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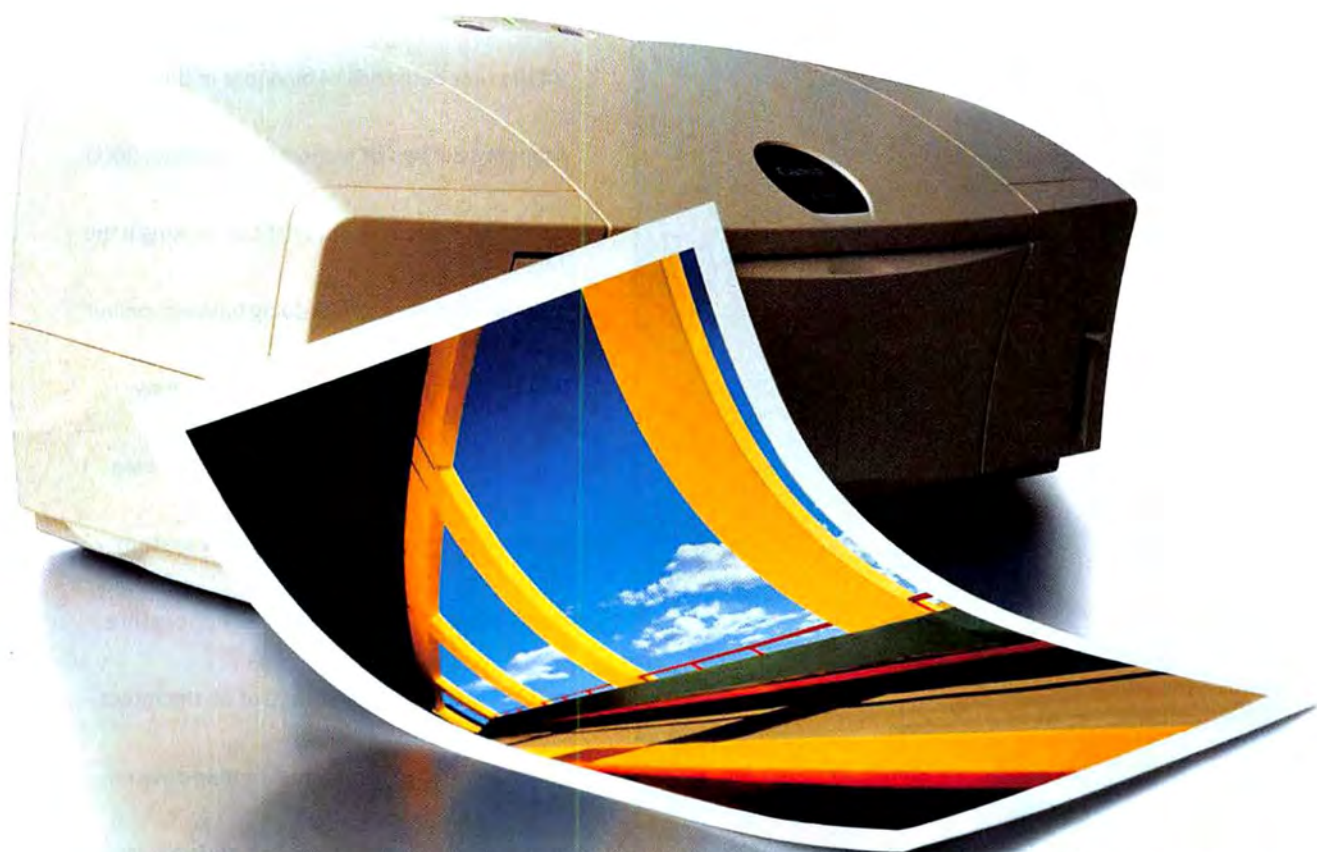
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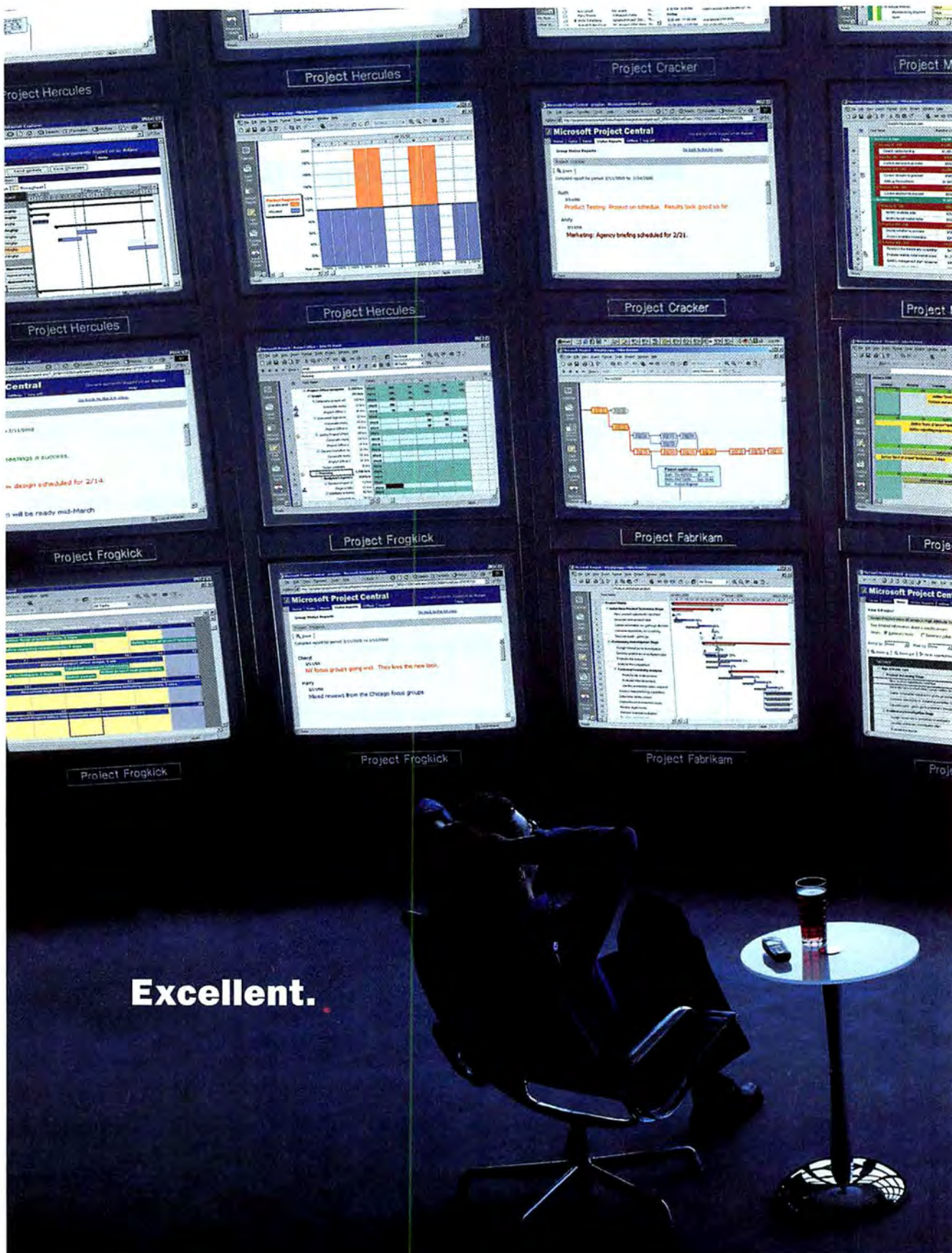
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COVER STORY

102 BROADBAND OR BUST

UPDATE Rah-rah hyperbole and horror stories have dominated the headlines about broadband access. But the people who've taken the plunge into DSL or cable modem service tell a different tale—one of minor frustrations, uneven prices, and data transfer rates that make it all worthwhile. We look at cost, installation, security, speed, and availability to find out why 86 percent of the broadband users we surveyed say they'll never go back to 56 kbps.

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HOW-TO You don't need a multi-million-dollar budget to create a movie masterpiece. A powerful PC and an inexpensive video-editing package can bring Tinseltown to any desktop. We review a dozen products designed for the home cinema paradiso.

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OPERATING SYSTEM

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135 WORKING THE WEB BAZAAR

CONSUMER ISSUES

New dynamic-pricing sites let you negotiate the best deal, whether you seek a last-minute flight to Florence, a suite at the Ritz-Carlton Boston, or a handheld PC. Three types of sites let you call the shots. Which one works best for you—and what are the hazards?



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available online at
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THE WEB AND YOU

171 TRADING UP

It's a bull market all right, but you still must watch your step when it comes to investing your money. We go online to round up the best brokers in the herd for your style of investing, whether you happen to be an active trader, a buy-and-hold-'em type, or a newbie. Find your match here.




COVER Photography by Marc Simon

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TOP 100

- 200 STEP ON IT: NOTEBOOKS AND DESKTOPS PUMP UP THE HORSEPOWER**

TOP 100 Notebooks with Intel's  SpeedStep technology and desktops boasting 800-MHz CPUs debut this month. We've also updated our test suite—say hello to PC WorldBench 2000.

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TOP 10 A new monochrome from Xerox tops our corporate lineup, and two Brothers bracket the SOHO chart.

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Teach Excel to handle numbers as fractions and decimals, unlink chart series from data ranges, prevent display of error messages.

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TOP CD-REWRITABLE DRIVES

REVIEW The trend on our chart toward faster, cheaper, more versatile drives continues with three new models in the mix, including a 12X and a USB unit.

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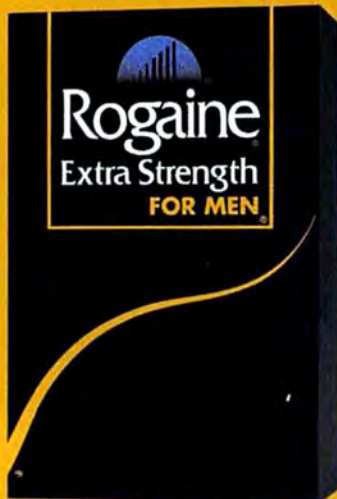
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Of Bandwidth and Benchmarks

WAY BACK IN 1992, I worked on a story about a then-hot broadband technology called ISDN. In that article, we lamented the "last mile," the distance—both physical and metaphorical—from the phone companies' switching offices to the average PC user's small business or home. Fast-forward eight years and we're still talking about that last mile. As we found out working on this month's report

about high-speed connections, "Broadband or Bust," availability is still the deepest barrier between us and fast access to the Internet—more than cost, security, or delayed installations. There is good news, however. Competition between the telcos and cable companies is hot, giving small-business and home Internet users something new: choices.

Of the two leading technologies, DSL and cable, the latter leads the availability race—primarily for home use. For the 50 percent of U.S. households with cable TV, the connection is already in place, awaiting only upgrades by the cable companies to add Internet service. Providers like AT&T@Home and Comcast are hard at it. According to Comcast, 75 percent of its 6 million cable TV subscribers can add Internet service immediately. And over the next 18 months, the company will be upgrading its equipment to accommodate the rest of its customers. Competition is spurring price wars, too: Recently, a bright red AT&T mailing arrived at my home, pushing free installation and rates rivaling inexpensive dial-up services.

DSL BETTER FOR SMALL BUSINESSES

DSL IS ALSO ROLLING OUT to American homes, but its prime destination is small businesses. A case in point: Builders Booksource, a specialty bookstore in Berkeley, California. Co-owner George Kiskaddon, an old acquaintance, remembers life before DSL. With one dial-up line, his staff had to take turns conducting research and business on the Web. Moreover, the connection was painfully slow, and staff often got knocked offline by the ISP.

For two years, Kiskaddon nagged his local phone company about DSL service but was told the store was too far from the phone company's central office. Then he received a flier from a



Availability is still the deepest barrier between us and fast access to the Net.

local ISP, LANMinds Internet Services (www.lmi.net), offering service in conjunction with national DSL provider Covad Communications. Technicians tested the store's lines and decided DSL could work.

Twenty days later, Builders Booksource had six networked PCs happily sharing a 192-kbps DSL line, for \$109 per month. After eight months, Kiskaddon is extremely pleased with his choice: "It's in use all the time, and the e-business opportunities are amazing. We check with distributors for ship dates and inventory, do research, and check out the competition."

His experience is far from unique. As we report in "Broadband or Bust," a recent *PC World* survey of cable and DSL users found that most respondents would never go back to life with an analog modem.

PC WORLDBENCH 2000 LIFTS OFF

THAT HUGE SIGH of relief coming from the PC World Test Center is thanks to the launch of WorldBench 2000, our latest (and most ambitious) application for measuring PC performance. Two years in development and beta testing, PC WorldBench 2000 debuts in this issue's Top 100 charts and in the *Top of the News* story on fleet 1-GHz PCs.

What's new? Compatibility with Microsoft's latest OS, Windows 2000, tops the list. PC WorldBench 2000 also runs on Windows 95, Windows 98, Windows 98SE, and Windows NT 4.0. Plus, we've expanded the number of test applications from six to eleven—the better to test today's incredibly fast PCs. As with all of our previous versions, PC WorldBench 2000 uses common applications like Microsoft Word and Excel, Intuit's Quicken, and Adobe's Photoshop to measure PC speed. Automated scripts

for each of the eleven apps mimic many of the common tasks we all perform on our machines. PC WorldBench 2000 times each of the automated scripts and converts them into the final performance score you'll see in our Top 100 charts.

People frequently ask how they can get PC WorldBench. The short answer is, you can't. As computer journalists, we know the complexities and costs of supporting a software application. And given the choice between putting our resources into more and better stories for the magazine and PCWorld.com or into technical support for a public version of our benchmark, we believe you'll benefit most from the former.

For more details on PC WorldBench 2000, check out www.pcworld.com/benchmark on PCWorld.com.

Tracey Capen is PC World's executive editor for Reviews. ■



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Magnify any area of your document, photo-retouching application, or Web page on the secondary display, while maintaining a full-screen view on the primary monitor.

"Matrox has demonstrated valuable insight into the needs of the professional graphics market."

- Adobe Systems Incorporated

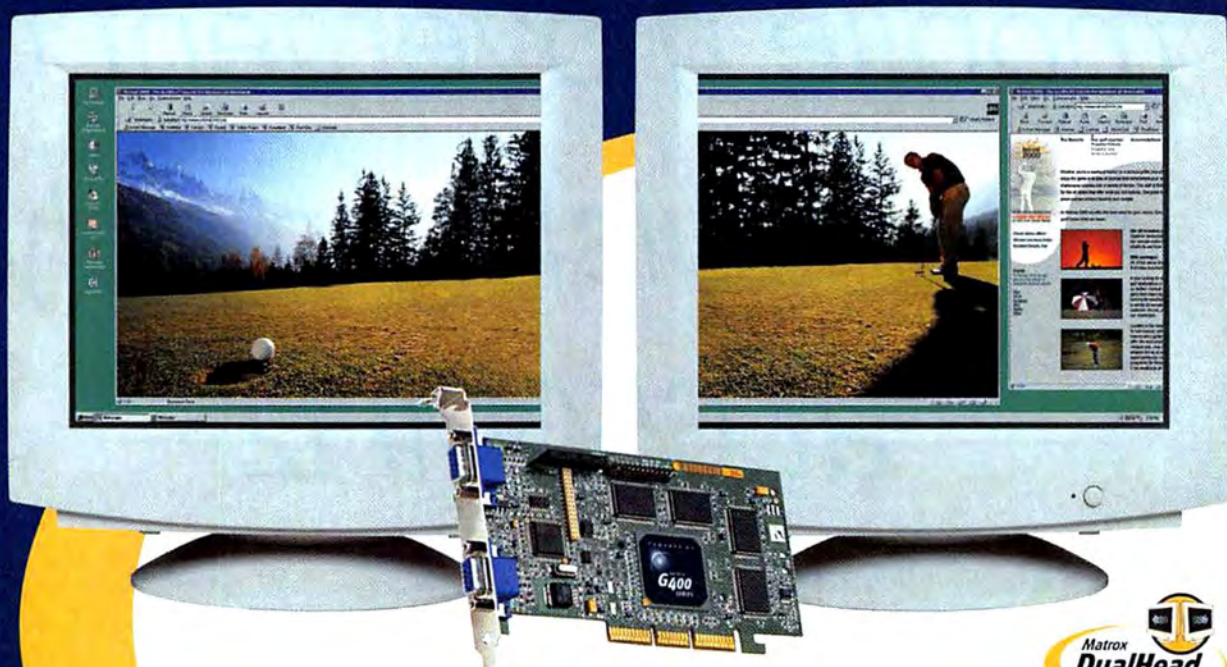


Share

Run full-screen DVD video on the secondary display while maintaining a fully accessible Windows desktop on the main monitor.

"The quality of the output was actually the best option ... giving the same type of quality that you would get from a stand alone DVD card."

- AGN Hardware



Extend

Spread multiple applications across two displays for a less crowded and more efficient Windows desktop.

"Its DualHead Display is the most powerful dual-monitor implementation we've seen."

- PC Magazine (January 2000)



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YOUR TAKE ON: Internet privacy ♦ Digital photo quality ♦ Windows 2000

WINDOWS 2000:
NO RUSH TO SWITCH

INSTABILITY MAY BE the main reason to upgrade to Windows 2000 ["Destination Windows 2000," March]. My Windows 3.1 crashed once a month, Windows 95 once a week, and Win 98 SE once a day. Instead of buying Windows 2000, I will buy Microsoft stock. Every time the company succeeds in selling even worse products, it makes a killing on Wall Street.

Zalek Bloom, via the Internet

I LOOK AT your article and wonder, are we going backward? Windows 2000 is slower in some areas, and the only improvements seem to be added apps.

