewhat short. Next month we will turn our attention to 17-inch monitors. ▶

TOP 10 GRAPHICS BOARDS

	AGP BOARD	Month tested	Street price (12/22/00)	Overall rating	Image quality	Overall speed	Features rating	Comments
1	CardExpert GeForce2 MX 800/539-2273 www.gainward.com	Feb 01	$119	94	Very good	Good	Good	**FEATURES:** 4X AGP, NVidia GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC, DVI-out. **SUMMARY:** Still number one, this budget board delivered respectable performance in our tests and includes DVD software. It also provides DVI-out, a nice add-on for people with digital monitors.
2	ATI All-In-Wonder Radeon 905/882-2600 www.ati.com	Feb 01	$299	93	Very good	Good	Good	**FEATURES:** 4X AGP, ATI Radeon chip, 32MB of DDR SDRAM, 350-MHz RAMDAC, DVI-out, TV tuner, hardware DVD support; bundled graphics editing software. **SUMMARY:** ATI's bevy of video features make the All-In-Wonder Radeon a great one-card solution for PC users interested in video editing.
3	Hercules 3D Prophet II MX 877/484-5536 www.hercules.com	Retested	$149	93	Excellent	Good	Good	**FEATURES:** 4X AGP, NVidia GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC, E-Color 3Deep color-calibration utility, and five game demos. **SUMMARY:** Retested with new drivers, this board delivered significantly improved images; as a result, it climbs six spots up the chart.
4	Hercules 3D Prophet Pro 877/484-5536 www.hercules.com	(NEW)	$370	89	Very good	Very good	Very good	**FEATURES:** 4X AGP, NVidia GeForce2 Pro chip, 64MB of DDR SDRAM, 350-MHz RAMDAC; bundled PowerDVD, Hercules 3D Tweaker, and E-Color 3Deep color-calibration software. **SUMMARY:** This speedy performer generated impressive color contrast in Quake III and Unreal Tournament.
5	ELSA Gladiac GeForce2 GTS 800/272-3572 www.elsa.com	Feb 01	$229	89	Satisfactory	Very good	Good	**FEATURES:** 4X AGP, NVidia GeForce2 GTS chip, 32MB of DDR SGRAM, 350-MHz RAMDAC, TV-out; no bundled applications. **SUMMARY:** Thanks to a hefty $60 price drop, this swift performer retains fifth place on the chart. This board also boasted fine image quality in our games.
6	Hercules 3D Prophet II Ultra 877/484-5536 www.hercules.com	Retested	$450	88	Very good	Excellent	Very good	**FEATURES:** 4X AGP, NVidia GeForce2 Ultra chip, 64MB of DDR SDRAM, 350-MHz RAMDAC, DVI-out; bundled PowerDVD, Hercules 3D Tweaker, and E-Color 3Deep color-calibration software. **SUMMARY:** The second-priciest card on the chart. Retested with new drivers, this board rendered sharp images in Quake III.
7	ATI Radeon 32MB DDR 905/882-2600 www.ati.com	Feb 01	$129	85	Very good	Good	Good	**FEATURES:** 4X AGP, ATI Radeon chip, 32MB of SDRAM, 350-MHz RAMDAC; no bundled software. **SUMMARY:** A near-tie in image quality with our third-place board, but it places lower on our chart because it lacks the software extras. This hard-to-find Radeon can be purchased online or in smaller computer shops.
8	Creative Labs 3D Blaster Annihilator 2 Ultra 800/998-1000 www.creative.com	Feb 01	$499	84	Excellent	Excellent	Good	**FEATURES:** 4X AGP, NVidia GeForce2 Ultra chip, 64MB of DDR SDRAM; 350-MHz RAMDAC; bundled Lava music and video player. **SUMMARY:** This 3D powerhouse packs quite a punch. It soared on both speed and image-quality tests, but its high price keeps it from ascending higher on the chart.
9	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; bundled Enhanced BlasterControl 4, Lava music and video player, color-calibration utilities. **SUMMARY:** This high-powered 3D performer had a slight edge on our image-quality tests compared to the ELSA Gladiac.
10	Matrox Millennium G450 800/361-1408 www.matrox.com/mga	(NEW)	$145	76	Very good	Satisfactory	Good	**FEATURES:** 4X AGP, Matrox G450 chip, 32MB of DDR SDRAM, 350-MHz RAMDAC, dual-monitor support. **SUMMARY:** While the Matrox didn't exactly excel at 3D speed performance, it demonstrated terrific image quality in our tests. And unlike the other cards on our Top 10 chart, it offers dual-monitor support.

Best Buy   For reviews of other new graphics boards that we tested this month, visit www.pcworld.com/t10graphics.

TEST PC WORLD CENTER **HOW WE TEST** We test 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).

THE WORD THIS MONTH is Hercules: Three of the company's boards muscle their way up the chart into the third, fourth, and sixth spots. All offer solid performance and software extras at different prices, so gamers with bucks and those looking to pinch a few pennies should be pleased. A new board, the number ten Matrox Millennium G450, offers dual-display capability—a plus for users who wish to display images on a second monitor. ▶

TOP 10 SCANNERS

	SOHO SCANNER	Month tested	Street price (12/21/00)	Overall rating	Scan quality	Scan speed (seconds per page)		Comments
						Black-and-white	Color [1]	
1	**Epson Perfection 1240U Photo** 800/463-7766 www.epson.com	(NEW)	$299	93	Good	20 @ 300 dpi	226 @ 1200 dpi	**FEATURES:** USB, 1200 by 2400 dpi, 10.6-by-17.1-by-3.7-inch case,[2] 6.2 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter; no automatic document feeder option. **SUMMARY:** This hot successor to Epson's Perfection 1200S not only offers good performance but also creates crisp, colorful images.
2	Microtek ScanMaker 4700 800/654-4160 www.microtekusa.com	Dec 00 [3]	$199	93	Good	29 @ 300 dpi	263 @ 1200 dpi	**FEATURES:** USB, 1200 by 2400 dpi, 11.4-by-20-by-4.6-inch case,[2] 8 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter; no optional ADF. **SUMMARY:** Has 42-bit color, high resolution, quick-start buttons, and lots of software; can work with transparencies right out of the box.
3	Canon N1220U 800/652-2666 www.ccsi.canon.com	Dec 00 [3]	$199	91	Good	37 @ 300 dpi	298 @ 1200 dpi	**FEATURES:** USB, 1200 by 2400 dpi, 10.1-by-14.7-by-1.3-inch case,[2] 3.3 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter or ADF. **SUMMARY:** Ultrathin color image sensor unit produces good-quality images and comes with a strong selection of software, including robust OCR.
4	HP ScanJet 5370Cse 800/722-6538 www.scanjet.hp.com	Oct 00 [3]	$299	90	Fair	37 @ 300 dpi	243 @ 1200 dpi	**FEATURES:** Parallel and USB,[4] 1200 by 2400 dpi, 11.9-by-19.9-by-4.1-inch case,[2] 10.7 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter; ADF optional. **SUMMARY:** Good black-and-white speed, has two interface options and four quick-start buttons, but overall scan quality is less than stellar.
5	Canon D660U 800/652-2666 www.ccsi.canon.com	Feb 01 [3]	$149	89	Good	52 @ 300 dpi	100 @ 600 dpi	**FEATURES:** USB, 600 by 1200 dpi, 10.2-by-17.3-by-3.9-inch case,[2] 5.7 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter; no optional ADF. **SUMMARY:** CCD-based unit creates attractive color for Web images and has a built-in 35mm film adapter. Black-and-white performance is slightly sluggish.
6	Microtek ScanMaker V6USL 800/654-4160 www.microtekusa.com	Oct 00 [3]	$129 [5]	89	Good	50 @ 300 dpi	82 @ 600 dpi	**FEATURES:** USB and SCSI,[6] 600 by 1200 dpi, 11.8-by-21.5-by-3.2-inch case,[2] 11.5 pounds, 8.5-by-14-inch scanning area; includes transparency adapter; no optional ADF. **SUMMARY:** Legal-document-capable model offers small transparency unit plus SCSI card/cable combo. A USB/parallel unit can be had for $129 too.
7	Umax Astra 6450 800/562-0311 www.umax.com	Nov 00	$299	89	Good	39 @ 300 dpi	50 @ 600 dpi	**FEATURES:** IEEE 1394, 600 by 1200 dpi, 12.2-by-18.4-by-3.9-inch case,[2] 8.5 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter; no optional ADF. **SUMMARY:** Our first IEEE 1394 SOHO unit; card and cable included; delivers ultrafast 600-dpi scans with 42-bit color. Color quality could be better.
	CORPORATE SCANNER							
1	**Microtek ScanMaker 8700** 800/654-4160 www.microtekusa.com	(NEW)	$1000 [5]	95	Excellent	29 @ 300 dpi	83 @ 1200 dpi	**FEATURES:** IEEE 1394 and USB,[7] 1200 by 2400 dpi, 22.3-by-15.25-by-6.3-inch case,[2] 25.5 pounds, 8.5-by-14-inch scanning area; built-in transparency adapter; ADF optional. **SUMMARY:** Costly, but offers great scan quality and blazing performance. Does both reflective and transparent scans at the outset.
2	Epson Perfection 1640SU Office 800/463-7766 www.epson.com	Jan 01	$499	94	Good	17 @ 300 dpi	423 @ 1600 dpi	**FEATURES:** USB and SCSI,[4] 1600 by 3200 dpi, 11.4-by-17.4-by-9.2-inch case,[2] 14.8 pounds, 8.5-by-11-inch scanning area; includes ADF; transparency adapter optional. **SUMMARY:** 1600-dpi, 42-bit color powerhouse offers snappy performance and sharp, colorful scan quality. A $299 version omits the ADF.
3	Microtek ScanMaker X12USL 800/654-4160 www.microtekusa.com	Aug 00	$319 [5]	94	Good	31 @ 300 dpi	438 @ 1200 dpi	**FEATURES:** USB and SCSI,[4] 1200 by 2400 dpi, 11.9-by-21.4-by-2.8-inch case,[2] 12.1 pounds, 8.5-by-14-inch scanning area; optional transparency adapter and ADF. **SUMMARY:** A $30 price drop on legal-document-capable unit. It boasts solid scan quality and excellent software. Without a SCSI card, unit is $40 less.

Best Buy **ONLINE** For expanded reviews of this month's scanners, visit www.pcworld.com/t10scanners.

HOW WE TEST Scanners are tested with default settings under Windows 98 on a Gateway GP7-550 (Pentium III-550) PC with 128MB of RAM, using each unit's bundled software. Overall score is based on image quality (25 percent), speed (SOHO 22 percent; corporate 25 percent), ease of use (SOHO 17 percent; corporate 10 percent), features (SOHO 16 percent; corporate 20 percent), support (10 percent), and price (10 percent). Speed tests are timed from start of scanning until cursor control is regained. Data based on tests designed and conducted by the PC World Test Center. [1] At unit's maximum optical resolution. [2] In order: width, depth, height. [3] Online-only chart. [4] Tested with USB interface. [5] Priced with SCSI or IEEE 1394 adapter. [6] Tested with SCSI interface. [7] Tested with IEEE 1394 interface.

IN AN UNPRECEDENTED EVENT, two new Best Buys top our SOHO and corporate charts. Epson's $299 Perfection 1240U Photo comes with a transparency adapter and recorded faster performance in both of our color tests than its predecessor, the Perfection 1200S, but it lacks SCSI connectivity. On the corporate side, Microtek's ScanMaker 8700 offers unrivaled scan quality, IEEE 1394 connectivity, and a legal-size scan bed. ▶

TOP 10 DIGITAL CAMERAS

	CAMERA: $500 AND OVER	Street price (12/5/00)	Overall rating	Image quality	Ease of use	Battery life/ shots	Comments
1	Epson PhotoPC 3000Z 800/463-7766 www.epson.com	$874	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	Casio QV-2300UXplus 800/836-8580 www.casio.com	$699	81	Good	Very good	Good/ 196	FEATURES: 2.1-megapixel resolution, 16MB CompactFlash media, 41-123mm focal range;¹ serial, USB, and video output; 8.6 ounces. SUMMARY: Huge photo capacity with 340MB Micro-drive; manual exposure controls; includes panorama mode but lacks optical viewfinder; $100 price drop pushes it up the chart.
3	HP PhotoSmart 618 800/752-0900 www.photosmart.com	$599	81	Good	Good	Good/ 199	FEATURES: 2.1-megapixel resolution, 16MB CompactFlash media, 34-105mm 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.
4	Kodak DC4800 800/235-6325 www.kodak.com/go/dc4800	$799	81	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 we'd prefer to see audio and video recording at this price; also lacks manual focus and manual exposure override.
5	Olympus Camedia C-2100 Ultra Zoom 888/553-4448 www.olympus.com/digital	$899	80	Good	Good	Good/ 231	FEATURES: 2.1-megapixel resolution, 8MB SmartMedia card, 38-380mm focal range;¹ serial, USB, and video output; 24 ounces. SUMMARY: Easy-to-handle SLR-like shape with 10X optical zoom lens and image stabilization; kit includes recharge-able AA batteries and charger; some menus not very intuitive.
	CAMERA: UNDER $500						
1	Olympus D-360L 888/553-4448 www.olympus.com/digital	$289	80	Adequate	Good	Limited/ 44	FEATURES: 1.3-megapixel resolution, 8MB SmartMedia card, 36mm focal range;¹ serial and video output; 9.1 ounces. SUMMARY: Feature-rich with extensive exposure controls, digital zoom, 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 11 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 range;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 for a point-and-shoot.
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 range;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 D-490 Zoom 888/553-4448 www.olympus.com/digital	$430	76	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 photos on-screen and printed 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.

GREAT BUYS FROM EPSON and Olympus crown our debut *Top 10 Digital Cameras* chart. Leading the models that cost $500 and more, Epson's PhotoPC 3000Z combines impressive images, extensive features, and top-notch ease of use. For budget-minded buyers, the Olympus D-360L wins a Best Buy on the strength of its well-rounded performance. For more reviews, head over to www.pcworld.com/reviews/more_cameras. ∎

HERE'S HOW

WINDOWS TIPS SCOTT DUNN

Windows Freebies Go the OS One Better

WINDOWS HAS REALLY GROWN UP over the years, offering more built-in applets for work and play. But no single tool or set of options is perfect for everybody. Fortunately for us, dozens of programmers the world over have devised solutions and enhancements to make Windows more elegant, complete, and customizable. Better yet, many of these products are available at no charge.

You'll find a generous array of these useful utilities at PCWorld.com's Downloads. **Tweak UI:** Microsoft's programmers knew that intermediate and advanced users would want more control over the Windows interface than the basic operating system provided. So they created Tweak UI, one of the best all-around Windows fixer-uppers. One thing Tweak UI lets you do is stop Windows from adding the words *Shortcut to* to the name of every shortcut you create and from pasting that clunky arrow onto every shortcut icon. If you find the animation of zooming windows and sliding menus an annoying drag on your machine's performance,

Tweak UI can remove the problem instantly. But don't stop there: Use Tweak UI to hide special desktop icons such as Internet Explorer, Network Neighborhood, and the Recycle Bin; to remove disk drives from My Computer's list; and to keep individual Control Panel icons from displaying. Feeling paranoid? Tweak UI will cover your tracks, letting you selectively delete items from the Document menu, the list of recent searches in the Find dialog box's Named drop-down menu, Internet Explorer's history, and the list of programs launched recently from the Run dialog box—either immediately or each time you log on. And the utility has plenty of other options to please power users and determined customizers. For more Tweak UI tips, see the February article "Windows Your Way" (www.pcworld. com/feb2001/windows).

Webshots Desktop: You spend many hours peering into your computer screen every day, so why settle for a static or boring view? You can spruce things up with Webshots Desktop, a combination wallpaper manager and slide-show screen saver. Webshots Desktop can automatically change your wallpaper at preset intervals and resize any image to fill the screen on the fly. The screen saver provides an array of transition effects between the pictures in your collection, and it features password protection.

Too frivolous for you? Perhaps you'd prefer to superimpose a no-nonsense calendar grid (with past and future months if desired) on your desktop wallpaper. Free registration at the Webshots Web site (www.webshots.com) entitles you to download stunning images to your computer and purchase poster versions of some photographs. You can share your photos with friends and family by adding your picture collection, using a simple drag and drop. The built-in photo manag-

ILLUSTRATION: ADAM McCAULEY

FIGURE 1: MANAGE YOUR WALLPAPERS easily with the photo manager in Webshots Desktop.

er allows you to create logical groupings for your images and preview them in thumbnail form (see **FIGURE 1**).

EditPad: For skimming ReadMe files, editing simple HTML code, or jotting down notes, a simple text processor can be a handy tool. Unfortunately, Notepad—the text editor that comes with Windows—lacks a search-and-replace feature, can't cope with files larger than 45KB, and has other flaws. (The Windows NT and 2000 versions of Notepad address some of these drawbacks, but the improvements never reached Windows 9x or Me.) You can find many freeware replacements, but few are as elegant and functional as Edit-Pad by Jan Goyvaerts. EditPad lets you customize your font style, font colors, and background colors, and it supports multiple open documents (in one or multiple windows). It also has a helpful toolbar; a full-featured find-and-replace command that works on one or multiple documents simultaneously; and tools for converting

FIGURE 2: AN ELEGANT, functional design makes Ontrack's PowerDesk a great replacement for Windows Explorer.

between spaces and tabs, changing case, and jumping to a specified line number.