It appears Microsoft has spent a great deal of time remaking Windows into a system that looks integrated and part of the Internet rather than into a meaningfully improved operating system—that is, one with better stability and security.

As a businessman and computer user,

I want good products that work well for many years, without requiring me to upgrade or fix them continuously.

Dean Cullison, Baraboo, Wisconsin

I COMMEND your coverage, particularly the advice for home users to stay with Windows 98. I just pray that you will continue to deal with Win 98 (and preceding versions) and not let those of us who use earlier OSs fall by the wayside.

Charles M. Chayes
Panama City, Florida

YOUR ARTICLE implies that there are no benefits of upgrading to Windows 2000 other than cosmetic ones. This is true for the home user and is the reason for the upcoming Windows Millennium. Windows 2000 is much more suited to LANs and networks. For

example, if an application loses a critical file, such as a .dll or .exe, the workstation will call the server and the missing file will be replaced on the fly.

Gary Morris, via the Internet

MODEMS AND NETWORK CARDS

A "TECH TREND" in the March issue [Top 10 Power PCs] asked whether anyone needs both a network card and a modem.

If you are purchasing a computer for a college student, you may indeed want both options. Many college dorms offer a PC connection free of charge through a network. In a home or apartment, however, a student's PC would need a modem.

Steven Shakin
Cape Cod, Massachusetts

WITH THE proliferation of high-speed Internet connections via cable and DSL, home users

will likely require a network card. Even then, they will want to keep the modem for times when the cable or DSL line goes down or for sending and receiving faxes.

Sean Kurizaki, West Hills, California



CROSS FIRE

Keep Your Net
Surfing Private

IN MARCH'S *Consumer Watch*, Roberta Furger describes how DoubleClick and other companies are using cookies to aggressively target consumers and compile large information databases, raising privacy concerns. The article mentions that you can customize your browser to block cookies, but I have found what I think is a more trustworthy solution.

The privacy advocacy group Internet Junkbusters (which you mention) has long offered a free cookie-blocking program on its Web site (www.junkbusters.com). The configuration of this program is best left to trained people, but once set up, it works so well that you don't even remember that it's running. In addition to blocking cookies, the program can be set up to block URLs, pop-ups, header source exchanges, and more.

Chris Farrell, Bowling Green, Ohio

Too Late! Privacy's
Disappeared

DESPITE THE UBIQUITY of companies and services that can track random surfers, your columnist Roberta Furger concludes, "it's your responsibility to... decide what information you're willing to share." So don't accept cookies, deselect all check-boxes that sign you up for mailing lists, and opt out of all databases.

While you're at it, avoid stores with security cameras and bar-code readers when buying food or clothes. Don't apply for a mortgage, a loan, or a credit card. Don't make a purchase over the phone. Don't use a cell phone, ride an airplane, or go to a movie. Don't go to college.

We are watched, counted, measured, and broken down into our constituent demographic bits daily in the real world, and we usually can't say no. To complain that it is happening online is pointless; to avoid it, just turn off your system.

Dan Rosen, Teaneck, New Jersey

DIGITAL CAMERAS
VS. KODAK BROWNIES

THE ARTICLE ON digital cameras in the January issue ["New Year's Resolutions"] tends to reinforce what any reasonable person would conclude—digital cameras have a long way to go.

Despite all the hype about tremendous advances in CCD technology, the more I read in my own research, the more I realized that digital cameras are a bad, bad investment. Nevertheless, I purchased a low-end, 640-by-480-pixel camera suitable for e-mailing and storing JPEG photos. It was fun to use, and recipients of the e-mailed photos said the pictures were adequate. Printed photos were another matter. I compared my prints to ones in a magazine on digital photography. The pictures taken with cameras costing 10 ▶

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times what I paid were only incrementally better—and certainly no improvement over those taken with my Dad's old fixed-focus Kodak Brownie box camera of the 1930s and 1940s.

John Lawson, Hatfield, Pennsylvania

MORE ON SOFTWARE CONFLICTS

IN MARCH'S *Letters*, Bob Carpenter said his McAfee antivirus software would not install until rival products were removed.

Virus detection software can give false alarms—say, when one program is running in the background and other antivirus software runs at the same time. ▶

CORRECTIONS AND CLARIFICATIONS

CONTRARY TO A statement in April's *Top of the News* ("Attention Net Shoppers"), Nevada does have sales taxes.

In March's *Top 10 Printers*, we should have said that the price of \$2699 for the IBM Infoprint Color 8 didn't include a network interface card; the price with a NIC is \$2999. Also, we should have listed the street price of the Oki Data OkiColor 8n as \$3195.

The Gateway Essential 500 that made the midrange systems chart in recent *Top 15 Home PCs* should have been listed as a Gateway Performance 500, a slightly more expensive model than the Essential. But versions with faster processors have replaced both 500-MHz systems.

Despite a statement in April's *Top 15 Notebooks*, the Gateway 9300LS (listed in the Gateway@Work pages of the company's Web site) has no IEEE 1394 port. Gateway's Solo 9300xl does have that port.

Clarification: On page 114 of the March article on upgrading to Windows 2000, we should have stated that we installed two Matrox G200 cards to drive two displays. Only the newer Matrox Millennium G400 Max card supports the company's DualHead two-monitor technology.

In March's *Internet Tips*, the URL to download ICSCConfig (also available at FileWorld) should have read lynx.neu.edu/a/amccombs.

The chart in March's story "Is Flat Where It's At?" (19-inch monitors) should have indicated that the Sony CPD-G400 does not offer a USB connector as an option. Also, the warranty is for three years.

PC World regrets the errors.



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This is the most likely reason the default installation asks for removal of similar apps. Also, vendors assume their product is the only one of its type installed on a single PC, which is usually the case. But for more sophisticated users, they should include higher-level instructions.

Jeff Auerbach, Huntington, New York

OFF-THE-RACK DSL: BELL ATLANTIC RESPONDS

BELL ATLANTIC sincerely regrets the problems your reporter experienced when obtaining DSL service from us ["Off-the-Rack DSL Not a Good Fit Yet," *Top of the News*, April]. We have examined the areas where he encountered difficulties and taken steps to ensure that future customer experiences are much smoother.

Your reporter was one of the first customers to use the 3Com and Bell Atlantic net Home Connection Kit, which we are testing in a limited number of retail stores. As a result of customer feedback,

the kits soon will include revised instructions to make it easier for customers to install DSL on their computers.

However, your writer's difficulties did not relate to the kit itself. They reflect the challenges of working with a new technology and the growing pains of developing a new workforce, new systems, and new procedures for a product for which there is overwhelming demand.

We are working diligently to smooth out the hiccups so we can make DSL easy and convenient for consumers to get and use. We have increased our workforce, strengthened our training, and established a customer satisfaction team. We continue to examine our processes and systems so we can identify ways to improve our customers' experiences.

The Home Connection Kit's suggested retail price is \$229, but Bell Atlantic offers a \$130 rebate on the purchase.

Colson Hillier, Bell Atlantic,
Arlington, Virginia

MICROSOFT'S INVENTION

IN THE MARCH *Letters*, Marty Rubenstein claims that Microsoft did not invent Video for Windows. Actually it did, and I was the lead developer on the project.

The original design was created by me and Rick Ledoux. We had been working on the Multimedia Extensions for Windows project (circa 1990). I wanted to do multimedia from a format we could put on any CD, floppy disk, or network drive, so Rick and I hid out for a few days and came up with what we called AVI (Audio Video Interleaved). This later became the Video for Windows project. At the time, Apple had its own video technology, but we did not "reverse engineer" that or any other technology.

Nigel Thompson,
Chief Technology Officer, Tribal Voice
Woodland Park, Colorado

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Nonetheless, as homeowners (or tenants), drivers, and parents, we all need the stuff. And the Web can take some of the misery out of finding and buying it. Better yet, going online for insurance can save you a bundle right now.

But don't expect to accomplish all your insurance-related business with a few clicks in your Web browser just yet. For various reasons,

insurance companies are still playing catch-up with the rest of corporate America when it comes to the Internet.

The move online means big changes for the slow-footed insurance industry. "Insurance has always been a secretive business," explains David Sterling, chairman and CEO of insurance brokerage firm Sterling and Sterling. "The theory has been that the less [a consumer] knows, the better off [insurance companies] are. It's a model that supports a huge network of brokers who make a living off commissions."

I found that observation vaguely comforting: I'm confused because I'm supposed to be, not because I'm an idiot. Over time, though, the Web could change everything that's currently involved in buying and using insurance.

SHOP AND SAVE

FIRST THE GOOD NEWS: A little comparison shopping online can reap big rewards. In fact, Todd Eyster, a senior analyst with Forrester Research, estimates that the average consumer can save at least \$500 annually on insurance just by shopping around. Without the Web, Eyster says, "that process has been so tough that no one does it." You'd have to call several agents, maybe wait for forms to arrive, and probably meet face-to-face with a broker or two.

When you shop online, on the other hand, you can compare rates at your convenience, in a matter of minutes. "You can fill out one too-long form and get quotes from many insurance companies," says Eyster. "The value of the Net versus going to just one agent is that the agent will give you quotes from the company that gives him the highest commission. These sites will give you more competitive quotes."

You can get these quotes—often instantly—from insurance portals like Quotesmith.com, InsWeb.com, and Quicken Insurance (www.insurancemarket.com), as well as from the newer, less full-featured QuoteToday.com. Some of these sites also include articles about how to choose the right insurance; links to insurer ratings; and other helpful information. Other useful resources include Insure.com, an industry news site; and Gomez.com, which reviews insurance Web sites.

All of this is great when you're simply browsing around to see whether another insurer can beat your current company's premium. In most cases, however, you'll eventually reach a point where you need to talk to a broker—if only ►

electronically—before the deal is done. The reason? Selling insurance is an intricate process under optimum conditions, and it's made far more complicated by laws that vary from state to state. Moving the transaction online evidently creates a logistical nightmare.

Still, a few brave companies have taken up the challenge, and no doubt more will follow. For instance, insurance giant Allstate recently announced that it would start selling policies online sometime this year.

Currently, though, some critics of online insurance contend that it often functions as little more than a lead generator for the industry. Which is why you shouldn't fill out online application forms recklessly—once you start submitting your personal data to insurance companies, you're guaranteed to generate telephone calls from salespeople. And bringing a swarm of eager insurance agents down upon your head is no way to improve your life.

WHAT'S HERE NOW

RIGHT NOW, THE ONLY types of insurance sold online without requiring any offline interaction are auto, term life, and some health policies. These forms of insurance are simple enough that you can secure them with a Web interview and a credit card transaction. Most other types of insurance require that you relinquish specimens of bodily fluids or at least a signature. But you can't submit a blood or urine sample over the Internet, and few states currently allow insurers to accept digital signatures.

Jean-Bernard Duler, the CEO of Esurance.com, an Internet-only start-up that sells its own auto insurance over the Web, explains, "There is a lot involved in taking care of the regulations and programming for each state. It has been a real pain, but we are getting it done." At press time, Esurance.com sold auto insurance in only a handful of states; other car insurance sites, such as Ecoverage.com, were even more limited geographically.

Some critics of online insurance contend that it often functions as little more than a lead generator for the industry.

But if Esurance.com lives up to its ambitious goals, it will be licensed to provide car insurance in most of the United States by the time you read this. And I liked the quote it gave me: A six-month policy from Esurance.com for my car in California (where I lived until recently) cost about \$250 less than the policy my current insurer offered. (My new home, North Carolina, wasn't yet covered when I looked.)

Health insurance, because of its complexity, is more difficult to sell on the Web than term life and auto insurance. But one early entrant into the arena is HealthAxis.com. This insurer allows you to complete an application online, and it plans to sell health policies in 37 states by midyear.

Another new face is Insurance.com, a site that hopes to streamline the whole cumbersome insurance-buying process. (At this writing, the site remains in the planning stages, but it should have launched by the time you read this.) Funded by Fidelity, Insurance.com intends to become the ultimate insurance supersite, with comprehensive information for anyone who's getting married, having a baby, or buying a house or car. The plan is that you'll be able to buy all your insurance directly from the Insurance.com site, but not right away. Company president Lou Geremia says the insurance industry needs time to acclimate itself to the Web: "Our focus now is content, and as the products develop, we will introduce them."

STAKE A CLAIM ONLINE

WHEREVER YOU BUY YOUR insurance—online or off—ask whether you will be able to handle part or all of any claims-filing process via the Web. (Assuming that's something you want to do; don't feel sheepish if you would prefer to get a little hand-holding from a real live agent.) Some traditional insurance companies allow you to file claims online; others provide the necessary forms for you to download, fill out, and return by snail mail. But if you buy from a broker that you found

through a quote site such as InsWeb.com, you'll probably file your claims the old-fashioned way—by calling the broker and filling out paper forms. And even built-for-the-Web Esurance.com handles its clients' claims over the telephone, via its 24-hour customer service operation.

FUTURE SO BRIGHT

CALL ME A DREAMER, but I have a vision. It's midnight; you need health insurance. You go online, comparison-shop, find a great deal, and secure the transaction right then and there. When you go to the doctor, you just provide a URL and your user name, and your claim gets filed through the Web site. And when it comes time to pay the bills, you simply log on, review your visits to the doctor, see how much was paid by your insurer, and confirm what you owe.

Lose your health insurance card? Print another. Need your kids' immunization records for school? Print them out, too. Want to transfer your medical records to a different doctor? Just give the new MD your user name and password.

The insurance experts I spoke with assured me that all of this will become a reality—though it won't happen in the immediate future. Today, it makes sense to use the Web for what it's currently good at: gathering information. By getting a quote at InsWeb.com, for instance, I've already slashed my family's monthly health insurance premium by two-thirds. (Yes, you read that right.) My new policy doesn't come from a virtual insurance company, but from a traditional, offline agent—in fact, one located in the same building as my office.

And even if you're happy with your current provider, a little online research can't hurt. As David Sterling says, "The very smart way to shop would be to shop on the Net, then call your local agent and tell them the quote you got. Right now they can probably match or beat that quote." That way, you'll get the best of both worlds: your friendly neighborhood agent and the best rate going.

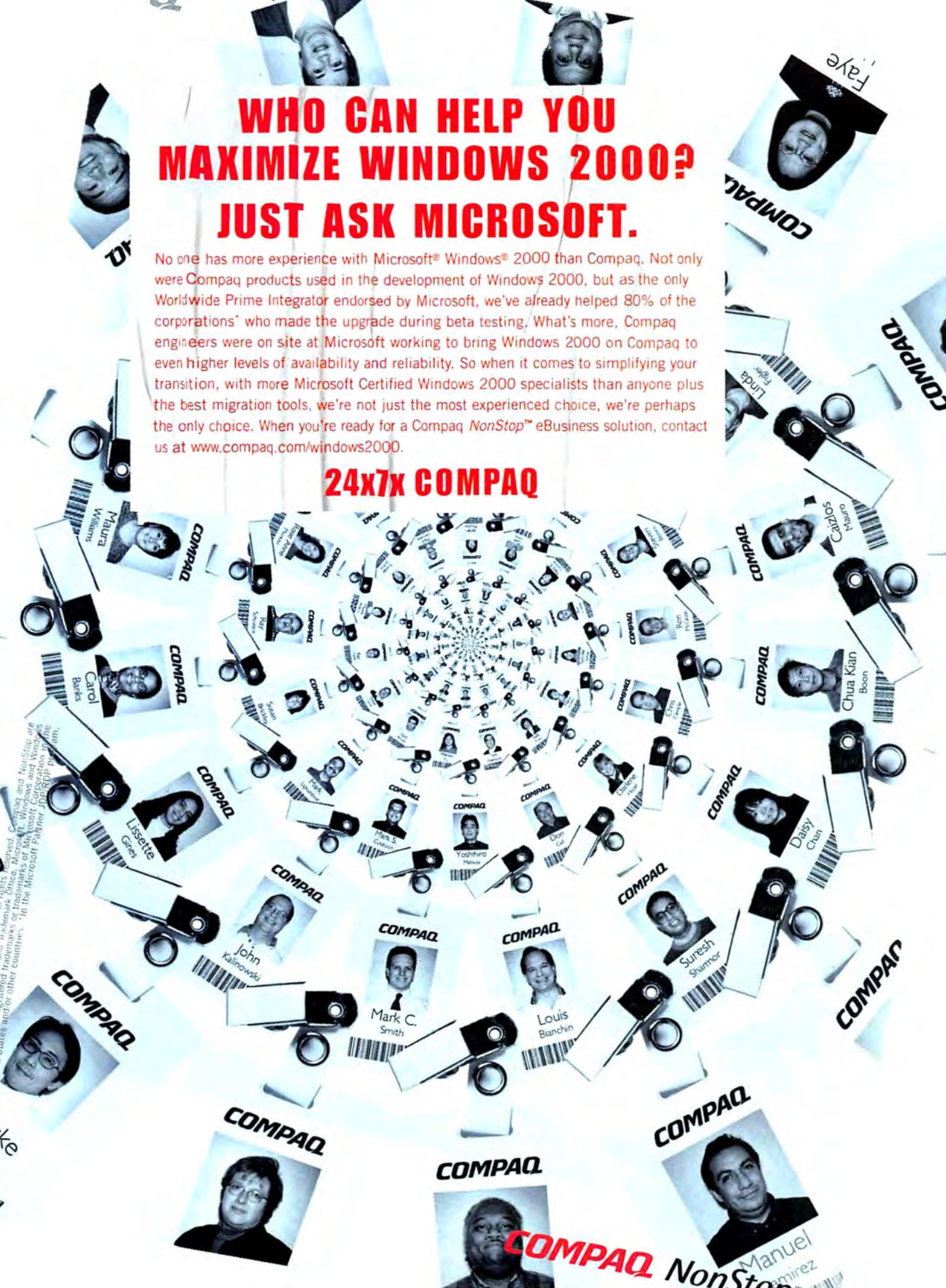
Christina Wood is a contributing editor for PC World.