EditPad is a variant on freeware that its developer calls postcardware: The only payment he requires is that you send him a postcard if you decide to use the product. How about "Greetings From Redmond"?

PowerDesk: Good software isn't just about piling on features. It's also about design. Spend a few minutes working with Ontrack's PowerDesk file manager, and you'll find an elegance of workmanship that Windows Explorer cannot match. You'll discover, for example, how much easier it is to access drives from a simple bar at the top of the window than by scrolling through ranks of folders in the tree pane. It's also nice to be able to access common files and folders in your Favorites menu without having to wade through the undergrowth of all your Internet shortcuts. (What was Microsoft thinking?) Imagine the time you'll save by having two folders that open in a single window tiled any way you want and that stay the way you laid them out (Windows forces you to drag and resize multiple windows every time you need to manage files in multiple folders). If you use the Quick-View viewer that comes with Windows, you can integrate that pane into the window as well (see **FIGURE 2**). The list goes on and on. Ontrack offers a more robust version (PowerDesk Pro) for only $20, but the freeware version will suit many people just fine.

Notify CD Player: Don't be fooled by the boring name—this handy software should be called Nifty CD Player. The simple, elegant utility plays audio (or mixed data/audio) CDs from an unobtrusive tray icon. You can extract the relevant information for your CD from the online CDDB database or submit the information yourself. Play tracks in order or randomly, and see information about the current CD, including track name, time remaining, and track

CONTENTS

Get more out of Active Desktop: Embed Web content in your desktop and keep info at your fingertips, using Active Desktop (www.pcworld.com/mar2001/active_desktop). **Web grocery shopping:** Getting groceries via the Web is convenient, and prices are competitive, but you can't squeeze the fruit (www.pcworld.com/mar2001/grocery).

number. In the title bar of the active application, Notify CD Player will display the information you like in the font of your choice. You'll find customization options that you would expect to see in a shareware application costing $20 or more. But this one's free. Notify CD Player is the brainchild of Mats Ljungqvist.

TIMESAVING PRINTER SETUPS

IF YOU HAVE a color printer, you probably print photos in color but use black-and-white mode to save ink when printing text-only documents. Making that switch involves traipsing through a series of windows by mouse. You click the Properties button next to the Name drop-down list in your app's Printer dialog box, then select the necessary tabs and settings, then click OK to return to the Print dialog, and finally issue the command to print. Even ▶

FIGURE 3: SWITCH QUICKLY among common printer settings by creating custom printer icons.

more cumbersome is going to the Printers folder (Start•Settings•Printers), right-clicking a printer there, and choosing Properties before you can get to and open a print dialog box.

Warren Broglie of Hudson, Florida, offers a tip to help you avoid spending a lot of time clicking and digging through dialog-box options: Create a separate printer icon for each type of print job.

Choose *Start•Settings•Printers* to open the Printers folder. Double-click the *Add Printer* icon to start the Add Printer Wizard. (In Windows 2000, confirm that the proper port is selected.) Click *Next*, and navigate through the wizard panels as if you were reinstalling your existing printer, repeating the choices you made when you first installed it. Once the wizard recognizes that you're installing a printer already set up on your system, it will ask whether to keep the existing printer driver or install a new one. Click *Keep existing driver (recommended)* and then *Next*. On the subsequent screen, type a name for the new printer icon—for example, **My Color Settings** (see **FIGURE 3**). This screen
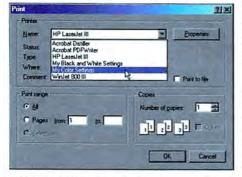
FIGURE 4: DON'T OPEN more dialog boxes—choose custom printer settings in the regular Print dialog.

lets you make the named printer the default one. Click *Next*, and follow the remaining prompts to finish the wizard.

Now you have two icons for the same printer. Right-click the one you called My Color Settings, and choose *Properties* (or press **<Alt>** and double-click the icon). Change the settings to suit your preferences for color printing. When you're done, close that Properties dialog box and open the *Properties* dialog box for the original printer icon. Adjust its settings to handle another printing chore, such as black-and-white printing. When you're done, press **<F2>** and rename the icon something descriptive, like **My Black-and-White Settings**. Then press **<Enter>**. When you've named both icons properly, right-click the one whose settings you use more often and choose *Set as default*, if that option isn't already selected. Now close the *Printers* window.

The next time you need to print, open the Print dialog box in your app. In most cases, the dialog box will have a drop-down list of the printers that are set up on your system. Select the more appropriate printer for the task at hand—for example, *My Color Settings* (see **FIGURE 4**)—set any other desired print settings, and click *OK*.
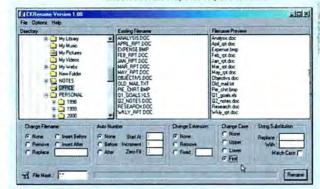
CLEAN UP YOUR REGISTRY

IF YOU'VE read this column for a while, you already know that most Windows settings are stored in two files: user.dat and system.dat. Together, they constitute the Windows Registry. Mark Justice Hinton of Albuquerque, New Mexico, points out that Scanreg, the Windows utility for backing up and restoring these two files, can also keep your Registry from becoming too large. Reboot your PC to a command prompt, and in Windows 98, choose *Start•Shut Down•Restart in MS DOS mode•OK*, if that's an option on your system; otherwise, restart your PC, and after it beeps, hold down **<F8>** until you see Windows' start-up

screen. In Windows Me, boot your PC using the start-up floppy you were prompted to make during installation.

When you see the boot menu, press **<Shift>-<F5>** to get to a command prompt. At the C> prompt, type **scanreg /opt** (be sure to include the space before the slash), and press **<Enter>**. The undocumented /opt switch reduces the Registry's size by removing unused space. If the Registry is defective, the command **scanreg /fix** will remove unused space and repair damaged portions. Press **<Ctrl>-<Alt>-<Delete>** to reboot to Windows.

Find files from this article at www.pcworld.com/downloads; find more tips at www.pcworld. com/heres_how. Windows Tips *pays $50 for published tips and questions. Scott Dunn is a* PC World *contributing editor.* ∎

YOUR QUESTIONS ON: Backing up dial-up networking entries ◆ **Network intercoms**

Remain Anonymous: Disable Your PC's PSN

I'VE HEARD THAT the Pentium III chip's processor serial number can compromise my privacy. How do I disable the PSN on my Pentium III system?

Sean Callen, Kingston, Ontario

INTEL'S PSN is a unique identifier that theoretically allows Web sites to pinpoint your surfing habits. PSN never became the supercookie many people feared: The critics' hue and cry held PSN in check.

So what's your computer's PSN status? If it isn't a Pentium III, you don't have a PSN. If you do have a PIII, your PSN is

FIGURE 1: YOUR PENTIUM III processor's PSN is disabled in BIOS when you see this message.

probably turned off already, per recommendations Intel made to PC vendors because of the controversy over privacy.

You can turn your PSN on or off via the hardware setup screen, but the method differs from one PC to another. On most PIII-based systems, you get to this screen by holding down <Insert> or <Delete> at the beginning of the boot-up process. Search the options to find the PSN off switch.

An Intel program tells you whether your PSN is turned on, and turns it off or on for you as you specify. Download it at support.intel.com/support/processors/pentiumiii/snum.htm?iid=psncu+corpen&. If PSN is disabled in your BIOS settings, you can't enable the feature using Intel's program. Instead, you'll get a message stating that 'the processor serial number has been disabled by another

user, an application, or by your computer's hardware setup' (see **FIGURE 1**).

When PSN is enabled in the BIOS, you can use Intel's PSN program to toggle between enabling and disabling your PSN. You're warned that 'enabling the processor serial number may allow this information to be read by Web sites'. After you click *OK*, a dialog box shows your PSN. If you click *Settings* and disable the feature, the dialog box indicates that the PSN is unavailable (see **FIGURE 2**).

Once you turn the PSN off, can a program or Web site secretly turn it back on? Much controversy surrounds this question. Doing so would involve rebooting the CPU surreptitiously—no easy trick.

But even if some hacker managed to turn on your PSN for the fun of it, all he or she would get is a number. The PSN's true potential as a spying tool was checkmated as a result of the controversy, since the number is almost universally turned off. Intel says it will not put serial numbers in its Pentium 4 processors.

BACK UP OR TRANSFER DIAL-UP NETWORKING

HOW CAN I back up the entries in my Dial-Up Networking folder without manually writing them down?

Jim Bowman, Greenwood, Indiana

CRAZY, ISN'T IT? Each dial-up networking (DUN) entry contains important information for getting onto the Internet by modem (phone number, log-in name, dialing string, and so on), yet Windows offers no obvious way to back up this information or move it to a new computer.

DUN stores its information in a partic-

Windows 98 System File Checker

THE SYSTEM File Checker checks that original Windows 98 files—the ones on your hard disk that came from the Win 98 CD-ROM—are in good condition. To launch it, select *Start•Run*, type sfc, and press <Enter>. The program looks at Windows files and restores bad ones. But reader Drew Schaffner notes that System File Checker can't tell a corrupt file from an updated one, so run the program after you update Windows, and select *Update verification information* for any file that System Fact Checker complains about.

ular branch of the Windows Registry—so all you need to do is back up that branch. You can do this in the Registry Editor. To launch it, select *Start•Run*, type **regedit**, and press <Enter>. Our standard admonition about backing up the Registry before you start doesn't apply in this case because you're not changing anything.

Once you have the Registry Editor open, navigate through the left pane's folders to HKEY_CURRENT_USER\RemoteAccess. Then select *Registry•Export Registry File*. In the resulting dialog box, give the file a name and save it in an appropriate place, such as on a removable disk. Set the 'Save as type' field to *Registration Files (*.reg)* and the Export range to *Selected branch*. The field at the bottom of the screen should read HKEY_CURRENT_USER\RemoteAccess. Click *Save*, and close the Registry Editor. Your DUN is backed up.

To move your DUN information to another PC, simply place the .reg file onto the target computer and double-click the file. If Windows asks whether you really want to make this change, click *Yes*. When you open *My Computer* and double-click *Dial-Up Networking*, your old dial-up information will be there.

FIGURE 2: INTEL'S PROCESSOR Serial Number Control Utility will disable your PIII's PSN.

ILLUSTRATION: JEFFREY PELO

Well, almost. Your password isn't saved in the Registry, so that won't be included. The first time you use a dial-up connection, you must enter the password manually. If you don't want to enter it again, check the *Save password* option.

If your new PC's modem is a different model from your old one, you have to tell each DUN item about it. Open *Dial-Up Networking*, right-click the icon for a connection, and select *Properties*. You'll likely get an error message that says the modem isn't installed. Click *OK*. Under the *General* tab in the Properties dialog box, select the modem you want to use in the 'Connect using' box, and then click *OK*.

HOME NETWORK INTERCOM

CAN MY WIFE and I use our home network as an intercom between two PCs? Each of the computers has its own microphone and speakers.

Mark Gallagher, Point Lookout, New York

YES, YOU CAN. The right tool for the job is NetMeeting, which comes with Internet Explorer and therefore with Windows.

To get started, select *Start•Programs•Accessories•Communications•NetMeeting*

FIGURE 3: A SIMPLE WIZARD helps you turn off annoying Explorer warnings when you enter the Windows folder.

(depending on your version of Windows, NetMeeting may be in the Internet Tools folder, or even on the Programs menu, instead of in Communications). The first time you run NetMeeting, a wizard helps you set it up. When asked to specify a connection speed, select *Local Area Network*.

To communicate over the network, you and your wife must be running NetMeeting. To place a call, click the icon of a phone or select *Call•New Call*. In the To

field, enter the name of your wife's PC (if you don't know the name, open Network Neighborhood on your desktop to see a list of the network's computers). In the Using field, select *Network*, and click *Call*.

Your wife will hear the sound of a phone ringing, and a pop-up window will announce that there's a call. If she accepts the call, you'll soon be talking.

PUT A BIG FILE ON LITTLE DISKS

MY FILES are getting too big to fit on one floppy disk. How can I copy a large file onto multiple floppies?

Edward Wong, via the Internet

NO MATTER HOW hard we try, we can't completely dispense with floppies—even though their 1.44MB capacity is often too small for a single file.

The best solution is a .zip archive program, such as WinZip Computing's $29 WinZip 8 shareware. It's available from PCWorld.com's Downloads. Virtually all .zip programs let you span an archive across multiple disks. Besides, copying an archive (instead of an uncompressed file) will reduce the number of disks you need.

If you have WinZip, right-click the file you want to copy and select *Add to Zip*. In the 'Add to archive' field in WinZip's Add dialog box, preface the file name with a:, as in **a:bigfile** (assuming that you need to span your floppy drive).

As soon as you type a: into that field, WinZip's 'Multiple disk spanning' option will become available. You can leave it on the default *Automatic* setting. Click *OK* to start the compression and spanning; the program will prompt you to insert other blank formatted disks as needed.

If you don't want to compress your files or pay $29, you can download Marc Bjorklund's File Splitter freeware, a program that splits large files into multiple smaller files of a specified maximum size (the default is 1.44MB). It also creates a batch file for restoring the original, now-divided file to its united state. You can download File Splitter from PC World.com's Downloads. The author's Web site is at members.nbci.com/mbjorklu.

JUST OPEN MY WINDOWS FOLDER

I'M IRRITATED BY the warning text that appears when I try to open the Windows folder in Windows Explorer—the one that forces me to click Show Files before I can do anything. How can I make Windows just show me the files?

Ian Reece, Toronto

WHEN YOU select the Windows or Windows\System folder in Windows 98's Explorer, you expect to see a list of the folder's files and subfolders, but instead Explorer may warn you that you shouldn't be there. (I'll discuss Windows Me below.) You then have to click Show Files to get where you want to go (see **FIGURE 3**).

Worse yet, even after you've clicked Show Files, you continue to get the same stupid warning every single time you return to the folder.

Luckily, this warning comes up only if you view the folder as a Web page. So the next time you get the warning, instead of clicking Show Files, select *View* and uncheck *as Web Page*. Thenceforth, Explorer won't display that particular folder as a Web page, and you won't get the warning.

But what if you want to see the folder as a Web page? Go to the folder in question (either C:\Windows or C:\Windows\System), and select *View•Customize this Folder*. On the first page of the resulting wizard, select *Remove customization*, click *Next* twice, and then click *Finish*. From now on, that folder will display as a Web page without problems.

In one sense, Windows Me is worse. Besides getting warnings when you go to C:\Windows and C:\Windows\System, you can't select C:\ or C:\Program Files without being warned.

Luckily, Windows Me is a lot smarter about shutting up. Once you've clicked *Show Me* for a particular folder, Windows Me will remember that you consider yourself mature enough to handle its contents.

Find files from this article at www.pcworld.com/downloads. Send your questions and tips to answer@pcworld.com. Answer Line *pays $50 for published items. Find Contributing Editor Lincoln Spector's humorous writing at www.thelinkinspector.com.* ∎

Juice Up Your High-Speed Internet Connection

IF YOU'VE RECENTLY moved to a high-speed Internet connection, you're undoubtedly finding new and frivolous ways to put the additional speed to work. Downloading digital movies, streaming the BBC World Service, or listening to Radio Estonia are just a few examples. But as the novelty wears off, one question inevitably arises: Can I make it go even faster?

Sure, you can download a 400MB file over a cable modem connection in less than an hour, but if it took only half as long, you'd have yet more time to download other stuff that you'll probably never get around to using. It's likely you can squeeze more performance—maybe a lot more—out of your high-speed link with just a few clicks of your mouse.

Many Web sites offer to tell you your connection speed, but the tests they use aren't always accurate. Microsoft's MSN Computing Central Bandwidth Speed Test at msn.zdnet.com/partners/msn/bandwidth/speedtest.htm and DSL Reports' speed-test page at www.dslreports.com/stest gauge your download and upload speeds by timing the transfer of a small file to and from your computer. While this technique provides a general speed readout, the results can fluctuate dramatically. You're testing the speed of the entire connection between your PC and the test site's server, and neither you nor the Web site has any control over the efficiency of the routers in between. Also, testing a small file can lead to inaccurate results, and if that file is stored in your browser's

cache, the results will be muddled further. Over several minutes, MSN clocked my cable modem connection at anywhere from 850 to 1250 kbps. While DSL Reports indicated steadier speeds in the vicinity of 950 kbps, there's no assurance that either service is accurate.

To get a more exact measurement of your connection speed, transfer a large, noncompressible file, such as a multimegabyte .mp3 or .zip archive file, between your hard disk and any nearby server that you have access to. The home directory that your ISP provides, an office computer, or a nearby FTP server are all good choices. Download and upload the file four or five times, and track how long each transfer takes. To find your connection speed in kilobits per second, convert the file size to kilobits by multiplying the number of kilobytes by 8, then divide by the transfer time. We'll use an 8MB file as an example. A megabyte is 1024 kilobytes, so our 8MB file is 8 times 1024 times 8, or 65,536 kilobits. If the 8MB file takes 1 minute and 40 seconds to download (100 seconds), divide 65,536 by 100 to get the per-second transfer speed. In

Does Windows Me Hate AOL?