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Slow Delivery for a Fast PC

WHEN DAVID NAPPI, of West Berlin, New Jersey, ordered a new 650-MHz Pentium III PC from CyberMax, the company's Web site indicated seven to ten business days for production. Adding time for delivery, Nappi says, he expected to receive the system in three weeks, at the most.

Eight weeks later, he was still waiting. CyberMax alerted Nappi after he placed his order that the PC would take three or four weeks to ship, but that was only the beginning. He next learned that his graphics card was out of stock and would take another month to arrive; then a CPU shortage delayed the unit's shipment indefinitely. "If I had known it would take this long," Nappi gripes, "I would have approached my purchase differently."

I've heard similar stories from several customers of CyberMax and other vendors. Companies attribute the delays—especially for cutting-edge PCs—to unexpectedly high sales and a recent CPU shortage. But many buyers say their biggest frustration is with poor communication. CyberMax president Bill Bisignano acknowledges the problem. "At the time Mr. Nappi

ordered, all customers who ordered online were given a standard shipping time frame." Since then, CyberMax has begun providing tailored estimates of shipping time to its customers.

How can you avoid unexpected shipping delays? First, if you are ordering online, make sure the Web site provides order status reports and a delivery date specific to your purchase, not a blanket estimate for all orders. If necessary, call a sales representative to confirm that the required components are in stock. Bear in mind that CPU manufacturers provide chips to PC vendors on varying schedules. You may not be able to find out where your vendor falls in the pecking order, but you can check Web sites like CPUReview.com (www.cpureview.com) to see what's happening in the processor industry.



Heads Up...

CTX Drops PCs: About a dozen customers of PC- and monitor-maker CTX International have written to complain that they've been unable to contact the company. I spoke with CTX's Alex Campbell, who confirmed the problem: "We recently switched to an in-house call center, which is now up and running, although understaffed." Campbell also said that the firm will cease producing PCs but plans to continue customer support for its products...

DoubleClick Sued: A California woman has filed a lawsuit against Web ad firm DoubleClick, alleging that it collects data on consumers—including addresses, purchases, and demographics—without their knowledge or consent. The suit follows DoubleClick's merger with direct marketer Abacus Direct. DoubleClick had intended to use the Abacus consumer database to identify formerly anonymous Web surfers. But the company later announced that it was postponing these plans indefinitely...

Memory Liquidators Liquidates? Memory Liquidators, a mail-order vendor in Torrance, California, seems to have vanished without a trace. The company's Web site has effectively disappeared, all telephone numbers have been disconnected, and my repeated e-mails went unanswered. At press time, there was no report of the company filing for bankruptcy, but stay tuned.

LETTER OF THE MONTH



WHEN I MOVED from CompuServe Classic ISP service to CompuServe 2000, I thought I'd continue to pay a flat monthly rate. So I was shocked to find a \$254.49 CompuServe charge on my credit card bill. The company said that it began charging me an hourly rate once the CompuServe 2000 trial period ended. I asked them to revert to a flat-rate plan. But the next bill showed charges of \$151.19.

David Suarez, Brooklyn, New York

On Your Side responds: According to Anne Bentley, director of communications at CompuServe, members who don't choose a specific billing option when they upgrade are put on an hourly-rate plan. "Mr. Suarez did not call us when he received the first bill that would have shown the [hourly] pricing plan," she says. "When he called to switch [back] to the unlimited plan, he had already accrued the \$151 in charges." CompuServe says it is working with Suarez to resolve the dispute.

GOTTEN A RAW DEAL?

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

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Web Shopping for the Very Impatient

INSTANT GRATIFICATION IS the way of the Web. Not only can you get just about anything online—an e-mail account, a home loan, the answer to a pressing question about the Taft administration—but you can get it in minutes. There is, however, one vast exception to the Web's

no-wait policy: Online shopping can often be painfully slow.

Sure, you can dump items willy-nilly into a virtual shopping cart and pay for them in a flash. But then you'll usually end up biding your time for at least a few days before your purchases arrive: The UPS's cheap-but-leisurely ground service is the Web's shipping method of choice. And even grocery sites such as Peapod usually require overnight notice to make a delivery. So when I'm in a tearing rush (which is frequently), I'm much more inclined to browse the mall than to browse the Web.

Web shopping may never be *faster* than



retail, at least not until some start-up figures out how to zap physical objects across the Internet (an e-commerce breakthrough prophesied by Willy Wonka and the Chocolate Factory). Still, I am happy to report that there are some signs of an emerging effort among Web merchants to offer their customers semi-instant gratification: delivery of products in a matter of minutes or hours, rather than days.

SPEED THE CHOW

PICTURE THIS: You develop a sudden craving for Fritos at work, so you toggle from your spreadsheet for a moment to

On the Net...



Search Engine Sleeper: Who has the biggest, quickest index on the Web? Nope, not Yahoo or AltaVista. A site called Fast Search (www.alltheweb.com) claims to be the winner, with more than 300 million pages cataloged on superfast servers. And based on its lickety-split, exhaustive responses to my search queries, I believe it...

Well-Armed Octopus: Information junkies will be intrigued by Octopus.com, a new site that lets you drag and drop snippets of information from numerous sources (including PCWorld.com) into customized personal pages. The beta version I tried was still a bit rough around the edges, but promising... **E-Mail for YoYos:** If you sign up for YoYoMail (www.yoyomail.com), you'll get an in-box full of animated ads—and a nickel for each one you watch. In theory, the big bucks come when you collect commissions on friends who join up. My take: Friends don't ask friends to stare at spam.

buy a bagful on the Web. An improbable snacking scenario? A shopping site called Kozmo.com aims to make it a reality. And judging from my experiences so far, it... well...delivers.

Kozmo.com's tagline—"We'll be right over"—isn't hype: The company's policy is to make deliveries in under an hour, anytime from 10 a.m. until 1 a.m. in most cities it serves. Besides junk food (and a few healthful treats), it stocks videos (for rent or sale), CDs, books, video games, magazines, medicinal supplies, and other items. Service is currently available in Boston, Los Angeles, New York City, San Francisco, Seattle, and Washington, D.C.

In a highly scientific experiment, I visited the Kozmo site to order two pints of Ben & Jerry's (Cherry Garcia and Doonesberry) and a video (Mel Brooks's immortal classic *Young Frankenstein*). A scant ▶

GIMME FIVE

Sites for Disgruntled Consumers



HAVE A GRIPE with a company you've done business with? Don't stew, take action. The following sites offer complaint forms, tips on resolving disputes, and public forums for your beefs.

1. Federal Trade Commission Consumer Protection (www.ftc.gov/ftc/consumer.htm): Uncle Sam's consumer portal offers a host of primers on solving problems, plus an online complaint form.

2. ECaveat (www.ecaveat.com): This site forwards grievance letters to merchants and spotlights those that take action.

3. Better Business Bureau (www.bbb.org): Check with the BBB for company reports, consumer tips, and information on local chapters.

4. Consumer World's Consumer Agencies and Organizations (www.consumerworld.org/pages/agencies.htm): Dozens of links to watchdog groups, both governmental and private.

5. UGetHeard.com (www.ugetheard.com): Speak out on corporate America's reproaches—and good citizens—at this ECaveat competitor.

40 minutes later, a Lycra-clad Kozmo courier arrived with the goods. Subsequent orders have arrived just as rapidly, including one I placed during an industrial-strength New England snowstorm.

And Kozmo.com's free-delivery policy is the real deal—its prices aren't set artificially high to compensate. You can get an emergency copy of *Harry Potter and Prisoner of Azkaban*, for instance, and pay almost exactly what Amazon.com charges for a copy sent via the U.S. Postal System. My only premium is the couple of bucks I slip the courier for each delivery (which I do just to be on the safe side, since I can find no mention of tipping etiquette in Kozmo's ordering FAQ).

Kozmo's cool, no doubt. But some aspects of the service need work: The selection is spotty (in Boston, at least, you can't get a Pepsi or a Hershey bar), and the search engine can be a hassle to figure out. Magazines are sometimes weeks out-of-date—I can read those copies at my

doctor's office, for free. And although the company intends to expand to 20 cities by the end of the year, service focuses on a handful of densely populated urban areas. PC World's Boston office is covered; my home, 8 miles away in suburbia, is not.

KOZMO'S KOMPETITION

EVEN IF KOZMO.COM doesn't wend its way to your neighborhood anytime soon, another super-quick shopping service might. A copycat outfit called Urbanfetch (www.urbanfetch.com) offers a similar range of products (but a niftier array of electronics items), 24-hour service, and a strict no-tipping policy. It's already up and running in New York, with plans to expand both domestically and internationally by year's end.

Sameday.com has a different approach to speedy service: If you place your order by 2 p.m., it promises to deliver toys, power tools, sporting goods, jewelry, and other items by 8 p.m. the same day. Ship-

F Y I

Three-quarters of Internet users research their travel plans on the Web. But a scant 16 percent have actually booked a flight online.

SOURCE: GARTNER GROUP

ping costs a maximum of \$7, no matter how many items you order. Starting with Southern California, Sameday.com aims to serve 40 percent of U.S. households by the end of the year and to buddy up with established Web stores that want to offer same-day delivery from their own sites.

You begin to see a future in which the Web brings us nearly everything almost instantly. And while we're glued to our keyboards, today's bustling malls could start to resemble ghost towns—quaint relics of an age in which people left their homes to buy stuff.

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

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Five Tools to Make Your Windows Shine

HAVE ANY EXTRA space on your hard drive? Usually my answer is an emphatic "No!" But recently I found a few terrific utilities for Windows that I just had to make room for. Some of them will cost you a few bucks, others are freebies; but all will enhance Windows and boost your productivity.

As fun as it may be to spend my week trolling for new utilities—"Honestly," I tell my wife, "I really am working"—my foraging involves an element of risk. It's fairly common, for instance, to run across a utility that fouls up my system with an out-of-date DLL. Worse, I could open the door to a virus or even a Trojan horse, a destructive program masquerading as a utility. So I've devised a few foolproof ways to safeguard my PC against these hazards.

First, it's a given that before you install any new utility, you should scan it with an antivirus program. Next, back up your PC often. I know, I know—you've heard it before. But it's your absolute best defense against misbehaving utilities. Finally, have a restore app like Wild File's GoBack.

GoBack: This little program adds a big margin of safety to *everything* I do with my computer because it keeps track of any



This brilliant utility has skills that are light-years beyond Windows' woefully inadequate cut-and-paste Clipboard.

changes I make to my computer and lets me instantly restore my hard drive to the way it was minutes or days before. Deleting unwanted utilities with GoBack is also better than simply uninstalling them because it eliminates every trace of the program—registry settings, drivers, DLLs. Trust me, GoBack is a tool you'll find yourself using often. It works with Windows 9x; an NT/2000 version will be ready by August. For more about GoBack and recovering from bad installations, see this month's *Answer Line*, page 248.

Now (drum roll, please) more utilities: **InfoRapid Search & Replace:** Once I tried this gem, I never used Windows' Find feature again. Like Find, InfoRapid lets me search for text in nearly any file. But InfoRapid's

search combinations are vast, including Boolean operators (AND, NOT, OR, and NEAR) and phonetic searches. I can actually view the files (listen up, Microsoft) with built-in viewers for text, HTML, RTF, and common image file formats such as BMP, JPEG, and GIF. With Microsoft Word 95 or later, I can view almost all other files, including databases and spreadsheets. Search results are highlighted, and a double-click on any other word starts a new search.

ClipCache Plus: This brilliant utility has skills that are light-years beyond Windows' woefully inadequate cut-and-paste Clipboard. ClipCache Plus lets you manage whatever you send to the Clipboard. You can preview clips, organize and save them in categories for future use, or clean up their text before pasting—for example, remove extra spaces, strip out HTML tags, or delete those '>>>' from e-mail messages. Neat, eh?

X-Setup: Tired of all those superfluous icons in your Control Panel? Wish you could remove "unremovable" items from the Start menu? Stick your head under the hood with Xteq's X-Setup. You'll get access to hundreds of hidden system settings, almost all with minitutorials. Wizards guide you through the modifications.

Proxomitron: Ordinarily, you can't hit the Internet without encountering annoying banner ads and pop-up windows, or privacy-nabbing HTML code. I evade them all with Proxomitron, a utility that sounds like a gizmo from Woody Allen's *Sleeper*. The program's dozens of features let you, for instance, control Web site music and selectively stop Java applets. The tool works with both Netscape Navigator and the Evil Empire's Internet Explorer. You will need to change something called the proxy option of your browser, but the program provides instructions on how to perform this 2-minute task.



Find links to these tools and more reviews of Steve's favorite utilities at www.pcworld.com/mayoo/home_office. Steve Bass is president of the Pasadena IBM Users Group. Reach him at steve_bass@pcworld.com.

ClipCache Plus

Street price: \$20; Rose City Software;
www.infinisource.com/cc.html

PRODUCT INFO NO. 605

GoBack

Street price: \$50; Wild File; 888/945-3345;
www.goback.com

PRODUCT INFO NO. 601

InfoRapid Search & Replace

Free; www.inforapid.com/html/english.htm

Proxomitron

Free; www.members.tripod.com/Proxomitron

X-Setup

Free; www.xteq.com



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Win 2K glitches ♦ WordPerfect file import woes ♦ Money 2000's autopay anguish

Windows 2000 Bug Parade Begins

WINDOWS 2000 IS SUPPOSED to mate the stability of Windows NT with the plug-and-play capabilities of Windows 9x. And our test results (see our March cover story, "Destination Windows 2000," www.pcworld.com/mar00/win_upgrade) indicate that the new operating system is living up to its billing—at least for stability.

But even a stable system has bugs. And in the two months following Windows 2000's release, several glitches have emerged.

BUG NT 4.0 users who upgrade to Windows 2000 may find themselves unable to print anything. This problem may occur if your PC has Service Pack 4 (or an earlier version) installed along with a non-Microsoft print driver.

FIX Upgrade to Windows NT 4.0 Service Pack 6a before you install Windows 2000. Find SP6a at www.microsoft.com/ntserver/nts/downloads/recommended/sp6/allsp6.asp. Alternatively, after upgrading to Windows 2000, you can replace the print-driver support files `rasdd.dll` and `rasddui.dll` on the hard disk with the files of the same name included on the Windows 2000 CD-ROM. For more details, check out Microsoft's posting at support.microsoft.com/support/kb/articles/Q233/5/46.asp.

BUG Your Iomega Zip or Jaz parallel-port drive appears on Windows Explorer and Disk Administrator lists after you install Windows 2000 on your computer, but Iomega's tool utilities seem not to recognize the drive.

FIX Iomega advises users who haven't already upgraded to Windows 2000 to uninstall their current Iomega software beforehand. If it's too late for you to do that, find Microsoft's 90KB fix at windowsupdate.microsoft.com or at www.microsoft.com/Windows2000/downloads/recommended/q251381/download.asp. Installing IomegaWare 2.2.1 for Windows 2000 may be a better solution, but it's a much bigger download (15.6MB). You'll find the Iomega patch at www.iomega.com/software/featured/windows2000_thanks.html. You can download the fix in a single block or in four smaller modules. Make sure you select *Enable legacy Plug and Play detection* within the parallel port settings of Windows 2000's Device Manager—ideally, before you upgrade.



I N B R I E F

Money 2000 Aggravation

SOME MICROSOFT MONEY 2000 users who set up recurring Automatic Payment (Apay) transactions have reported that payments were not made, along with other problems. Choose *Tools•Update Internet Information* within Money 2000 to download a fix for both bugs. For more details, go to support.microsoft.com/support/kb/articles/Q251/3/63.asp.

VirusScan and Blue Screen of Death

McAfee's VIRUSSCAN 4.x may be to blame if you've been getting deadly error messages, depending on the DAT files your PC has. Install the 2.6MB fix from download.mcafee.com/updates/4x.asp. Network Associates has additional instructions at naisupport.sento.com/kba/virusscan/win9x/general/vsfatalerrors.htm.

BUG During installation of Windows 2000, your Windows 9x or NT system freezes while displaying 'Setup Is Starting Windows 2000.' The reason? Your system's BIOS may not properly support the Advanced Configuration and Power Interface. Or the problem may be caused by an outdated or otherwise incompatible mass-storage device driver.

FIX For starters, visit your PC maker's Web site and collect any relevant BIOS updates. If you suspect that a mass storage device is the source of trouble, check with the appropriate vendors for updated drivers. To identify the problem device, try removing tape drives, removable drives, scanners, and the like, from the mass-storage device controller, one by one. Microsoft offers more detailed information and appropriate remedies at support.microsoft.com/support/kb/articles/Q234/7/72.asp.

WORDPERFECT DATABASE IMPORT PROBLEMS

COREL WORDPERFECT OFFICE 2000 users who try to import old database files may find that the suite's version of WordPerfect refuses to open the files—for use in tables, for instance. This is caused by Y2K problems involving some of the older database software apps (like FoxPro and FileMaker Pro) that lead to invalid dates within their databases. WordPerfect then interprets the invalid dates as signs of a corrupted file. In response to the problem, Corel has posted a WordPerfect Office 2000 update allowing such files to be imported—invalid dates and all. To download this 1MB update, go to www.corel.com/support/ftp/site/pub/WordPerfect/wpwin/Office2000, and choose the file named `PFIT90.dll`.

B U G G E D ?