ARE WINDOWS Me's reported conflicts with America Online part of the Microsoft Network's rivalry with AOL? Nah, it's probably just the usual upgrade-itis. Reports of problems between AOL and Windows Me include system freeze-ups, modem disconnects, and conflicts with Internet Connection Sharing. If you've had AOL/Me trouble, check the 'Frequently Asked Questions About AOL in Windows Millennium Edition' Web page at support.microsoft.com/support/windows/topics/winme/AOL/winmeaol.asp.

our example, the connection is running at approximately 655 kbps. Try the tests at different times of the day to detect speed troughs. The wee, wee hours of the morning will likely be fastest, and weekday early evenings the slowest.

If that's too much math, let your browser do the gauging for you. Both Internet Explorer and Netscape Navigator do a pretty good job of tracking download speeds, which their download dialog boxes report in kilobytes per second (see **FIGURE 1**). A 120-kilobytes-per-second transfer speed translates to 960 kbps. That's decent cable modem performance, but something tells me I could do better.

LET THE TWEAKING BEGIN

THE TCP/IP networking protocols that keep the Internet humming do their magic by breaking files into packets. Several TCP/IP settings control how efficiently your computer receives these ▶

FIGURE 1: ESTIMATE DOWNLOAD SPEED via the download dialog box. IE and Navigator display it in kilobytes per second.

packets, and adjusting the settings can make your connection measurably faster. Go to www.dslreports.com/tweaks to find a Java applet that tests your TCP/IP settings. Once you click on the *Start* button (see **FIGURE 2**), the applet will probe your parameters and list suggested tweaks. Scroll down the page for explanations of the tweaks and a list of links to tools you can use to make the changes.

For a second opinion on which settings to tweak, visit John Navas's Cable Modem/DSL Tuning Guide at cable-dsl. home.att.net. Both DSL Reports and the Cable Modem/DSL Tuning Guide focus on increasing the TCP Receive Window (RWIN) setting, and both offer Registry files that you can download to your desktop, then merge with your Windows Registry to beef up your RWIN setting. To enable the change, right-click the downloaded .reg file and select *Merge*. Navas

FIGURE 2: DSL IN THE DUMPS? GET A QUICK FIX for your lagging connection from DSL Reports' high-speed Internet tweaks page.

provides a VBScript file called set_ rwin.vbs that combines the Registry tweak with an Internet Connection Sharing bug fix (see cable-dsl.home.att.net/#Method2). To run the script, download it to your desktop, then double-click it. You need to restart Windows to enable any Registry update. As always, you should back up the Registry before making any changes. For instructions on how to do so, see the May 2000 *Answer Line* (www.pcworld.com/may2000/registry).

After I ran Navas's script and rebooted my computer, I checked my download speed at both DSL Reports and MSN. DSL

Reports told me I was running at a prodigious 3000 kbps, and while MSN's results still varied widely, the range started at 3000 kbps and extended as high as 8000 kbps. Not content with these artificial benchmarks, I decided to repeat the download of a 400MB Linux CD image I had downloaded prior to my tweaks. Instead of taking 50 minutes to transfer, as it had originally, the image flew onto my hard disk in a mere 32 minutes. Not a bad performance boost, considering that all it took was a couple of mouse clicks and a reboot.

DONATE YOUR EXTRA CPU CYCLES TO RESEARCHERS

DID YOU JUST buy the latest gigahertz PC? Even if you max out its processor 12 hours a day (unlikely), that leaves 12 more hours when it sits there doing nothing. Got a few other PCs sitting around doing nothing, too? If they're connected to the Internet, you can do a good deed by putting them to work as data crunchers for worthy research projects. You may even earn a prize, such as an MP3 player or frequent-flier miles. And there just might be some cash in it for you. United Devices (www.ud.com) is a Texas-based online clearinghouse for unused CPU power, which it resells or donates to organizations performing computationally intensive research. The groups receiving your spare processing capacity include the Human Genome Project and the National Cancer Research Foundation's Centre for Drug Discovery in the University of Oxford's Department of Chemistry. Find out more about the projects at www.ud.com/projects/cancer.

To make your computer available for such projects, simply download and install the free 1.75MB UD Agent client software. (The system requirements are minimal.) Then, when your system is idle, the UD Agent puts it to work on a small piece of the current project. Will you get

Sweeter Music With Opera, the Browser Alternative

WHEN IT COMES to browsers, you've got your Bush and your Gore: Netscape Navigator and Microsoft Internet Explorer are just different enough that you feel like you have to choose one or the other. Internet Explorer is arguably the better browser, but some people would like a candidate far removed from the taint of the Microsoft name. Bush, er, Navigator, on the other hand, is sometimes a little slow on the uptake, and since being absorbed by America Online, it is hardly the rebel it was in its youth.

What we really need in the browser race is a Ralph Nader. And that's just what Opera is. The "other" browser incorporates e-mail, newsreaders, and a contact manager, and it supports all the latest Web standards—HTML 4.0, Cascading Style Sheets, XML, and JavaScript—but Opera flies coach. The basic version is a no-frills, 2MB download. If you want a Java run-time environment that's compatible with just about any Web site, the download swells to more than 9.5MB.

Simplicity has a price, however. Unlike with the bloated big-name browsers, you have to pay for Opera (or put up with the ads in the new "free" version 5). To get the browser without the ads will cost you $39.

For those of us who value our online privacy, there's a single feature that may make Opera worth the price: A Clear Private Data command deletes cookies and cached passwords with just a click. Of course, Linux and BeOS versions of the browser are available for those who eschew Windows (I only eschew gum myself). Green Party Ralph is probably using Opera right now to find a good price on an SUV.

rich from this? No, but you may get a kick out of participating in an experiment in commercial distributed computing. If it should turn out to be a bore or a hassle, simply uninstall the software.

Find files from this article at www.pcworld.com/downloads. Send your questions and tips to nettips@spanbauer.com. We pay $50 for published items. Scott Spanbauer is a contributing editor for PC World. ∎

Make Word Do It Your Way With Customized Settings

MOST OF US will use an application such as Microsoft Word for years and rarely if ever change its default settings. Instead, we tolerate what we perceive to be the program's shortcomings. Consider the Style drop-down list located at the far left end of the Formatting toolbar in Word 97 and 2000 (its default setting is Normal). Why stick with the list's default styles if they don't suit your needs? It's easy to change Word's Style defaults to make your documents look the way you want.

Note: The following steps work for all styles except Normal. The procedure for changing Normal's default settings appears at the end of this item.

Open a new document, type some text on a line, select it, click *Format• Style*, and choose the style you want to alter from the list in the left pane of the Style dialog box. Click *Modify* in the Style dialog box. In the resulting Modify Style dialog box, check *Add to template* and *Automatically update*, and then click *OK* (see **FIGURE 1**); finally, click *Apply* on the next screen.

Now you can use Word's normal formatting tools to alter the font, the font size, the paragraph spacing, or any other characteristic. As you format the new text, the style you chose will be updated automatically with the formatting you apply.

If you want to alter any other styles, simply repeat the steps given above.

When you exit Word, you'll see a box asking you to confirm the changes you made to the normal.dot template (where the default settings are stored). Click *Yes*. Thereafter, your style changes will remain in place until you repeat this process.

As noted, you can't alter the default Normal style with this procedure. To change the Normal style, you must select *Format• Style* in a paragraph formatted with that style and then click *Modify* in the Style dialog box. In the Modify Style dialog box, click *Format* and choose the appropriate commands from the pop-up menu to access the Normal formatting dialog boxes. When you're done with your selections, check *Add to template*. Click *OK* and *Apply*. Once again, you'll be asked to confirm the changes to normal.dot when you exit Word. If you change the Normal style's font, all styles that are based on Normal will be changed to that font as well.

LAUNCH APPS FROM WORD

WORD 97 AND 2000 users can launch other Office applications faster from within Word than from the Start menu, but the toolbar that makes this possible isn't among the choices that appear when you select View•Toolbars. To display this toolbar, select *Tools•Customize*, then click the *Toolbars* tab in the Customize dialog box. Double-click *Microsoft* in the Toolbars list (or single-click its check box), and finally click *Close*. The Microsoft toolbar appears as a floating box, but you

can, of course, click its title bar and drag the box to your normal toolbar area or dock it on any screen edge (see **FIGURE 2**).

SEE GRAPHICS' BOUNDARIES

WHEN WORKING with graphical elements, text boxes, and inserted objects in Word documents like newsletters, reports, and

FIGURE 2: THE MICROSOFT toolbar offers one-click access to your favorite Office apps.

brochures, you may need to see their exact boundaries to place them properly. Here's how to show these boundaries in both the Online/Web Layout and Page/Print Layout views in Word 97 and 2000:

Select *Tools•Options*, then click the *View* tab in the Options dialog box. In Word 97, select *Text boundaries* in the Show section of the dialog box. In Word 2000, select *Text boundaries* in the Print and Web Layout options section of the dialog box. Click *OK* to finish the job.

Find additional tips at www. pcworld.com/heres_how. Send questions and tips to george_ campbell@pcworld.com. We pay $50 for published items. Visit Contributing Editor George Campbell at www.osomin.com. ∎

FIGURE 1: YOU CAN MAKE STYLE CHANGES in Word permanent by using the Modify Style dialog box.

Stylish Keyboard Shortcuts

IF YOU USE WORD'S Heading styles (and you should), you need not use your mouse to assign a heading style to a paragraph. Word's keyboard shortcuts will quickly and simply apply the heading style you prefer. To apply Heading 1, press <Ctrl>-<Alt>-1; Heading 2, <Ctrl>-<Alt>-2; and so on. Here are two other useful styles you can apply with keyboard shortcuts: <Ctrl>-<Shift>-L converts the selected text to the program's Bulleted List style, and <Ctrl>-<Shift>-N sets the paragraph style back to Word's default Normal style.

Upgrade Celeron PC graphics ◆ New modem, new settings ◆ Right-click file moves

Handy-Dandy Windows Fixer-Upper Guide

SOMETIMES YOU just have to do things the hard way. When Windows—or any program—conflicts with your hardware, the easiest, most effective remedy may be a fresh start (see www.pcworld.com/feb2001/hardware). But reinstalling devices or restoring Windows Registry files from a backup won't solve every problem.

You may be better off rolling up your sleeves and tackling the problem directly. Fortunately, both Windows 98 and Windows Me have several tools for hunting down the source of your hardware woes.

HELP ME, MR. WIZARD!

START BY RUNNING one of Windows' Troubleshooters. You'll find a list of troubleshooting wizards under *Start•Help* in Win 98 and Me. Click *Troubleshooting* on the first Help screen.

The wizards lead you through a series of questions and problem fixes for a specific device or subsystem in your PC (see FIGURE 1). In Windows 98, you'll see a list of the available troubleshooters as soon as you click Troubleshooting, but in Me, you must first select *Hardware & system device problems* to see the list.

Some Troubleshooters cover many potential problems; others are more limited. But any of them is worth trying once, if only to ensure that you haven't overlooked the obvious.

FIX FAULTY SYSTEM FILES

NEXT, CHECK Windows' system files. According to Microsoft, many calls to the Windows technical support line are prompted by problems caused by damaged, altered, or out-of-date system files. Windows relies on these files (many of which have .dll or .vxd extensions) to function.

When you first install Windows, all of the system files are intact, but something as simple as an improper Windows shutdown—due to a power failure or some other cause—can damage these files without leaving any indication that trouble is just waiting to happen.

Application programs may replace certain system files during their installation. Typically, these programs copy the most recent version of a system file over the existing file to ensure that the application will run smoothly. This won't cause a problem until Microsoft releases a new version of Windows that contains new system files. Thereafter, when you install the older application program, it will overwrite the most recent version of the system files with its own out-of-date version.

Even more troubling is the tendency of some programs to write customized versions of Windows' system files over Microsoft's originals. Although these tweaked files may enhance the performance of the program that installed them, they may also hinder or even disable the operation of other programs.

PROTECT SYSTEM FILES

TO PRECLUDE such problems, Windows Me incorporates a new System File Protection (SFP) scheme that monitors any attempt to change your system files and prevents detrimental changes from being made. SFP runs seamlessly in the background and requires no action from you.

In contrast, Windows 98 lacks the preemptive protection of an automated SFP scheme. But it does provide a couple of tools for checking your system files manually: the System File Checker (SFC) and the Version Conflict Manager.

When Win 98 is installed, it stores the size, time stamp, and other characteristics of each system file in the SFC database. So each time you run SFC, Windows compares the data for the old and the current files. If it finds a file that has been ▶

Maximize File-Moving Options

MOVING FILES BETWEEN folders and hard disks in Windows Explorer can be confusing: Sometimes a file gets copied, sometimes it gets moved, and sometimes Windows simply creates a shortcut. To avoid this confusion, hold down the right mouse button instead of the left one when you drag the file from one folder to another. When you drop the file, the right-click menu displays several options, among which are Copy, Open, Print, and (one of my favorites) the very useful but terribly underused Send To.

FIGURE 1: WIN 98'S Troubleshooters appear under Contents in Windows Help. Windows Me's are two selections deeper.

altered, damaged, or deleted, it prompts you to reinstall the original version.

To open SFC, click *Start• Programs• Accessories• System Tools• System Information*, and then select *Tools• System File Checker*. Before clicking Start, click the *Settings* button. By default, the utility checks only for damaged files. I suggest you set it to look for changed or deleted files also: Check the appropriate boxes at the bottom of the Settings tab and click *OK* (see **FIGURE 2**).

To run the utility, select *Scan of altered files* and click *Start*. (The 'Extract one file from installation disk' option is used to extract files from the Windows CD-ROM.)

You can also set SFC to detect changes made to other file types—such as documents or spreadsheets—located in specific folders on your hard drive. To do so, simply check the appropriate boxes in the

FIGURE 2: SET SYSTEM File Checker to find deleted and changed files or corrupted system files.

dialog box under the Search Criteria tab.

When System File Checker finds a corrupted or missing file, it displays the box shown in **FIGURE 3** and offers to walk you through the process of restoring the file from the installation disk(s). Note that you may not be able to find some of the files that System File Checker flags as damaged or changed; Windows 98 creates these files—many of which are .ini files—after installation is complete.

Windows 98's Version Conflict Manager is useful only to people who upgraded from Windows 95 and encounter problems with a program that worked fine before the upgrade. The utility is easy to run and lets you restore the old Win 95 system files that were replaced during in-

stallation of the upgrade. Like System File Checker, it can be run from the Tools menu in the System Information utility.

FASTER GRAPHICS FOR CELERON-BASED PCs

DECEMBER 2000's *Hardware Tips* (see www.pcworld.com/dec2000/graphics_upgrade) included a question from Katie Latimer of Denver about upgrading the graphics of a Celeron-based PC, which integrates graphics onto the motherboard. As I stated earlier, if your system lacks an AGP slot (as nearly all brand-name Celeron-based systems do), adding a PCI-based graphics card with lots of memory can enhance the machine's graphics performance tremendously.

Your PC may well be based on Intel's 810e chip set; many systems with the 810e have been sold in recent years. These machines use the PC's main system RAM for both standard and graphics duties, so they offer good economy but relatively poor graphics performance. Adding a PCI graphics card with its own dedicated graphics RAM eliminates shared memory and its lackluster visual consequences.

If you have a Dell system, you're in luck: Dell's 810e-based systems accept PCI graphics cards. But some 810e-based systems from Gateway and Compaq do not.

Check your manual for information about PCI upgrades for your system, but don't be surprised if it's not there. Low-cost PCs often lack detailed technical documentation. If you don't find the information you need, contact your system's manufacturer. If all else fails, call your motherboard manufacturer.

OUT WITH THE OLD (MODEM)

I FINALLY MOVED UP to a new 56-kbps, V.90 modem and removed my 28.8-kbps modem. Sure enough, the new modem won't work. When I try to go online, I get error messages referring to my *old* modem, which I removed. What gives?

Kurt Wilson, Baton Rouge, Louisiana
IT SOUNDS LIKE your old modem is really old—so old that it doesn't support Plug and Play. Unfortunately, if you remove any non–Plug and Play device from a system running Windows 95 or later, Win-

FIGURE 3: IF SYSTEM File Checker finds a corrupted file, it warns you and asks if you want to restore it.

dows doesn't know that you've made a switch until you tell it manually.

To do so, go to the desktop or to an Explorer window, right-click the *My Computer* icon, and select *Properties* to open Device Manager. Click the *Device Manager* tab, confirm that *View devices by type* is selected, and double-click *Modem*. Both your old and new modems should be listed. Select your old modem, press the *Remove* button, and reboot (see **FIGURE 4**).

FIGURE 4: WHEN WINDOWS won't forget, uninstall old hardware drivers via Device Manager.

If problems continue, repeat this process two or three times; sometimes Windows just doesn't get it the first time. And if all of these efforts don't work, try removing and reinstalling the new modem as well.

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. ■

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Soup Up Your PC's Processor

AS TODAY'S NEWEST CPUs surpass the 1-GHz barrier, it's easy to get frustrated with the older, pokier processor in your PC. A CPU upgrade kit can give your older machine a reasonable performance boost for a practical price.

If your PC uses a Socket 7 processor and currently runs at between 75 and 233 MHz, you can upgrade to an AMD processor that runs at 333 MHz for about $100 or at 400 MHz for about $130.