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



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

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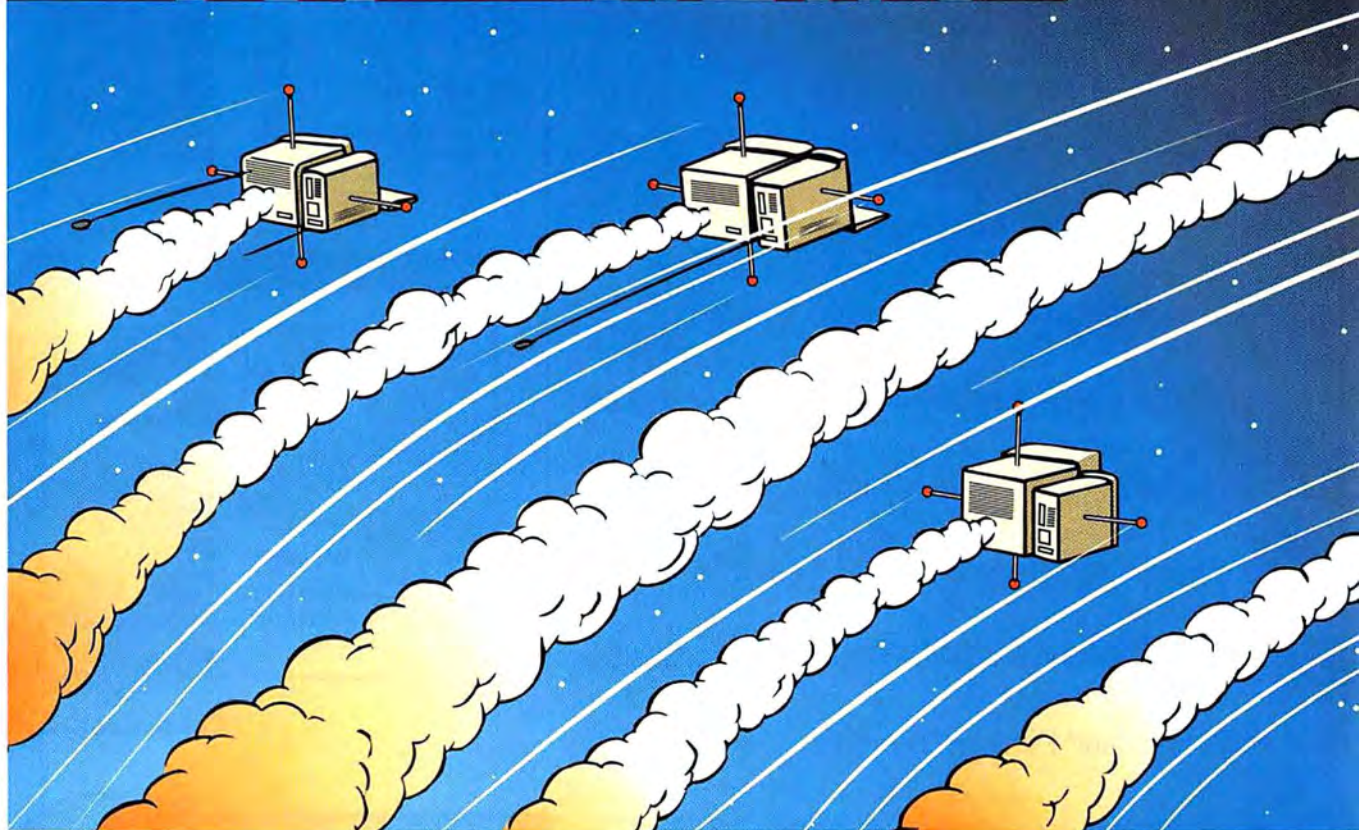
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TOP OF THE NEWS



AMD, Intel PCs

Desktop speeds hit the stratosphere.

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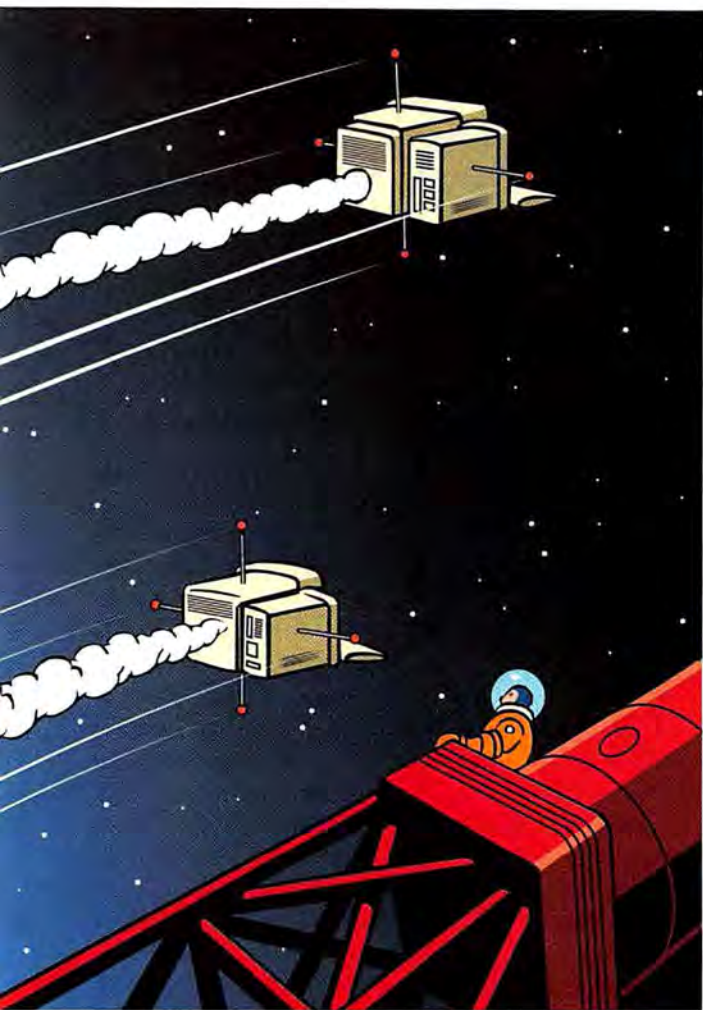
One Gigahertz

◆ By David Essex

INTEL NOW knows how the United States felt in 1957 when the Russians beat America into space with Sputnik.

For years, Intel dominated the CPU speed race. But on March 6 of this year, the unexpected happened. Several months ahead of schedule, AMD surprised the world and launched the first x86 CPU to require a whole new term for blazing speed: *gigahertz*.

The famously competitive Intel must have seethed as AMD grabbed the glory. At the time it got wind of AMD's plans, the chip giant was busily preparing to launch its 850-



and 866-MHz Pentium III chips. Intel hastily regrouped and on March 8 announced its first 1-GHz PIII processors. Intel does win bragging rights for the quickest 1-GHz processor—by a sliver.

FIRST TESTS

WE TESTED 1-GHz Athlon machines from Compaq and Gateway for this story, plus a 1-GHz PIII machine from IBM. On our PC WorldBench 2000 tests, the Intel-based IBM PC ran a slim 5 percent faster than the number two machine, Gateway's Athlon system. Intel's 1-GHz chips will ship in limited quantity until the third quarter, which

means you'll be able to buy systems from only a few companies, including Dell, HP, and IBM. AMD, meanwhile, should have plenty of 1-GHz Athlons to go around, several PC vendors told us.

In the 1-GHz glare, don't lose sight of the other new chips: 850-, 900-, and 950-MHz Athlon systems will be shipping when you read this, as will 850- and 866-MHz PIIIs. We tested Athlon-850 machines from Compaq, Cybermax, and Gateway, plus a Dell PIII-866EB system that runs nearly as fast as the IBM 1-GHz machine. These 850- and 866-MHz machines may offer a better balance of price

and performance for many people. Compaq's 1-GHz Athlon PC, for example, runs 11 percent faster than the company's 850-MHz model but costs hundreds of dollars more.

BIG BOOST?

DO YOU remember PCs that ran at rates slower than 100 MHz? If so, you can't help but marvel at the megamilestone of 1000 MHz.

But understand this: While Intel and AMD are pushing CPU clock speeds ever higher, 800- to 1000-MHz systems are clustering pretty close to each other on our application-based performance tests.

For systems today, CPU speeds simply don't tell the whole performance story. A CPU acts as a system's brain, but backbone components like main memory, the system bus, and the graphics card do a lot of heavy lifting. These components can noticeably speed up or slow down a PC. More than ever, it's important to take into account the differences inside these boxes—and not just the MHz ratings outside.

Of the seven systems tested here (all running Windows 98 SE), IBM's Aptiva S Series GZ earned the top score of 165 on PC WorldBench 2000. (This updated version of our benchmark suite uses 11 applications, including Word, Excel, Netscape Navigator, Quicken, and PhotoPaint. You'll also see WorldBench 2000 at work in this month's Top 20 desktops reviews, beginning on page 200.) Gateway's Select 1000, carrying a 1-GHz Athlon, clocked in at 157; and the Pentium III-866EB computer, Dell's Dimension ▶

DISPATCH



Product Pipeline

▶ **Next Netscape:** The first brand-new version of Netscape in more than two years should be in public beta by the time you read this (scheduled release date: April 6)—and it will not be Netscape 5, which was to have been based on the existing 4.x code. Instead, Netscape 6 will be based on the Gecko browsing engine, which Netscape says is smaller, faster, and more customizable than its predecessors.

▶ **IBM's NetVista All-in-One:** This compact one-box LCD PC boasts a 15-inch display; an optional radial arm clamps to a work surface or mounts on the wall so you can swivel the machine out of the way. It's due by June at prices starting at under \$2000.

Tidbytes

▶ **Dell Notebook Memory Alert:** Defective memory chips in 200,000 to 400,000 Latitude and Inspiron notebooks shipped last year can cause system hangups and other problems. Dell's site (support.dell.com) has a diagnostic test; if you have a bad chip, Dell will replace it.

▶ **You Talk, Your PDA Listens:** IBM has developed voice-recognition technology for Palm III series palmtops that lets you record memos and perform other tasks with speech commands. Look for the first products in 2001.



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1-GHz Systems Race to Photo Finish...

SYSTEM	CPU	RAM (MB) ¹	Level 2 cache (KB)	PC WorldBench 2000 score	Better
IBM Aptiva S Series GZ	Pentium III-1000	128	256	165	
Gateway Select 1000	Athlon-1000	256	512	157	
Dell Dimension XPS B-866	Pentium III-866EB	128	256	156	
Compaq Presario 5900Z-1GHz	Athlon-1000	256	512	154	
Cybermax Enthusiast K7-850	Athlon-850	128	512	153	
Gateway Select 850	Athlon-850	128	512	150	
Compaq Presario 5900Z-850	Athlon-850	128	512	139	
Average of two systems	Pentium III-800	128	256	153	

TEST HOW WE TEST All systems are tested with PC WorldBench 2000, PC World's application-based benchmark. A higher PC WorldBench 2000 score is better. For more details on our benchmark and how we run it, see "PC WorldBench 2000 Launches," page 201. Data based on testing conducted by the PC World Test Center. All rights reserved. ¹Dell and IBM systems have RDRAM; all others use SDRAM. Number highlighted in red represents best score.

XPS B-866, earned 156: Those figures add up to a virtual dead heat, despite the Dell's slower clock speed. The Compaq Presario 5900Z-1GHz earned a similar score of 154.

Note that the Dell and IBM systems have 128MB of Rambus memory (RDRAM), while the 1-GHz machines from Gateway and Compaq have

256MB of SDRAM. To date, Rambus memory hasn't made much of a difference on our benchmark tests, but Intel has said the benefits of Rambus will become more evident as CPU clock speeds increase. That's an assertion our tests may already be starting to support. Unfortunately, RDRAM still costs about 30 percent

more than standard SDRAM.

More importantly, the Athlon chip's off-die Level 2 cache (as opposed to an L2 cache on the same piece of silicon as the CPU) limits system performance gains. The 1-GHz Athlon chip's Level 2 cache runs at one-third of the chip's clock speed, while Intel's Coppermine PIII chips have an

on-die Level 2 cache that runs at full speed. Our tests show that the on-die L2 gives a speed jolt to everyday applications like those used in PC WorldBench 2000. You can expect big performance gains when AMD releases its next Athlon, code-named Thunderbird, with an on-die L2 cache; Thunderbird is due out sometime between April and June.

BUSING ISSUES

IT'S ALSO WORTH noting that the AMD Athlon has a 200-MHz front-side bus—a key data path between the CPU and the system—but thus far 1-GHz Athlon PCs are shipping with 100-MHz SDRAM for main memory, so they're not taking full advantage of the fast bus. Coppermine PIII systems use either 100- or 133-MHz front-side buses. When they use a 133-MHz front-side bus and have the on-die L2 cache, they're designated with the letters EB. Dell's Dimension XPS B-866 has a PIII-866EB chip and uses the Intel 820 chip set, which supports

...But Dell's Loaded 866 Takes Graphics Honors

SYSTEM ¹	CPU	Graphics memory (MB/type)	Quake III (frames per second)		Unreal Tournament (frames per second)		TrueSpace (frames per second)	3DMark 2000		AutoCAD (seconds)
			800-by-600 32-bit color	640-by-480 16-bit color	800-by-600 32-bit color	640-by-480 16-bit color	1024-by-768 32-bit color	Overall index	CPU test	1024-by-768 32-bit color
Gateway Select 1000	Athlon-1000	32/SDRAM	49	120	54	61	16	4007	316	626
Dell Dimension XPS B-866	PIII-866EB	64/DDR	82	119	60	64	28	4645	317	630
Compaq Presario 5900Z-1GHz	Athlon-1000	32/SDRAM	63	123	31	42	16	3957	381	634
Cybermax Enthusiast K7-850	Athlon-850	32/SDRAM	62	116	52	55	15	3852	307	706
Gateway Select 850	Athlon-850	32/SDRAM	49	118	52	57	14	3956	298	687
Compaq Presario 5900Z-850	Athlon-850	32/SDRAM	62	114	29	54	14	3911	365	706

TEST HOW WE TEST In our Quake III and Unreal Tournament tests, we measure the self-running demo frame rates produced by each PC at 800 by 600 resolution and 640 by 480 resolution. In Caligari TrueSpace 4.2, a 3D modeling program, we measure the frame rate of a tutorial that uses AGP textures. In MadOnion.com's 3DMark 2000 benchmark, the test generates a composite overall index score based on image quality, image rendering, and CPU capability (CPU test broken out separately above). In the AutoCAD 2000 test, we time the Autodesk User Group International's AUGI Gauge benchmark, which runs computer-aided drafting tasks. Data based on testing conducted by the PC World Test Center. All rights reserved.

¹IBM Aptiva S Series GZ was not available in time for graphics testing. Numbers highlighted in red represent best scores on each test.

a 133-MHz front-side bus, 4XAGP graphics, and ATA-66, an enhanced version of the IDE storage interface that can transfer data at a peak rate of 66 MBps, a step up from the standard 33 MBps.

On our supplemental graphics tests, which include games and CAD and modeling applications, the graphics cards used in the systems played a

DDR SDRAM, which runs significantly faster than standard SDRAM graphics memory. (Compaq will offer a Presario 5900Z-1GHz system with 32MB of DDR graphics memory, but the card in the machine that we tested had 32MB of SDRAM.)

Dell's behemoth ran fastest on most tests, and it won the Caligari TrueSpace 4.2 model-

geometric shapes and high-resolution color screens of games such as Unreal Tournament and Quake III.

The Gateway Select 1000 machine zipped through the AutoCAD 2000 test in the shortest time, presumably because of the 1-GHz Athlon chip's superior processing of floating-point calculations.

THE COST QUESTION

IN HIGH-END machines like these, PC vendors throw in all the toys, so costs can quickly add up. All seven of the systems we tested have 19-inch monitors, and all but the 850-MHz Compaq came equipped with 7200-rpm hard drives (now the standard on high-performance desktops).

The Compaq Presario 5900Z-1GHz costs the most at \$3799, with a 10X DVD-ROM drive, a combination XDSL and 56-kbps modem, and a 40GB hard drive. IBM's Aptiva S Series GZ checks in at \$3498 with a comparable configuration. Compaq sells a similarly loaded Athlon-850 system for \$3452.

ing test by a mile, delivering 28 frames per second while the others topped out at 16 fps. The Dell and Gateway machines did especially well displaying the



Site to See: Cellmania.com

SO MANY CELL-PHONE plans, so little time to compare them all. Need help? Cellmania.com will help you choose a plan that suits your needs, then sell you service from more than 40 national and regional plans—along with a phone and accessories. You can also buy pagers and two-way radios. There's even an area where you can read what others have to say about the products and services—or add a comment of your own.

We also tested the more modestly configured Presario 5900Z-850, which, at \$2564, costs \$1235 less than the 1-GHz model but has a 20GB hard drive, and a 40X CD-ROM drive instead of a DVD-ROM. Note that the 850-MHz chip alone costs \$400 to \$500 less than the 1-GHz chip.

Gateway's \$3308 Select 1000 Athlon 1-GHz system seems reasonably priced, given its 30GB drive, 8X DVD-ROM drive, and CD-RW drive, and you can cut that figure down to \$2999 if you do without the CD-RW and choose less-expensive speakers. Our Gateway Select 850 configuration skips the CD-RW drive and checks in at \$2699.

Cybermax's \$2499 Enthusiast K7-850 doesn't cut many corners either, what with a 27GB hard drive, a Sony ▶



COMPAQ'S PRESARIO 5900Z-1GHz
packs a stylish design and high-end goodies.

large role in the results, but main memory and bus speeds also affected performance.

GRAPHICS GRAB BAG

ONE FACT QUICKLY became clear during testing: If you're a gaming fan, you should look for a system with DDR memory on the graphics card.

All our systems use graphics cards based on Nvidia's GeForce 256 chip set, which provides the most advanced 3D rendering available on PCs, thanks to extra pipelines that shoot pixels and crunch geometric calculations. Dell's system boasts the most graphics power, thanks to its 64MB of

Compaq Presario 5900Z-1GHz

Street price \$3799; 800/345-1518;
www.compaq.com

PRODUCT INFO NO. 725

Compaq Presario 5900Z-850

Street price \$2564

PRODUCT INFO NO. 726

Cybermax Enthusiast K7-850

Street price \$2499; 800/345-8926; www.cybermaxpc.com

PRODUCT INFO NO. 727

Dell Dimension XPS B-866

Street price \$3679; 800/388-8542; www.dell.com

Gateway Select 850

Street price \$2699; 800/315-2536;
www.gateway.com

PRODUCT INFO NO. 728

Gateway Select 1000

Street price \$3308

PRODUCT INFO NO. 729

IBM Aptiva S Series GZ

Street price \$3498; 800/426-7235; www.pc.ibm.us



Ever Higher

CPUs TOOK ALMOST 20 years to hit 500 MHz, but they took just eight months to zip from 600 MHz to 1 GHz.

March 2000

Athlon-1000, PIII-1000,
Athlon-900 and -950,
PIII-850 and -866

February 2000

Athlon-850

January 2000

Athlon-800

December 1999

PIII-750 and -800

November 1999

Athlon-750

October 1999

Athlon-700, PIII-700 and -733

August to September 1999

AMD Athlon-600, PIII-600

February 1999

Intel Pentium III-450 and -500

May 1997

Intel Pentium II-233

March 1993

Intel Pentium-60 and -66

April 1989

Intel 486-25

October 1985

Intel 80386-16

February 1982

Intel 80286-6

June 1979

Intel 8088 5-MHz

CD-RW drive, and an 8X DVD-ROM drive. Better yet, the Enthusiast has plenty of pep. In our tests, it slightly outperformed the Compaq and Gateway 850s, with a PC WorldBench 2000 score of 153.

Extreme power users may be tempted to absorb the high cost of the \$3679 Dell Dimension XPS B-866. This configuration has a 30GB hard drive, a 12X DVD-ROM drive, and a CD-RW drive. Remember, this system runs much like Gateway's 1-GHz Athlon machine on business apps, and it wins most of our graphics tests. For the ultimate in video editing, 3D modeling, and gaming, you want the best graphics card and RAM you can find, if you can swallow the price. But typical PC users will get all the performance they need from a slightly less powerful system like the Gateway Select 850 or Cybermax Enthusiast K7-850, at a price well under \$3000.

If you have an equity stake in Amazon.com, check out the 1-GHz PIII system Dell will be selling by the time you read this. Called the Dimension XPS B1000r Special Edition, it will sell for a whopping \$5299 with 256MB of RDRAM, a 40GB hard drive, a graphics card with 64MB of DDR memory, a 12X DVD-ROM drive, a CD-RW drive, a V.90 modem, and a 21-inch monitor. A \$3999 version has a similar configuration but with 128MB of RDRAM, a 30GB hard drive, and a 19-inch monitor. Supplies are limited, the

Beyond Intel's Pentium III:

IN ITS WAR WITH AMD, Intel's new battle cry is "Watch Out for Willamette!" Code-named for an Oregon river, Intel's next-generation microprocessor should debut later this year at a racy clock speed of at least 1.5 GHz. But to enliven today's software and prepare for future apps, Intel has to do more than just ratchet up clock speed—the chip will incorporate some major design changes that make it quite different from the the Pentium III.

First, Willamette employs a technique called Advanced Dynamic Execution. (*Dynamic* means the processor deals with instructions in whatever order is most efficient, instead of in numeric order.) Willamette considers more than 100 instructions at a time, compared to the PIII's limit of 40. Additionally, Willamette's two arithmetic logic units run at two times the processor frequency and zip through four operations in one clock cycle—twice as many as the PIII. An execution trace cache—a new type of Level 1 instruction cache—feeds data quickly to the hungry CPU.

In another quick change, Willamette PCs will boast a 400-MHz (3.2-Gbps) system bus, as compared to the 100-MHz (800-Mbps) or 133-MHz (1056-Mbps) buses on PIII machines. Intel says



THE "PENTIUM IV": Intel's upcoming Willamette processor ushers in a new generation of chips.

Dell Web site warns. The company plans to sell lower-priced configurations later in the year, when more 1-GHz chips become available.

INTEL SUPPLY WOES?

SUPPLY MAY be a factor to consider when you compare systems: As of late February, some PIII machines carried shipping delays of a couple of weeks to a month. Intel chip and chip-set shortages have disappointed PIII-800 system buyers and others—even a PIII-600 Dimension machine ordered from Dell in late February took longer than two weeks to ship.

Intel's supply woes hurt the fourth-quarter profits of system makers such as Dell and prompted some rare public

criticism. Gateway said that Intel's supply problems encouraged it to return to the AMD fold. "Even with the lower-end [700-MHz] Intel CPUs, availability hasn't been that strong," says Mark Vena, Compaq's director of consumer desktop product marketing. "They probably have not executed as well as AMD."

Intel says it is increasing its manufacturing capacity to produce the 850- and 866-MHz chips in volume by the time you read this. "Demand is high across the product line. Certain speeds of the Pentium-III processor have been tight since Q4," says Intel spokesperson George Alfs. As of late 1999, Intel had four fabrication plants running the .18-micron process used to

Willamette in the Wings

the faster bus will prove particularly important for future applications that use streaming audio and video. To take advantage of this bus, PCs will need fast main memory. Intel designed Tehama, the first chip set for Willamette PCs, for use with Rambus memory. (By the way, don't plan on popping this chip onto an older PC motherboard: Intel hasn't designed Willamette to work in systems with 100- or 133-MHz buses, or with the chip set that supports SDRAM.)

Intel will also build in SSE2, a revamped version of the PIII's Streaming SIMD extensions. This instruction-set technology can speed up specially modified applications—although to date, it hasn't delivered much for most PC users.

To do battle against Willamette, AMD will give the Athlon chip a clever makeover. Sometime between April and June, AMD will begin shipping an Athlon (code-named Thunderbird) with an on-chip L2 cache running at full CPU clock speed, instead of the one-third speed of the 1-GHz chip's L2.

In the third or fourth quarter, AMD plans to release a new 760 chip set so Thunderbird systems can use a 266-MHz front-side bus (up from 200 MHz) and DDR main memory, which AMD says will perform much like Rambus but at a lower cost. What's more, AMD plans to stay "competitive with Intel clock speeds throughout the year," says spokesperson Drew Prairie. Based on what we've seen recently, they're not just talking tough.

—Laurianne McLaughlin

make Pentium-III chips; the company will add one such plant by the end of the first quarter of 2000, and another by the end of the year. But as noted earlier, the 1-GHz PIII chips will not ship in volume until the third quarter.

It's an unfamiliar situation for Intel. In the years before the Athlon chip, AMD fought

a continual plague of supply problems. But now, even the financial situation at the often unprofitable AMD has improved, with a reported \$65 million profit for the fourth quarter of 1999.

AMD's greater credibility as an Intel competitor benefits consumers by ensuring continuing price reductions. A

scant few weeks before unveiling their 1-GHz surprises, both of these companies reduced the prices on their mid-range chips by as much as 30 percent, which should slash a couple of hundred dollars off the prices of sub-850-MHz computers.

YOUR BEST STRATEGY

AMD AND INTEL will continue battling fiercely in the months ahead, leading up to some interesting changes this fall. At that time, AMD plans to release its 760 chip set for Athlon machines, which will support both a faster front-side bus speed of 266 MHz and the use of DDR SDRAM as main memory to take advantage of that faster bus. Intel's next-generation chip, code-named Willamette, will arrive soon after that (see "Beyond Intel's Pentium III," above). Both companies have demonstrated that they can push existing PIII and Athlon

chips further, to perhaps 1.1 GHz, before the Thunderbird and Willamette appear.

If you buy a computer anytime soon, you'll get an awful lot for your dollar. Today's "slow" systems run at 600 MHz—a lot more speed than many of us need to run our Word, Excel, and e-mail programs, and a Web browser.

We usually recommend buying "minus one" systems—computers whose CPU clock

Top PC World Downloads

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Neo, Morpheus, and Trinity perform virtual reality stunts in this action-packed screen saver.

2 NetWatcher 2000

5.30MB, 8504 downloads

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3 Back Orifice Detection Program

111KB, 6362 downloads

Free utility keeps outsiders from hacking into your system.

4 Ads Off

1.46MB, 6290 downloads

Removes Internet ads from Web pages. Optional setting disables pop-up windows.

5 SurfSaver

5.52MB, 5982 downloads

Saves Web pages so they look the same for offline reading as they do online.

Download files can be found on www.pcworld.com/fileworld/top5.

speeds are at least one level down from the top. The case for this approach has never been stronger.

The speed boost from 800 MHz to 1 GHz is less dramatic than you would expect. For the power-hungry, a well-loaded Pentium III-866 system like the Dell Dimension XPS B-866 performs quite well indeed. For mainstream computer buyers, the Athlon-850 systems hit a sweet spot for price and performance.

By all means, go for a gigahertz PC if you find one that you can afford. As always, the priciest performers will appeal to gamers and graphics professionals. But for the rest of us, the race to 1 GHz and beyond may be a spectacle best watched from a comfortable, money-saving distance for the next few months.



GET YOUR KICKS FROM 866: Dell's PIII-866-based Dimension XPS B-866 ran almost as fast as 1-GHz systems on business apps and won on graphics.

Wireless Web Services: Finally Real, Even Useful

UPDATE

FOR MONTHS, wireless Web services—which let you tap into the Internet with a cell phone, a pager, or a properly equipped handheld computer—have been touted as the next big Internet craze. Finally they're a reality, but like many other technological marvels, they don't immediately live up to their billing. Finding them and finding things to do with them are still difficult. However, providers plan to make wireless Internet services more widely available soon. At the same time, the services should become more useful as producers create content specifically for the small screens and narrow bandwidth of wireless devices.

Nonetheless, the caveats abound. Pricing policies are labyrinthine. At this stage of the wireless Web, not all services and applications are available on all devices. For example, Ameritrade users



BIG WEB, LITTLE WEB: Many wireless services for handhelds require setup on a desktop site, such as GTE Wireless's Mygtew.com (above).

can trade stocks only on a Sprint PCS phone. Moreover, you'll have a hard time checking your corporate or personal e-mail because many wireless ISPs require you to set up a separate e-mail account for their devices. And pri-

vacy concerns are surfacing: Sprint PCS customers who use their mobile phones to surf the Web leave a record of their phone number at the sites they visit—a situation the company says will be remedied by mid-April.

The Wireless Web Gets Better

NEW WIRELESS services for cell phones, pagers, and PDAs handle many tasks that usually require a standard PC and an Internet connection. Here are a few examples—and some of the major content providers and services that offer them.

- ◆ Check flight status (Expedia, GetThere.com)
- ◆ Check POP3 e-mail (Clickservices.com, MobileID, PhoneFish.com)
- ◆ Send instant messages (AOL Anywhere)
- ◆ Obtain traffic alerts and driving directions (Etak, Mapquest)
- ◆ Buy a gift (Amazon.com)
- ◆ Trade stocks (Ameritrade on Sprint PCS, E-Trade on Palm VII)
- ◆ Buy concert tickets (Ticketmaster)
- ◆ Compare prices (Bargainpoint.com, IQOrder.com)
- ◆ Find the nearest Federal Express drop box or Taco Bell (Vicinity)



WIRELESS ISPs

IF YOU USE a cellular phone, you will buy wireless Internet access as part of a bundle that includes voice calls and possibly paging services. AT&T's PocketNet was the first national carrier to offer Internet information on a wireless phone, followed last fall by Sprint PCS. Now other providers are joining the fray: GTE Wireless launched earlier this year, Nextel should be available in April, and Air-

Touch will follow this spring. Many regional digital cellular phone services are adding Internet access too.

The competition may lower prices, but it will certainly bring confusion. Different providers serve different areas, and pricing and policies on roaming vary. Besides offering phone, wireless Web, and paging services, Nextel plans to include access to its Direct Connect walkie-talkie-like service, popular with businesses whose employees need instant voice communication. For a flat

\$10 a month, GTE Wireless lets you use your monthly allotment of minutes for either Internet access or voice calls. Sprint PCS gives customers on its cheapest wireless plan an hour of Internet connection time for an extra \$10 a month. AT&T expected to introduce a \$20 flat-rate surcharge in mid-April to cover PocketNet service for customers participating in its Digital One Rate voice programs.

The provider dictates your choice of phones. At launch, GTE Wireless offered Internet access only on a Qualcomm QP860 device; it planned to support several other brands by mid-April. Nextel requires one of various Motorola phones, and Sprint lets you choose from several models, including the lightweight, large-screen \$299 Neopoint.

WIRELESS PORTALS

WIRELESS INTERNET access isn't worth the radio waves it's carried on unless it brings good content. To make finding that content easier, a ►

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number of companies are building wireless portals—services that offer a menu of such wireless applications and content as e-mail, news, stock quotes, and local traffic information. In February Microsoft announced a beefed-up version of its portal-like MSN Mobile service. MSN Mobile 2.0 will particularly benefit users of Microsoft's other Web services. These customers will be able to check itineraries booked through the Expedia travel site, read Hotmail messages, and check MoneyCentral portfolios. But this free service isn't available from all wireless carriers. At press time, Nextel and AirTouch were the only providers to offer MSN Mobile 2.0.

Other portals are building their own wireless versions: For example, Sprint PCS's Internet menu has a link to MyYahoo. Oracle's OracleMobile.com portal (www.OracleMobile.com) is accessible to devices with minibrowsers or text-messaging capabilities. Less-familiar players like Clickservices.com, GiantBear.com, and Strategy.com are launching wireless portals too. Still other companies such as Yodlee are developing wireless portal software that will eventually be used by major Web sites wishing to serve their mobile users.

COOL NEW APPS

INSTANT TEXT messaging is one of the hottest new tricks on the wireless Internet circuit. America Online's AOL Anywhere, for example, will soon allow AOL's mobile cus-

tomers to have instant messages forwarded to their Internet-enabled devices. Sprint PCS and BellSouth Wireless Data are the first announced partners in this service.

Two-way pagers such as Motorola's PageWriter 2000x and RIM's Inter@ctive Pager enable you to send instant text messages over data networks such as American Mobile, BellSouth, and Wireless WebLink (formerly PageMart), but these pagers cost more than \$350; however, this summer Motorola will offer a petite \$149 alternative, the Talkabout.

Several new services, including MobileID and PhoneFish.com, allow you to check your POP3 mail from a device with a minibrowser.

WIRELESS SHOPPING

MAJOR WEB shopping sites are jumping on the wireless bandwagon. You can use an Internet-enabled phone, a Palm device, or a pager to buy items at Ama-

zon.com. Palm VII users can purchase concert tickets from TicketMaster and track eBay auctions. Movie listings will be available this spring to users of most Web-enabled phones and pagers.

If you're out shopping in a brick-and-mortar store and want to see if you're getting a fair deal, whip out your wireless Web device and call Barpoint or IQOrder. Both services can track down the best online price for an item, and IQOrder will even let you buy it from some e-tailers. Need help locating the nearest Federal Express drop box or Taco Bell? Look up the info in Vicinity's Brandfinder wireless application.

Because stock prices won't freeze while you rush to a PC, you need mobile options. E-Trade lets you check prices via a Palm VII. Other brokerages are working on their own wireless services.

Need a traffic report? Etak (www.etak.com) distributes traffic advisories for most major metropolitan areas to various wireless devices. Want driving directions? Mapquest.com routing advice is available to people who use Palm VII

and Sprint PCS phones.

Stuck in a cab on the way to the airport? Most wireless carriers offer flight status info, though getting it can require laborious typing.

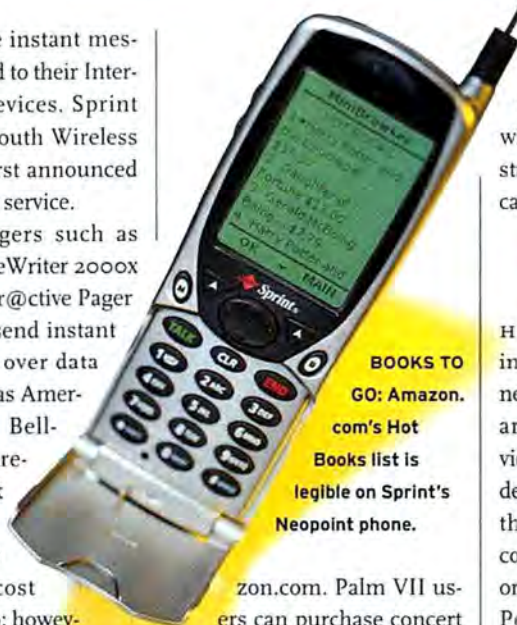
TAPPING INTO THE WIRELESS WEB

HOW MUCH WILL all this information cost you? Good news: Most wireless Web apps are free. Many content services make their money from deals with your wireless ISP or through transaction fees—commissions on stock trades or product sales, for example. Personalized traffic reports and some other premium services, however, will likely cost an extra few dollars a month.

If you're not yet ready to jump in, you have company. A study by Peter D. Hart Research Associates for the Cellular Telecommunications Industry Association found that 26 percent of the 85 million wireless phones in the United States are Internet-ready, but most of them aren't used for data services. And only 12 percent of people who own Net-ready phones express great interest in using them for Web surfing.