Most upgrade processors are designed for Slot 1 PCs that use early Intel Celeron or Pentium II CPUs in the 233- to 450-MHz range. An upgrade to 600 MHz will set you back $249 if you have a Pentium II PC, or $220 if you own a Celeron. Stepping up to 700 MHz costs $320, and jumping to 800 MHz runs about $400.
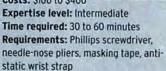
Most contemporary Intel-based motherboards use Socket 370 for their CPU. If you purchased one of the early Celeron-based systems that use Socket 370, upgrades are now available. You can boost your PC to 566 MHz for about $240.

But consider carefully whether an upgrade makes sense for you. While an upgrade processor can double your CPU speed, an old hard drive or video card in your PC can limit the overall performance boost to as little as 25 percent. Sometimes a new PC can be the best deal of all.

Stan Miastkowski is a PC World contributing editor. ∎

THE TOP DOWN

Benefits: Faster overall system performance; new multimedia commands can speed up graphics.
Costs: $100 to $400
Expertise level: Intermediate
Time required: 30 to 60 minutes
Requirements: Phillips screwdriver, needle-nose pliers, masking tape, anti-static wrist strap
Vendors: Evergreen Technologies (www.evertech.com), Kingston Technology (www.kingston.com), PowerQuest (www.powerquest.com)
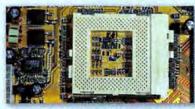
PROCESSOR SLOTS AND SOCKETS

THE TYPE of slot or socket that houses your processor goes a long way in determining what upgrades are available to you. Here's a look at the most popular types out there.

Socket 7, Super 7 – Socket 7 motherboards support original Pentium chips and compatible chips by AMD, Cyrix, and Intel (133 MHz to 266 MHz). Uses a 66-MHz system bus. Super 7 motherboards add support for 100-MHz memory and AGP, along with AMD K6 processors up to 450 MHz.

Socket 370 – Standard socket for all new Intel Pentium III and Celeron CPUs. Maximum supported speed depends on motherboard and BIOS. Most Socket 370 motherboards support up to 133-MHz memory.

Socket A – Standard socket for current AMD Athlons and Durons. Maximum CPU speed supported depends on motherboard and BIOS. Socket A motherboards support up to 133-MHz memory.

Slot 1, Slot A – Slot 1 is used for Intel Pentium II, Pentium III, and Celeron processors. Maximum speed supported depends on motherboard and BIOS. Most Slot 1 motherboards use 100-MHz memory. AMD used a similar design called Slot A for its early Athlons up to 800 MHz. Slot A motherboards support up to 133-MHz memory.

1 **Buy the right upgrade CPU.** Not all systems support CPU upgrades. Before you buy, check the Web pages of vendors offering CPU upgrades. Most provide prequalification information that will help you decide which upgrade is right for your PC.

In most cases, you should also make sure that your PC's BIOS is up-to-date. Check your computer maker's Web site for the latest BIOS. You'll also find extensive BIOS info on Wim's BIOS Page (www.ping.be/bios).

Finally, make sure you do a complete backup before you start.

Check Your Compatibility

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* The AcceleraPCI Prequal Software is specifically designed for the AcceleraPCI card. The software will provide information about your system to assist with the compatibility questions below.

If your system is not listed please contact the Evergreen Customer Care Center to find out if your system is compatible.

System Type : PentiumII
Please select your manufacturer:
[Compaq ▾]
[Back] [Next]

UPGRADING A SOCKET 7- OR SOCKET 370-BASED PC
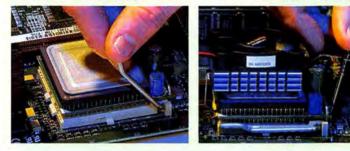
1 Remove the old CPU. Turn off and unplug your PC, and remove the cover. Attach an antistatic strap to your wrist to protect the chips. You may have to remove cables or add-in cards to reach the CPU. If so, use masking tape to mark what goes where. Disconnect the power cable that runs to the CPU fan, if your unit has a fan (some PCs use a heat sink instead).

Note the corner of the CPU that has a small diagonal cut and (usually) a dot. That is pin 1. Put a piece of masking tape near pin 1 of the motherboard to make installing the new CPU easier.

Unhook and lift the CPU release lever; then carefully pull the CPU out of the socket.

2 Insert the new CPU. Remove the upgrade CPU from its protective packaging and carefully insert it into the socket. Make sure that pin 1 of the processor carefully aligns with pin 1 of the socket.

Press the CPU down firmly with your finger and push the locking lever into place. Connect the processor fan to the power connector. (In some cases, you'll need to install the fan on the CPU separately; consult the directions that came with the processor.)

3 Set the motherboard jumpers (Socket 7 only). If you're upgrading an older Socket 7-based system, you may need to make sure that you set the jumpers to the maximum bus speed and the clock multiplier to its maximum value. (Most newer motherboards don't use jumpers for those settings.)

On some motherboards, the correct jumper settings are marked; on others, you may have to consult the PC's manual to determine which is which.

UPGRADING A SLOT 1 (PENTIUM II OR CELERON) PC

1 Remove the old CPU. Turn off your PC, unplug it, and remove the cover. Use an antistatic wrist strap to work with the processor modules. If the old CPU has a fan, unplug the power connector that runs to the fan. If the old processor has a heat sink, remove and discard it. (Upgrade CPUs have their own built-in fans.)

Small levers hold the CPU cartridge in a frame. Press them both until they pop open. Grasp the cartridge firmly, carefully rock it from side to side until it loosens, and then gently pull it out of its frame.

2 Insert the new processor module. Remove the new processor from its packaging, and gently slide it into the frame (it is designed to line up in only one way) until the cartridge is just above the slot. Then press down firmly until the levers of the frame click into place. Attach the fan power connector to the associated connector on the motherboard.

3 Set the motherboard jumpers (older motherboards only). Most motherboards made in the past few years don't have jumpers. If yours does, however, set the jumpers to the maximum processor speed, even if it's considerably less than the upgrade processor's. The new CPU will still run at its maximum speed.

FINAL STEP

Check it out. Before turning on your PC, double-check to confirm that the fan on the new processor is connected to power. Turn on your PC and make sure everything is running correctly. If your system won't start, switch it off and recheck that the new CPU is firmly seated in the slot or socket. If your system still doesn't work, or if it acts strangely, contact the upgrade maker's tech support. (Most upgrade suppliers offer a money-back guarantee if the upgrade won't work in your PC.)

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PC WORLD

The Upgrade Path: Uphill and Rocky

THE NEWS FROM COMPUTER MAKERS: Sales growth is slowing. Pundits have offered plenty of explanations, ranging from a Y2K panic-buying hangover to the idea that many users have computers that are already plenty fast for everything they do.

Let me propose another reason: The increasing pain of upgrading from an old machine to a new one, due largely to Microsoft products whose designers never gave the problem even a first thought. Once upon a time, upgrades were easy. You copied your data and program files from your old PC to the new one and started computing. Not even a reboot was required.

Now, thanks to that revolting Windows development called the Registry, you can move only the data. Every bit of software on the machine has to be reinstalled or upgraded—unless the PC comes with preinstalled versions of your applications. Extra-cost products like Aloha Bob's PC-Relocator can ease migration pains but have significant limitations.

NEW PC EQUALS NEW HASSLES

THE WEB MAKES things worse than ever. You'll probably have to re-download just about every browser plug-in you need. And thanks to Microsoft's cavalier attitude toward software quality in general and the upgrade process in particular, you still may not be out of the woods.

All this was impressed upon me recently when I swapped an ancient Pentium-90 Win 95 box for a modern 1-gigahertz PIII model running Windows 2000 Pro. With the old unit, I'd been using Outlook Express version 4 for e-mail. The new one came with version 5.5, so I figured I could copy my old e-mail files to the new machine and run the newer version's import function.

Four hours later, I was ready to lob grenades in the general direction of Redmond, Washington. The import process didn't work, and neither did the four different workarounds I found in Microsoft's online "searchable knowledge base"—including one that involved editing the Registry.

Microsoft's obnoxious **"Let 'em eat service packs"** hauteur gives users **one more reason** not to upgrade.

I briefly considered giving up on Outlook Express and tried importing my old mailboxes into the detestable Outlook. No go. Apparently Outlook's import function finds only the files already being used by the version of Outlook Express on the machine. If you can't import it into Express, you can't bring it into Outlook.

STUMPING THE EXPERTS

SO UNDER PRESSURE of deadline, I did something I normally try hard to avoid: I brought in heavy artillery unavailable to most users. I called Microsoft's PR firm and demanded to talk to a member of the development team.