Tiny displays (three or four lines of text with as little as a word per line), data-transmission rates that top out at a sluggish 14.4 kbps on most devices, and prohibitive prices are among the deterrents (see last October's *Top of the News*, www.pcworld.com/oct99/wireless). But as additional practical applications become available for wireless devices, and as we get used to the benefits, more and more of us will give the wireless Web a try—and get hooked.

—Yardena Arar ►



BOOKS TO GO: Amazon.com's Hot Books list is legible on Sprint's Neopoint phone.



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Top award for Web hosting, January, 2000. E-CommerceFirms.com.

A Web host is a Web host is a Web host, right? Wrong. If you've spent any time dabbling in the Web-hosting arena at all, you're probably painfully aware that technical support and customer service can sometimes be, in a word, lousy.

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MP3 Fans Get New Players, Services—Will Squabbles Stop the Music?

UPDATE

YOU CAN TUNE into radio stations without going near a radio. You can wear 30 minutes of music on your wrist. And you can buy a CD on the Web and start listening to it within seconds.

Welcome to the noisy nexus of computers and music—where players are proliferating, standards keep changing, and a free music mentality has the recording industry's lawyers hip-hopping.

PLAYER POWER

IF YOU WANT Internet music to go, you need a portable player. I examined three of the newest models: a prerelease version of Creative Labs' \$329 Nomad II; I-Jam Multimedia's \$299 IJ-101; and Sony's \$399 NW-MS7 Memory Stick Walkman. This new generation of player devices comes in many shapes and sizes and replaces awkward parallel ports with speedy USB connections.

Some vendors have also added new features. The Nomad II and the I-Jam player include FM radio tuners, and the Nomad II offers a voice

recorder. Both units can hold any type of file, so you can use them to shuttle documents around.

As an antipiracy measure, the Nomad II won't let you copy an MP3 file from the player to a PC. But I found that changing an MP3 file's extension before transferring it to the Nomad let me transfer it back to the PC—though the Nomad can't play the file under the new extension. So much for piracy prevention.

Sony's Memory Stick Walkman takes the size prize—it's not much larger than a pack of gum. Unfortunately, the copy-protection shackles imposed by Sony's OpenMG Jukebox software mar the unit's slick hardware.

You cannot transfer MP3 tracks to the Walkman unless you've converted them to Sony's format, which takes a couple of minutes per track. You must also register your player's serial number before you can use it, which makes you a candidate for junk e-mail from Sony. And you can't



SONY'S SLICK Walkman weighs just 2.5 ounces but imposes a heavy copy-protection burden.

back up encrypted files. If your hard drive dies, so does your music collection.

These aggravations provide a grim preview of how other portables may work as competing manufacturers adopt the industry's Secure Digital Music Initiative specifications.

In any case, more portables will be playing soon. Two of them worth watching are Casio's \$249 WMP-1V Wrist Audio Player (this product should be available by the time you read this), which straps 33 minutes of MP3 audio to your wrist, and Sanyo's SSP-HP7 (probably coming out later this year), which crams its playback circuitry and 32MB of memory into headphones.

Sanyo's player joins Diamond's Rio 500 models in supporting

content from Audible.com, which uses its own format to deliver audio books, radio programming, and more spoken content.

MP3, INSTANTLY

TIME TENDS to be an issue with MP3. Encoding a CD into MP3 format takes several minutes per track, and downloading an MP3 file can take 20 minutes or more over a dial-up modem connection.

MP3.com's slick My.MP3.com service eliminates both waits. If you buy a CD from one of MP3.com's partners, you can go to My.MP3.com and start listening to the CD within seconds of submitting your Web order.

Even better, you can listen to MP3 files of CDs you already own by using MP3.com's free Beam-It utility. Insert the CD into your PC's CD-ROM drive, launch Beam-It, and click a button. Within seconds, a list of the CD's tracks appears in your browser window, where you can then listen to them and create playlists.

By beaming and buying, you can build a library of online music and listen to it anywhere. Your tunes will become even more accessible as Internet audio extends to devices such as personal digital assistants, cell phones, and Internet radio appliances.

There's no tech secret behind MP3.com's speedy encoding. The company maintains a database of some 80,000 CDs that it has purchased and encoded into MP3 format. If the CD you buy or beam is among these, MP3.com can make its tracks ►

New Generation of MP3 Players

PLAYER	List price	Memory (MB)	Weight (ounces)	File format supported	Product info no.
Casio WMP-1V Wrist Audio Player 800/836-8580 www.casio.com	\$249	32	2.4	MP3	720
Creative Labs Nomad II 800/998-1000 www.nomadworld.com	\$329	64	3.2	MP3, WM ¹	721
I-Jam Multimedia IJ-101 888/326-4526 www.i-jam.com	\$299	32	2.5	MP3	722
Sony NW-MS7 Memory Stick Walkman 800/222-7669 www.sony.com	\$399	64	2.5	ATRAC3 ²	723

¹ Windows Media Audio. ² Must convert other file formats to this format.



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trades in honor
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your first month, commissions for Internet equity
orders are just \$8. Limit and stop orders are
\$5 more. Understanding investors and their
needs is the foundation on which we've built
Ameritrade. That's why we were the first brokerage
to introduce Internet trading, bringing Wall Street to
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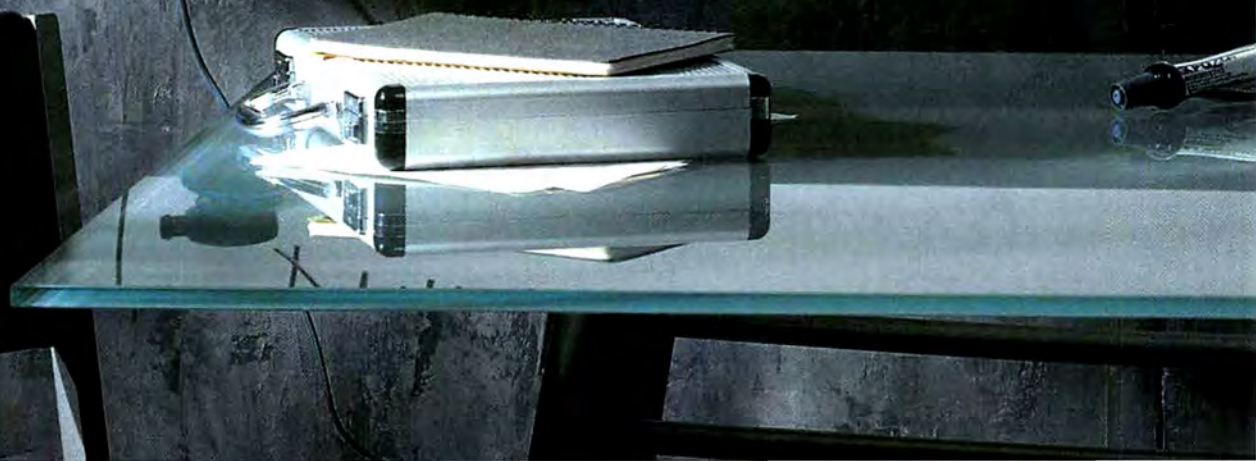


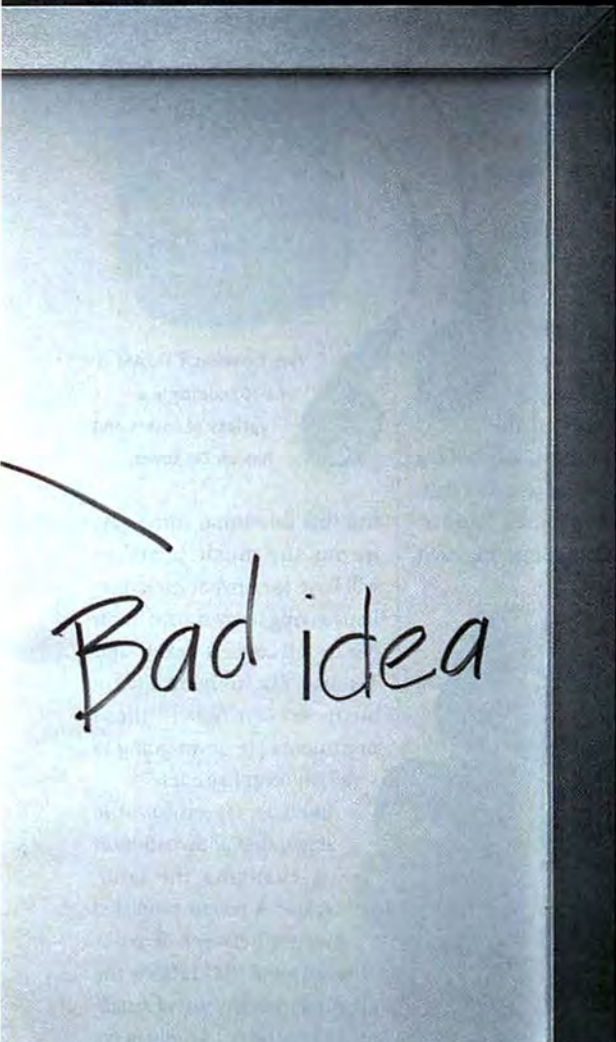
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That's why the Recording Industry Association of America has sued MP3.com. Copyright law permits consumers to duplicate their own CDs for personal use, but it doesn't permit third parties such as MP3.com to make copies. "It's a textbook case of copyright infringement," says Robert Kohn, founder and chairman of EMusic—the industry's largest network of music sites—and author of the definitive *Kohn on Music Licensing*.

MP3.com chairman and founder Michael Robertson counters that the record industry should be thanking him instead of suing him. MP3.com "keeps CDs an integral part of the system, and it encourages people to buy more CDs," he says.

It's true that you need a physical CD to use part of the My.MP3.com service, but nothing prevents a group of friends from passing around one CD so that each can beam it to the site.

Robertson argues that since music is streamed rather than downloaded to users, tracks can't be copied. Also true—to a point. With a few steps, I circumvented MP3.com's streaming and copied and downloaded tracks from beamed CDs. Again, so much for copy protection.

NAPSTER: DREAM OR NIGHTMARE?

THE RIAA is also suing Napster, which publishes a free utility of the same name. Napster doesn't provide the immediate gratification of My.MP3.com—you have to download files—but it makes finding illegal MP3s enticingly easy.

Napster turns your PC into an MP3 server. You can make a directory of MP3 tracks on your hard drive accessible to other Napster users, and all such users have access to each other's shared directories. Type the name of an artist or song into Napster's search box, and you get a list of every currently connected Napster user who has the goods. From there, a double-click transfers the site from one pirate's drive to yours.

Napster's Web site stresses that its software is intended to

knees. Already, some 200 campuses are blocking the use of Napster's utility. A cross-country organization of college students has launched a campaign demanding an end to the blockade.

Despite the legal hassles, an AOL subsidiary, Nullsoft, also planned to get into the MP3-swapping game. But skitish AOL pulled the plug on Nullsoft's Gnutella, a downloadable application that, unlike the centralized Napster, relies on users contacting each



THE NOMAD is a bit heavier than the others but packs extras like a voice recorder.

THE COMPACT I-JAM IJ-101 comes in a variety of colors and has an FM tuner.

ing this dilemma, some say, means the music business will have to reinvent itself, perhaps giving away music in order to sell concert tickets and T-shirts. But in the recording business, says Sobel, "those arguments are never going to fall on receptive ears."

Even in its embryonic stage, digital distribution is changing the landscape. A recent proposed merger between Warner Records and EMI reflects the growing momentum of smaller, independent labels, says EMusic's Robert Kohn. He doesn't think the proposed AOL-Time Warner merger puts AOL in the musical catbird's seat. "AOL is buying a shrinking piece of the market," he says.

Sales of CDs are up since 1998, so perhaps the industry still has time to figure out how to do business in the Internet age. But the longer it waits, the more its future will be defined by the Net and by computer companies. —Jim Heid

other to form a private network. The future of the software is currently uncertain.

A LOUD NEW WORLD

SECURE MUSIC technologies such as Sony's OpenMG are overly restrictive, and unprotected technologies such as MP3 are prone to abuse. Solv-



Go to www.pcworld.com/may00/mp3-tools-to-download MP3 players and files. ►

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Who's Reading Your Mail? Feds Have Their Eye on You

CONSUMER ALERT

GOT AN international e-mail pen pal or chat buddy? Belong to a mailing list that includes one person from outside the United States? Use a cell phone much? If you do, odds are good that Big Brother is watching you.

According to intelligence experts in the United States and Europe, a massive electronic intercept program called Project Echelon scans all Internet traffic, cell phone conversations, faxes, and long-distance telephone calls—virtually every type of electronic communication—looking for evidence of terrorist activity, military threats, and transnational crime.

The e-spying is being conducted by the secretive U.S. National Security Agency and its counterparts in Australia, Canada, New Zealand, and the United Kingdom.

"They are looking for thugs and drugs," says John Pike, expert on security and intelligence issues for the Federation of American Scientists in Washington, D.C.

That pursuit may be worthwhile in theory—but most of what the spooks are scanning comes from you and me, not from terrorists, criminals, or other menaces to society.

HOW IT WORKS

ECHOLON USES a filtering process to flag messages with keywords such as *bomb*, *gun*, and *militia*. But because little is known about Echelon, it

remains unclear whether the system can differentiate between messages sent by criminals and those sent by law-abiding citizens. For example, a person in Chicago might innocently use two or more of the keywords in an e-mail to a friend in Japan while describing a Tom Clancy novel, or while discussing the latest *NYPD Blue* episode or even a news report about a recent terrorist act. What happens when Echelon picks up such a message? No one knows.

If you're a typical user, your chances of coming to the attention of a live person at the NSA—much less of being placed under more thorough surveillance as part of an investigation—are tiny. But nev-

"Echelon is a black box, and nobody outside the intelligence community knows what is inside."

ertheless, the NSA has cast a very wide net to catch just a few suspicious goldfish. And the agency is invading your privacy to do it.

Project Echelon's equipment can process 1 million message inputs every 30 minutes, according to a series of reports commissioned by the Scientific and Technological Options Assessment program, a research wing of the European Parliament.

The STOA studies found that the system filters intercepted material so minutely



that only 10 inputs out of 1 million are passed along for detailed analysis—which is likely a second level of software filtering; even fewer messages reach live analysts.

The system also reportedly uses voiceprint technology to search telephone communications for targeted speakers.

Echelon uses powerful search engines—called *dictionaries*—to ferret out keywords of interest to intelligence analysts. Only a handful of these keywords from the classified dictionaries have made their way into published reports about the program.

WHO WATCHES THE WATCHERS?

THE POSSIBILITY that innocent people may become Echelon targets or that the project's spying may exceed legal boundaries bothers privacy activists. They note that when an intelligence project operates in total secrecy, the public has no way of knowing whether or not the program is operating within the law.

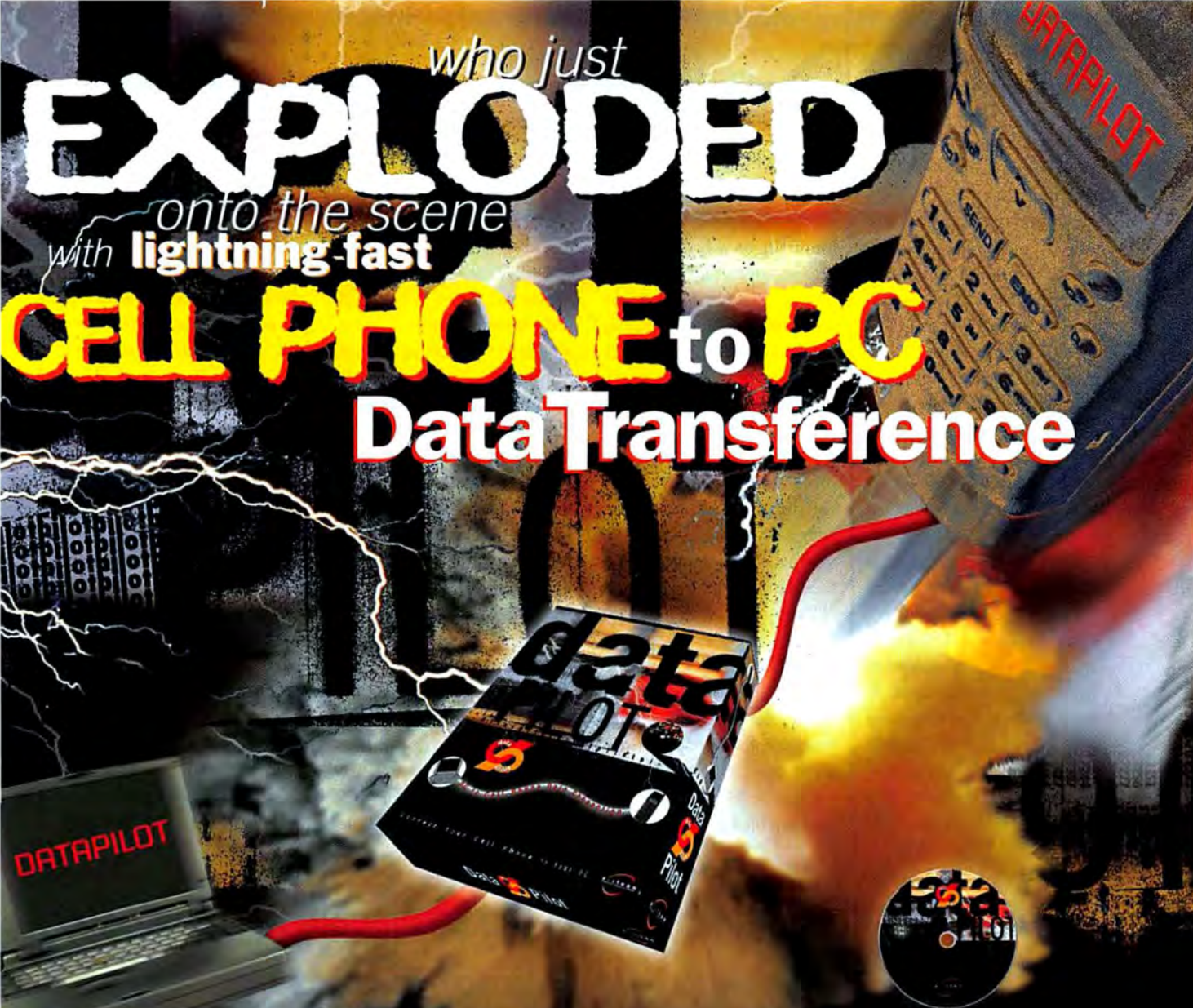
"Anytime you have a law

enforcement or intelligence agency that claims it is policing itself, I have a real problem with it," says Wayne Madsen, a specialist on U.S. intelligence operations for the Electronic Privacy Information Center.


"I would feel a lot more comfortable if there was an outside ombudsman who was independent who could go in and take a look," he adds.

Echelon is so hush-hush that the NSA will not even acknowledge the program's existence, much less discuss its targeting criteria or its civil liberties safeguards. Only two fragmentary documents have been released under the federal Freedom of Information Act; they consist of just seven highly censored pages. The STOA reports are more detailed but still leave many questions unanswered.

Partly because of STOA's reports, the American Civil Liberties Union petitioned the House Committee on Government Reform last year and asked for an investigation of Project Echelon. The ACLU wants to ensure that Eche-



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lon is operating in accordance with federal law and the U.S. Constitution.

"Echelon is a black box, and nobody outside the intelligence community knows what is inside it," says ACLU national director Barry Steinhardt.

For those concerned about potential abuses, the issue is simple: "What it comes down to is, somebody is reading your mail," says Pike, who serves as director of the Federation of American Scientists' Intelligence Project.

"If it is an international transaction, the National Security Agency is monitoring it," Pike adds. "The target is wide open: Essentially, it consists of anything that would be of interest to the U.S. government—and the rest of the English-speaking world." And no one is watching to see what they do with the information.

HERE'S LOOKING AT YOU, KID

NEWS OF ECHELON comes at a time when privacy concerns loom for us all. Consumer organizations and electronic privacy groups were up in arms after Internet advertising firm DoubleClick purchased a direct marketer last year and announced plans to merge data gathered about consumers into a megadatabase. The information would include consumers' real names and addresses, as well as their Web surfing habits and facts about their purchases.

The uproar, along with several pending lawsuits, recently led DoubleClick to put its plan on hold. Meanwhile, the ACLU, the Cellular Telecommunications Industry Association, the Electronic Privacy Information Center, and others have filed briefs in federal

What 'They' Are Watching

LOOKING FOR keywords such as *militia, gun, bomb, Delta Force, and explosive*, Project Echelon intercepts the following types of communications:

- ◆ Internet traffic, including e-mail and chat-room gab
- ◆ Most long-distance telephone conversations
- ◆ Any electronic signals transmitted by communications satellites
- ◆ Pager signals
- ◆ Fax transmissions

court challenging a Federal Communications Commission order that would force the telecom industry to support extensive police surveillance capabilities in connection with a 1994 law. A hearing on the

matter is scheduled for May.

We know that our employers can monitor our e-mail. And no one condones terrorism or crime (except terrorists and criminals). But aren't we still entitled to some level of privacy? Echelon leaves us with few alternatives. Pike says encrypting e-mail may offer some protection—as long as you aren't under suspicion in the first place.

Services such as Anonymizer (www.anonymizer.com) and Zero Knowledge (www.freedom.net) can provide you with an e-mail name no one can trace to you—a tactic that may lend you some cover. But such a solution is not practical for businesses, and it certainly does not offer a viable long-term option.

For now, watch what you say, and where you send it.

—Bill Wallace

Drive-By Computing: Dawn of the Dashboard Desktop

FIRST LOOK

CAR PCs will give new meaning to the concept of mobile computing. In-dash stereos with CPUs and other PC features are expected this summer at high-end auto accessory stores (and car dealers) near you. The pricey systems obey voice commands for hands-free cell-phone dialing, reading e-mail, retrieving driving directions, and more. Barebones models like Clarion's AutoPC 310C begin at \$1299.

—Yardena Arar ■



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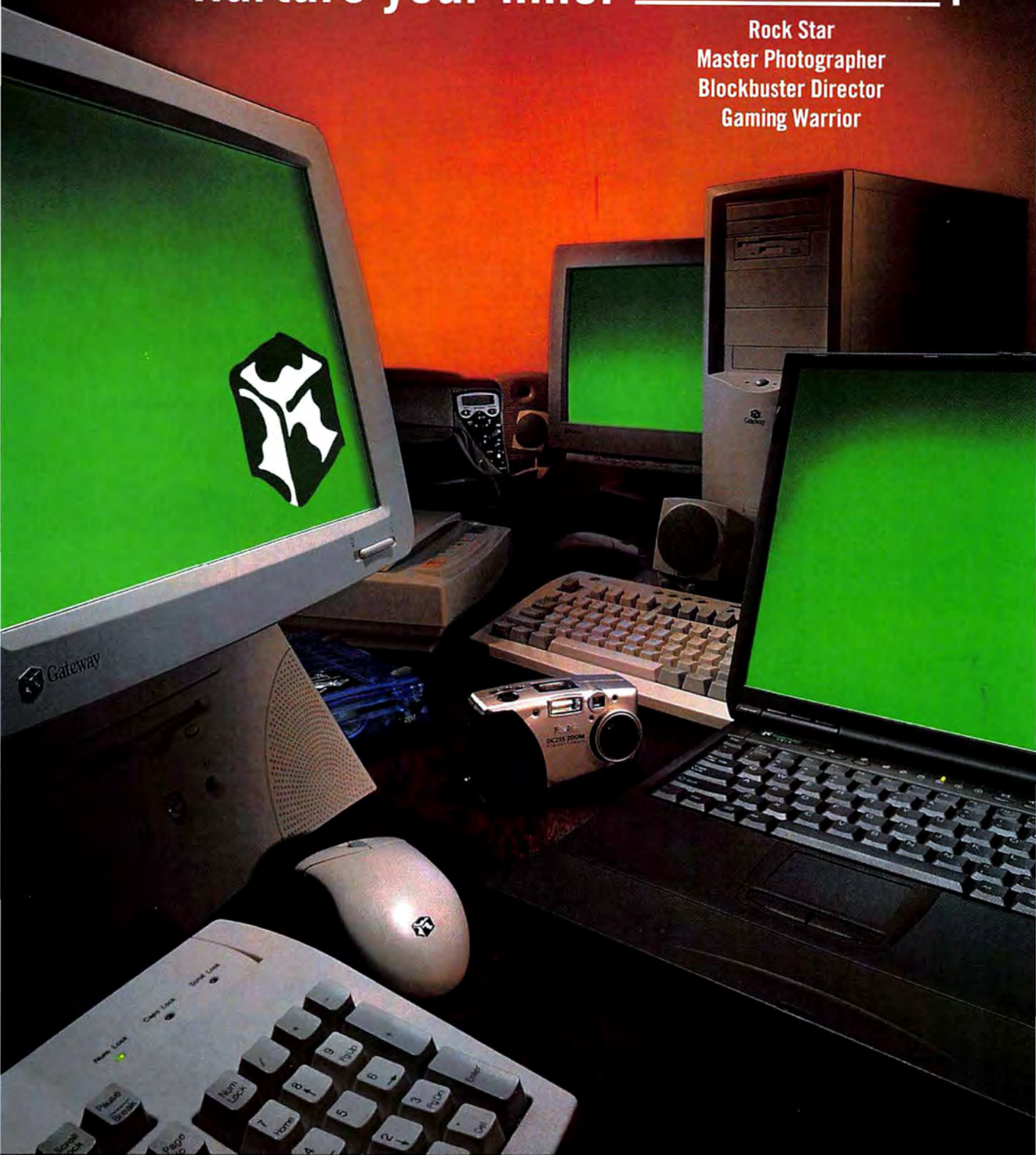
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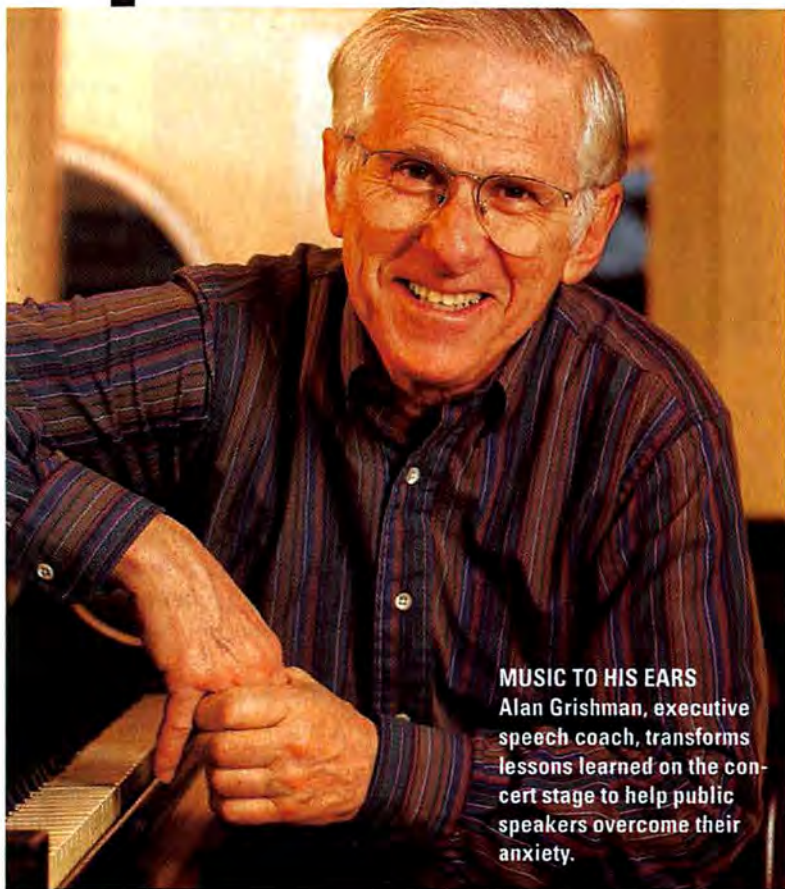
Overcoming Presentus Interruptus

Kick that cold and
lonely feeling when all
eyes are upon you.

One night 20 years ago, Alan Grishman was playing the violin with his wife, a pianist, before a group of fellow musicians and classical music fans in Pittsburgh, Pa. "It was a gorgeous recital," Grishman says. "We were playing in this beautiful hall, with great acoustics, and an appreciative audience."

In fact, the performance went so well that the city's cultural leaders asked Grishman and his wife to repeat their performance the following year.

Continued on page 3



MUSIC TO HIS EARS
Alan Grishman, executive speech coach, transforms lessons learned on the concert stage to help public speakers overcome their anxiety.

BRUCE ZAKE

IT'S SHOW TIME!

THE PRESENTATION SERIES: PART TWO

Continued from page 2

So the next time the couple stepped onto the stage, they felt they were ready to play. "Everything was the same—the hall, the acoustics, the audience, every-

sound awful."

Grishman only managed to stop his nose-dive "after I started paying attention to the job at hand, which was playing the violin," he says. "Within seconds, I could feel myself physically playing the instrument and enjoying the experience. I was no longer bothered by the anxiety."

Grishman, who earned his Ph.D. by helping musicians overcome their performance anxiety, now makes his living teaching anxiety-reduction techniques to public speakers.

"Whether you are a musician or a speaker, it doesn't matter," he says. "The anxiety is the same, and the work of overcoming it is the same." He and other public speaking professionals know that the fear most people

concentrate on their delivery, what they are saying, and how they are moving," he says.

Grishman rejects many familiar tricks of the trade. "The worst piece of advice I have ever heard is to look down at the audience as if they're all naked and laughable," he says. "Nobody I have ever spoken to has had success with that approach."

Speakers should instead try to ease their anxieties by establishing a rapport with their listeners. "The most important thing you can do is intellectually and emotionally connect with your audience, and the only way to do that is to look them in the eye," says Patricia Fripp, executive speech coach and author of *Get What You Want* and the soon-to-be-published *Make It So You'll Never Have to Fake It!*

It helps to have sympathetic faces in the audience. "If you're talking to a small group, greet people at the door," Fripp advises. "When you are speaking before a larger group, be sure to shake a few hands in the front row. Then you might have some friends cheering for you."

Speakers often forget that their

Continued on page 5

PUTTING IN THE TIME
Executive speech coach Patricia Fripp advises clients to turn off their TVs and use the time to prepare their speeches instead.



ANDY FREEBERG

thing," Grishman recalls.

But something had changed: Grishman himself. "Just before we started playing, my hands became cold and sweaty and my mouth went dry," he says. "I started to panic."

And that was only the beginning. "I asked myself, 'What is going on here? Last year was perfect; this year is suddenly all different.'" As he began to play, Grishman started to criticize his own performance. "I was saying to myself, 'This is terrible; you

have of public speaking can be overcome through knowledge, practice, and preparation. Whether your audience is two or two thousand, learning the skills and tools of effective public speaking can generate both personal and professional rewards.

IS ANYBODY OUT THERE?

As he did on that stage two decades ago, Grishman encourages his clients to remain mindful of their performance during a presentation. "I have them con-

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Continued from page 3

audiences want them to succeed. "It's important to remember that the audience is on your side," says Marjorie Brody, a motivational speaker and author of *Speaking is an Audience-Centered Sport*. "That should be an important part of your motivation. Ask yourself, 'How can I better serve my audience?'"



With WebEx, you can give live presentations, share applications, control another PC remotely, and videoconference.

FRIENDS IN YOUR CORNER

Indeed, the experts agree that the best techniques for reducing performance anxiety are practice and preparation. "There is no Viagra for becoming a better speaker," Grishman says. "Nothing beats hard work."

Effective use of technology, however, can improve your confidence and allow you to present your information in more dynamic and entertaining ways. "Having electronic backup can help, but you can't have everything on a slide," Brody says. "Instead, I encourage people to use more video and animation to bring the audience back into a

presentation."

Speakers ruin their presentations when they rely on still images and bulleted lists alone. "I call it death by slides," says Richard Arundel, a professional speaker and president of the London, U.K.-based Professional Speakers Association. "I see it all the time. People seldom take advantage of all of [Microsoft] PowerPoint's capabilities. They would be much better off rolling some animation sequences into their presentations, rather than just

using bulleted text."

To hold their audiences' attention, many speakers rely on multimedia projectors to weave diverse visual elements into their presentations. Some of the best projectors combine high-resolution video and picture-in-picture

capabilities in lightweight packages. The ViewSonic PJ1060 color XGA LCD projector, from Walnut, Calif.-based ViewSonic Corp., delivers 1024x768 native resolution, with scaling up to 1280x1024, in a 13.5-pound unit. The PJ1060 can also support simultaneous input from three computer sources and a single video source.

NEC Technologies Inc. has introduced its new MultiSync VT series of lightweight LCD-based projectors. Both the VT440 and VT540 weigh in at under nine pounds and use NEC Technologies' exclusive setup technology, AutoSense, to synchronize and



One of the Mitsubishi Oberhofer Executive Boardroom LCD Projectors

adjust the projectors to incoming computer and video signals. AutoSense can process a range of signals, including S-Video, RGB, YcbCr Component, and HDTV. The VT series also features NEC Technologies' proprietary Advanced Video Circuitry (AVC) system, which provides high-performance color, depth, and video in any environment.

Of course, speakers shouldn't rely on hardware to get rid of all their anxiety. Untested hardware can present its own challenges. "The worst problems are incompatibilities between PCs and projectors," Arundel says, "although this is improving. It's important to



The Office Theater PJ1060 by ViewSonic

check the kit in advance. If you cannot do so, have a back-up option in place."

In today's high-pressure executive boardrooms, even projectors convey part of a speaker's professional image. In addition to the hard work of preparation and

Continued on page 7



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IT'S SHOW TIME!

THE PRESENTATION SERIES: PART TWO

Continued from page 5

practice, a reliable and attractive machine can be a speaker's best friend. To meet the demand for executive-quality materials, Mitsubishi Presentation Products and Oberhofer Hand-Crafted Computers Inc. recently introduced the X200 and X300, two high-end LCD projectors with enhanced lamp technology, movable and resizable picture-in-picture capabilities, and point-and-zoom digital magnification. Both projectors boast compelling designs and wood-grain textured finishes.

InFocus Systems Inc. is also helping speakers do their best with its lightweight and sleekly designed multimedia projector, the Dragonfly LP335. The Dragonfly weighs less than five pounds, but it manages to pack a slew of features into its Lilliputian frame.

The projector beams with 1000-lumen brightness, flawless video quality, and DVI digital/analog support. And InFocus works to diffuse its customers' presentation jitters with around-the-clock technical support.



Presenters work from this console when using PlaceWare's Conference Center 2000.

the connection is going to be. So you need to know how to keep the presentation moving when a Web site is taking 30 seconds to download."

Arundel uses CatchTheWeb, from CatchTheWeb LLC, a Web application service that lets users capture, manage, and search Web content reliably. "The application lets me put pages in any order I want them before a presentation," he says. Arundel also runs Netsonic, a popular freeware application from Web3000.com that speeds up Internet browsing by quickly loading previously visited Web pages from its own cache.

Perhaps the Web itself offers the best technology for beating stage fright: online conferencing. Both WebEx.com and PlaceWare.com offer registered users more than enough free services to make lasting, high-tech impressions on remote audiences.