Several hours later, the developers admitted defeat. The import function, it turned out, "pointed to an area that doesn't necessarily exist." It would be fixed in a service pack available "in the next couple of months." In the meanwhile I could try downloading a utility developed by a consultant in Chattanooga. Alas, this tool didn't run properly on my machine.

Shortly thereafter, Microsoft finally provided a successful workaround. (For the benefit of fellow sufferers, here's the fix: First, make sure that your old Outlook Express mail files are not marked as read-only. Then create a directory called OE4 with subdirectories called Mail and News. Put your old Outlook Express files in the Mail folder. Then open Outlook Express 5.5 and run the import function.)

With Gatesian chutzpah, Microsoft advertises that Windows 2000 produces significantly fewer blue screens of death than the versions mere home users are supposed to put up with. But I've had three blue-screeners so far. Worse, Windows Explorer won't show me the directory where Outlook Express stores messages. And at this very moment, I'm staring at a taskbar that won't hide itself as I've requested. This happens intermittently, and I haven't found any solutions in Microsoft's knowledge base.

The joke used to be that Microsoft didn't get things right until version 3. Now version 5 products ship with version 1–level quality. The company's obnoxious "let 'em eat service packs" hauteur gives users one more reason not to upgrade. Why donate new fees to its overflowing coffers or spend time fixing its mistakes?

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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- 15" (13.8" vis) E551 Monitor
- Intel® 3D® AGP Graphics ■ 48X Max CD-ROM
- SoundBlaster 64V Integrated Sound
- Integrated Intel® 10/100 NIC
- MS® Windows® Me & MS® Works Suite 2001 & Norton® AntiVirus™
- 1-Yr Ltd Warranty² ■ 1-Yr NBD On-Site Service⁴

$649 E·VALUE CODE 03844-590206
BUSINESS LEASE: $18/MO., 48 MOS."
- harman/kardon® Speakers, add $30
- 17" (16.0" vis) E770 Monitor, add $60

DELL™ DIMENSION™ L

Affordable Business Desktop
- Intel® Pentium® III Processor at 866MHz
- 64MB SDRAM (up to 512MB)
- 20GB⁵ Ultra ATA/100 HD
- 17" (16.0" vis) E770 Monitor
- Intel® 3D® AGP Graphics ■ 48X Max CD-ROM
- SoundBlaster 64V PCI Sound Card
- PC Speakers
- 3Com® PCI 10/100 NIC
- MS® Windows® Me & MS® Works Suite 2001 & Norton® AntiVirus™
- 1-Yr Ltd Warranty² ■ 1-Yr NBD On-Site Service⁴

$899 E·VALUE CODE 03844-590208
BUSINESS LEASE: $25/MO., 48 MOS."
- 128MB SDRAM (up to 512MB), add $60

DELL™ OPTIPLEX™ GX150

NEW—Latest and Greatest Managed PC
- Intel® Pentium® III Processor at 866MHz
- 64MB PC133 SDRAM (up to 512MB)
- 10GB⁵ (7200 RPM) ATA/100 HD (up to 40GB⁵)
- 15" (13.8" vis) E551 Monitor (up to Flat Panel)
- Integrated 3Com® 10/100 NIC
- Intel® 3D® AGP Graphics
- 48X Max CD-ROM ■ Integrated AC97 Audio
- MS® Windows® 2000 Professional
- NEW OptiFrame™ Small Desktop Tool-less Chassis in Midnight Gray
- 3-Yr NBD On-Site Service⁴

$999 E·VALUE CODE 03844-390209
BUSINESS LEASE: $28/MO., 48 MOS."

DELL™ BUSINESS NOTEBOOKS:

DELL™ INSPIRON™ 3800

Design and Affordability Notebook
- Intel® Celeron™ Processor at 600MHz
- 12.1" SVGA Active Matrix Display
- 64MB SDRAM ■ 5GB⁵ Ultra ATA HD
- Modular 24X Max Variable CD-ROM
- 8MB ATI Rage Mobility™ 3D® Video, 2X AGP
- Internal 56K Capable⁶ Modem
- MS® Works Suite 2001
- 1-Yr Mail-in Service with 1-Yr Phone Tech Support

$1099 E·VALUE CODE 03844-890210
BUSINESS LEASE: $31/MO., 48 MOS."
- Intel® Pentium® III Processor at 700MHz, add $200
- 3-Yr NBD On-Site Service⁴ with Lifetime Phone Tech Support, add $218

DELL™ INSPIRON™ 8000

NEW—Performance and Versatility Notebook
- Intel® Celeron™ Processor at 600MHz
- 14.1" SXGA+ TFT Display
- 64MB SDRAM ■ 5GB⁵ Ultra ATA HD
- Fixed CD-ROM (Upgrade to CD-RW or DVD)
- Modular Floppy Drive (Upgrade to Optical Drive or Zip)
- 8MB ATI Rage Mobility™-M4 3D® Video, 4X AGP
- 59WHr Li-Ion Battery
- MS® Office 2000 Small Business
- 3-Yr NBD On-Site Service⁴

$1699 E·VALUE CODE 03844-890216
BUSINESS LEASE: $47/MO., 48 MOS."
- Factory-installed 8X Max CD-RW, add $299
- Internal TrueMobile™ Wireless NIC⁴² Card, add $159
- Upgrade to CompleteCare™ Service²⁰ from 3-Yr NBD On-Site Service, add $169

DELL™ LATITUDE™ CPt

Network-Optimized Notebook
- Intel® Celeron™ Processor at 600MHz
- 12.1" SVGA Active Matrix Display
- 64MB SDRAM ■ 6GB⁵ Ultra ATA HD
- Modular 24X Max CD-ROM/Floppy Drive
- Internal 56K Capable⁶ SoftModem
- MS® Windows® 98, Second Edition
- Li-Ion Battery w/ExpressCharge™ Technology
- Dual Pointing – Touchpad and Pointing Stick
- 1-Yr NBD On-Site Service⁴

$1399 E·VALUE CODE 03844-790213
BUSINESS LEASE: $39/MO., 48 MOS."
- 14.1" Active Matrix Display, add $250
- Deluxe Nylon Carrying Case, add $69

DELL™ SERVERS AND WORKSTATIONS:

DELL™ POWEREDGE™ 300

NEW—Basic Box at Our Lowest Price
- Intel® Pentium® III Processor at 800MHz (up to 850MHz)
- Dual Processor Capable
- 64MB 100MHz ECC SDRAM (up to 1GB)
- 10GB⁵ (7200 RPM) IDE HD (up to 40GB⁵)
- Up to 120GB Internal Storage Capacity
- Intel® Pro/100+ PCI Ethernet Adapter
- 48X Max IDE CD-ROM
- Dell™ OpenManage™ Server Management Solutions
- 1-Yr NBD On-Site Service⁴, Years 2 & 3 Parts & Labor
- 7x24 Phone Tech Support

$999 E·VALUE CODE 03844-290209
BUSINESS LEASE: $28/MO., 48 MOS."
- 2nd 10GB⁵ (7200 RPM) IDE HD, add $109
- 2nd Intel® Pentium® III Processor at 800MHz, add $499

DELL™ POWEREDGE™ 1400

NEW—Small Business Value Solution
- Intel® Pentium® III Processor at 800MHz (up to 1GHz)
- Dual Processor/RAID Capable
- 128MB 133MHz ECC SDRAM (up to 2GB)
- 9GB⁵ (7200 RPM) Ultra3 (Ultra 160) SCSI HD (up to 36GB⁵ 10K RPM)
- Up to 144GB Internal Storage Capacity
- Integrated NIC/SCSI Controllers
- 48X Max IDE CD-ROM
- Dell™ OpenManage™ Server Management Solutions
- 3-Yr NBD On-Site Service⁴
- 7x24 Phone Tech Support

$1299 E·VALUE CODE 03844-290212
BUSINESS LEASE: $35/MO., 48 MOS."
- 2nd 9GB⁵ (7200 RPM) Ultra3 SCSI HD, add $219
- Small Business Bundle Upgrade, add $1879

DELL™ PRECISION™ 220

Advanced Performance Workstation
- Intel® Pentium® III Processor at 866MHz (up to 1GHz)
- Desktop Chassis
- Dual Processor/RAID Capable
- 64MB PC600 RDRAM (up to 1GB)
- 10GB⁵ (7200 RPM) EIDE HD (up to 73.4GB⁵ 10K RPM SCSI)
- NEW NVIDIA TNT2 Pro 16MB 4X AGP
- Integrated NIC & Sound ■ 48X Max CD-ROM
- MS® Windows® 2000 Professional
- 3-Yr NBD On-Site Service⁴
- 7x24 Dedicated Workstation Phone Tech Support

$1299 E·VALUE CODE 03844-490212
BUSINESS LEASE: $36/MO., 48 MOS."
- Monitor Sold as an Upgrade