WebEx.com is a robust, scalable, and easy-to-use Web-based meeting center that allows users to meet online from any Web browser. Speakers can use WebEx.com to make live data, voice, and video presentations.

Because presenters work at their computers instead of standing in front of an audience, WebEx.com literally takes speakers out of the limelight. It also helps audiences actively participate in conversations and Q&A sessions. The site's collaborative meeting options let users share presentations, documents, desktops, and applications in real

Continued on page 9

Peeking Behind the Curtain

Only one thing rivals the fear of meeting an audience for the first time, and that is figuring out the workings of a strange multimedia projector. Fortunately, Texas Instruments' Digital Light Processing (DLP) technology lets speakers bring the brightness, color, and image quality of stationary systems with them wherever they go.

DLP projectors synchronize a tiny array of hundreds of thousands of mirrors (TI's Digital Micromirror Device) with a rapidly rotating color wheel to produce seamless images—including video—in millions of shades of vivid color.

The technology lies behind portable, lightweight projectors such as InFocus Systems' Dragonfly LP335, but it also enhances the performance and image clarity of stationary systems. For a closer look at DLP, check out Texas Instruments' Web site at www.ti.com/dlp.

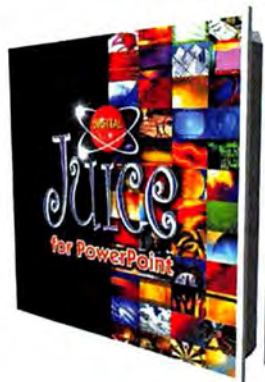
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Internet: www.ViewSonic.com *Users who purchase a LiteBird PJL1005 between January 1, 2000 and June 30, 2000 will receive a free full copy of Digital Juice upon completion of a registration at LiteBird.com or register via phone at 909-444-8800, option 2. All requests must be received by July 31, 2000. P.J.L1005 serial number required. • Specifications subject to change without notice. • Copyright © 2000 ViewSonic Corporation, all rights reserved. • Corporate names and trademarks are the property of their respective companies.

IT'S SHOW TIME!

THE PRESENTATION SERIES: PART TWO

Continued from page 7
time.

Speakers can also Web conference at PlaceWare.com, which offers an ideal environment for presenting PowerPoint slides and other images to large audiences in real time. PlaceWare.com's Conference Center 2000 service lets speakers scale their presentations to reach up to 1,000 users simultaneously, and helps structure audience interaction through



The LP330 "Dragonfly" Projector by InFocus

multiple meeting and auditorium places on the site.

PLAY IT AGAIN, SAM

Still, few of us can completely avoid the hot lights and cold stares of a live speaking engagement. Again, preparedness is the key. "Anxiety is mainly diffused when you are prepared," Fripp says. "So turn off that TV! Really, stop watching TV for three weeks, and use that time to practice instead."

Fripp has her clients try out bits and pieces of their speeches over time—with the folks at home, friends at work, or with the people seated next to them on airplanes (if the captives are amenable).

Marjorie Brody also recom-

Continued on page 11

Top 10 Anxiety-Busting Tips from the Pros

Even the world's best speakers are occasionally gripped with Presentus Interruptus. "Stage fright can manifest itself in three ways," says executive speech coach Alan Grishman: physiological changes (such as sweaty hands and wobbly knees), cognitive distortions (a.k.a. negative self-talk), and avoidance behavior (when any excuse will do to avoid speaking entirely).

"Most speakers experience one or two of these symptoms," he says. "Some have all three. The good news is that a trained professional can teach you the techniques to counter all of them." Here are the experts' top recommendations.

1. Know your audience—and your topic.

Studies show that the size of your audience is irrelevant to whether or not you feel nervous. "It's the quality of the group that counts," Grishman says. "If you're the expert and you're talking to 2000 people, it's easier than talking to just one expert in the field. That's why auditions are so hard." Try to find out in advance who is likely to be listening to your talk. Then learn your topic well to prepare yourself for any audience.

2. Improve your motivation.

Executive speech coach Patricia Fripp suggests asking yourself this question: "If I do superbly well, what is this worth to me and [to] my company over the next five years?" Fripp recently coached a company leader who was taking the stage after Microsoft Corp. "To him, a successful presentation meant five to ten million dollars. That's what [motivated] him to start practicing an hour a day in the weeks leading up to the event."

3. Get organized.

"Comfort comes from confidence, and confidence comes from organization," Fripp says. You can start by giving your practice time top priority.

4. Put your best material at the beginning and at the end.

"The first 30 seconds and last 30 seconds have the most impact on your audience, regardless of the length of the speech," according to Fripp. Humor can be your key to a strong start and finish. Fripp brought down the house with this opening line when she spoke to an audience of heavy truck distributors: "We all know God created the world in six days. He could have done it in one, but he had to wait for parts from Detroit."

Continued

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IT'S SHOW TIME!

THE PRESENTATION SERIES: PART TWO

Continued from page 9

mends that speakers record their presentations. "Video and audio recordings can reveal significant flaws in your performance," she says, "like rocking back and forth, or other unusual mannerisms."

Of course, a professional speaking coach is the person best equipped to review a speaker's recordings. "One of the most important things to remember," Brody says, "is that public speak-



NEC Technology's MultiSync VT440 Projector

ing is a skill that can be learned. So get videotaped, and have a coach take a good look at what you're doing."

Grishman, whose clients include politicians and corporate CEOs, acknowledges that public speaking can be a high-stakes gambit. "Bill Gates and Steve Forbes can afford to be such dreary speakers because they have already built their empires," he says. "For the rest of us, it's not quite so easy."

Patricia Fripp agrees. "It never ceases to amaze me that intelligent, educated, and ambitious people overlook the number-one skill that will position them above the competition—public speaking," she says. "That's why you need a coach, and [why] you need to practice."

Top 10 Anxiety-Busting Tips from the Pros

5. Practice out loud.

"Not in your head, where you are always eloquent," says motivational speaker Marjorie Brody. Start by practicing bits and pieces of your speech with friends at lunch, or with strangers on the plane (if they're amenable).

6. Practice with safe people.

If practicing your speech on strangers makes you want to crawl into the overhead storage compartment, seek out a more forgiving audience instead. It will help your confidence, as well as the clarity of your message. "Do you have any kids?" Fripp asks. "Sit them down and say, 'Mommy wants to tell you a story.' Then ask your child the point of the story. If an 11-year-old doesn't know the point, then it isn't clear enough yet."

7. Tell a good story.

"Audiences will resist a sale, but they cannot resist a good story," Fripp says. "You can emotionally connect with your audience through stories that have a point and [that] are edited for impact."

8. Relax.

"To lose some of that nervous energy," Brody suggests, "do some stretching, or take a quick walk [before your talk]. And remember to breathe."

"Concentrate on your delivery—what you are saying and doing at the moment," adds Alan Grishman. "You don't want to be guessing what the audience is thinking in the middle of a presentation [instead of concentrating on your own message]."

9. Know your technology.

Use today's electronic tools to enhance the visual and emotional impact you make on your audience—without eclipsing your message. "You should really learn the ins and outs of presentation graphics software," says Professional Speakers Association president Richard Arundel. "It's good to include animation and some video—but don't overdo it, either."

10. Be prepared for the unexpected.

It never hurts to have a spare joke in your pocket. "You should be flexible enough to handle technical difficulties—like a slow Internet connection—with patience and humor," Arundel says. "Otherwise, 30 seconds of a blank screen can seem like an eternity."

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Web Resource Guide: Links to a More Relaxed You

IT'S SHOW TIME!

THE PRESENTATION SERIES: PART TWO

The Web can provide aid and comfort to anxiety-ridden and reluctant speakers, especially those short on time and with limited personal budgets. Many professional speakers now have a foothold in cyberspace; their Web sites boast of their speaking accomplishments and awards, but they also offer novices free how-to articles and discounts on motivational books and tapes.

Leading speakers organizations—like the National Speakers Association and Toastmasters International—have online hubs with help for finding local chapters, suggestions for self-study, and links to additional resources. The Web is also home to universities—both virtual and real—specializing in the art of public speaking. The links on this page are no substitute for practice and hard work, but they give excellent advice for organizing successful presentations:

www.arundel.co.uk

Richard Arundel, who dubs himself "the wizard of hi-tech hi-touch," uses this site to describe his unique presentation style. He also bookmarks his favorite sites in his *Hi-Tech Hi-Touch Hot List*.

www.brodycomm.com

Marjorie Brody's Web site contains an archive of columns from her newsletter, *Brody Key Notes*.

The most recent issue features *Presentations 101: Dealing with Hostile Audiences*, which prepares speakers for the dreaded Q&A sessions that follow many presentations.

www.fripp.com

Patricia Fripp has written dozens of articles for business and professional speakers, and Web surfers can find them all here. Titles include *5 Sure-Fire Tips for Great Speeches* and the priceless *Avoid Clichés—Like the Plague*.

www.la.psu.edu/speech/100a

This site for speech communication students at Pennsylvania State University includes an online tutorial for developing and presenting great speeches. The 11-step program addresses everything from selecting appropriate topics to overcoming "communication apprehension."

www.nsaspeaker.org

The NSA has been connecting speakers with coaches, learning resources, and one another since 1973. Now users can search the NSA's online membership directory for the right speaker or coach for their business.

www.powerpointers.com

A virtual clearinghouse for advice columns by dozens of professional speakers, teachers, designers, and communicators. The articles teach users to overcome fear, plan and build presentations, and create effective handouts.

www.presentations.com

Presentations Magazine shows its readers how to improve the performance of their presentation hardware and software. By using the PowerPoint plug-ins reviewed on this site, presenters can expand their color palette and dazzle audiences with 3-D graphics.

www.presentersuniversity.com

Presenters University gets new multimedia presenters on their feet with its online tutorials, clipart, sound files, templates for PowerPoint, and predesigned business visuals for Lotus Freelance Graphics. The site also features a helpful Q&A archive and a moderated bulletin board.

www.thebarbershop.com

Jim Barber (a.k.a. "the Barberian") has infused his *Barber Shop* Web site with good vibrations and down-to-earth tips for better speeches. His online resource center, *Preparing for Your Presentation*, promises to show speakers how to "bring order out of chaos with program info-summaries."

www.toastmasters.org

Toastmasters International members practice their speeches in thousands of locations each week. The Web site directs would-be presenters to local chapters. And the article, *Ten Tips for Successful Public Speaking*, promises to help speakers "control [their] nervousness and make effective, memorable presentations."



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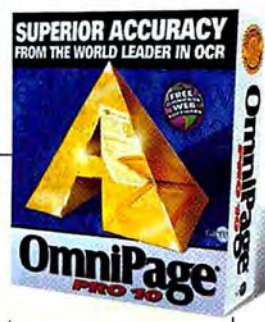
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NEW PRODUCTS

Petite, Chic, and Simplified PCs Arrive

DESKTOP

THINK SMALL and simple: A new type of miniature desktop system is here. Maybe you've seen these PCs on TV or in magazine ads: They stand less than half as tall as a standard tower, weigh as little as 8.5 pounds, and have a minuscule footprint. Some vendors describe them as "legacy-light" or "legacy-free"—euphemisms for stripped down.

In fact, these systems dispense with many of the add-in cards and ports (and much of the productivity software) that once came standard on desktop PCs. The positive news: Prices in this system class are

usually diminutive, too—as low as \$499—and vendors say the simple configuration will help you save on maintenance. We took a close look at three early arrivals: shipping models of Compaq's **IPaq Legacy-Free** and the **Micron ClientPro Cf**, and a preproduction version of Hewlett-Packard's **E-Vectra**.

NO CARDS, NO BAYS

THESE LAPDOG-SIZE units contain no internal PCI or ISA slots and no empty bays for subsequent expansion. Networking, graphics, and sound are all integrated onto the motherboard. Some models have no parallel or serial con-

nections, no floppy drive, or no CD-ROM drive.

But these machines are far more powerful than both the very limited Internet appliances we're starting to see and last year's terminal-like network PCs. Designed primarily to populate the desktops of the multitude of users on corporate networks, these systems all come with ethernet ports, a familiar Windows operating system (98 or 2000), and processors and hard drives beefy enough to handle most office applications. On the other hand, they may not please employees who play Doom on their lunch hour.

IPAQ: THE FUTURE IS NOW?

THE 11.8-POUND, 14-inch-tall IPaq Legacy-Free looks the most futuristic and fun of the three. A silver centerpiece juts like a metallic mohawk from the top of the sleek carbon-black minitower. Instead of containing a floppy drive and a set of standard parallel and serial connections, the IPaq has three USB ports in front and two in back. At upgrade time, you can access the hard drive and memory by sliding off the right panel.

But the IPaq's most remarkable feature is its multibay, a vertical slot situated on the front of the case. Since it's identical to the bay on Compaq's Armada notebooks, you can swap the Armada drives you already own into the IPaq. On the other hand, if you don't have any, you'll have to buy them individually—at prices that build in the modularity premium. A CD-ROM drive costs \$75 extra; a DVD-ROM drive, \$175; a SuperDisk LS-120 drive, \$99; and a 6GB second hard drive, \$219.

The IPaq costs as little as \$499 (when it's configured with a Celeron-500 processor, 64MB of RAM, a 4.3GB hard drive, and Windows 2000) or as much as \$799 (for a Pentium III-500 with 128MB of RAM and an 8.4GB hard drive). Either way, the price covers a matching black-



DOWNSIDED:

Compaq's IPaq Legacy-Free (left) and HP's E-Vectra.

and-silver USB mouse and USB keyboard with programmable buttons for launching applications or taking you directly to six different Web sites. A monitor in the same color scheme will cost you \$299 more (if you opt for a 17-inch CRT) or \$1169 (if you select a 15-inch LCD). Compaq sells a slightly more expensive version of the IPaq that carries parallel and serial ports in addition to the multibay slot.

SECURE OPTION

HP'S E-VECTRA is even smaller than the IPaq. A tranquil blue-and-tan unit about the size of a shoe box, it stands 9 inches tall and weighs only 8.5 pounds. You can either lay the E-Vectra flat or stand it upright (the latter requires using an included stand). The system owes its diminutive size in part to its notebook-style external AC adapter, which permits easy servicing.

The E-Vectra has no floppy drive, but unlike the IPaq, it retains standard serial, paral-

MICRON'S ClientPro Cf has a traditional profile, only smaller.

lel, and PS/2 connections, all crowded onto the back along with two USB ports. The unit's forte is security. System administrators can use a single master key to lock all of the company's E-Vectras, blocking access to the hard drive (which otherwise is easy to remove). Managers can also snap on a plastic attachment that blocks access to the lock and prevents anyone from unplugging the peripherals. E-Vectra prices range from \$549 for a Celeron-500-based system with Windows 98 and 64MB of

RAM (but no CD-ROM drive) to \$1199 for a Pentium III-667-based PC with Windows 2000, 256MB of RAM, and a 10x-24x CD-ROM drive. An 8.4GB hard drive is standard on all models.

TRADITION LITE

MICRON'S ClientPro Cf, the company's first sub-\$1000 PC, is the largest and most expensive of the three here. Its putty-colored box also comes closest to looking like a

traditional desktop case. The system carries floppy and CD-ROM drives and all the standard PC connections, plus two USB ports in front and two in back. Like the IPaq and the E-Vectra, the ClientPro eliminates internal slots and bays. It weighs 15 pounds and measures 3.75 inches high by 13 inches wide by 16 inches deep. But it's pricey: A Celeron-433-based unit with Windows 2000, 64MB of RAM, and a 4.3GB hard drive costs \$849, not including a monitor.

Legacy-light PCs may omit too many options for some prospective buyers' taste. CAD and other graphics professionals who need powerful video

- 84 Compaq IPaq Legacy-Free, HP E-Vectra, Micron ClientPro Cf
- 86 Epson Stylus Photo 870, Sony UP-DP10 printers; ArcSoft PhotoStudio 2000
- 88 WinFax Pro 10; SurfSaver Pro 2, WebSpace Professional
- 90 Applica Multimedia, Vega Buddy B-210A; PocketScience PocketMail Backflip
- 94 Microsoft Intellimouse Optical; HP Digital Sender 8100C; Microsoft Internet Keyboard Pro
- 99 Inetcam VTS 8500 Color Video Transmission System; Casio OV-3000EX 3.34 True Megapixel
- 100 BitLocker, BrainMatter; Corel WordPerfect Office 2000 Small Business Edition
- 101 Play Snappy 4; MetaCreations Carrara



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

IPaq Legacy-Free

PRO: Small, inexpensive tower with flexible multibay slot.

CON: No parallel or serial connections, no floppy drive, CD-ROM and other swappable drives cost extra.

VALUE: Good choice for companies on a budget that want a cutting-edge, head-turning PC.

Street price (without monitor or CD-ROM drive): \$499-\$799

Compaq

800/345-1518

www.compaq.com

PRODUCT INFO NO. 712

E-Vectra

PRO: Shoebox-size PC can sit flat or stand upright, includes all legacy ports, has unique security features.

CON: Cheapest configuration omits CD-ROM drive, includes only two USB ports.

VALUE: Great choice for companies with severely limited space.

Street price (without monitor or CD-ROM drive): \$549-\$1199

Hewlett-Packard

800/752-0900

www.hp.com/desktops/epc

PRODUCT INFO NO. 713

Micron ClientPro Cf

PRO: Smaller than traditional desktop, includes all legacy ports and drives plus four USB ports.

CON: Slightly expensive for the feature set it offers.

VALUE: Might suit companies looking for a small desktop to put a monitor on.

Street price (without monitor): \$849-\$1173

Micron

800/964-2766

www.micronpc.com

PRODUCT INFO NO. 714

capabilities, or companies that prefer more configuration control, will want a full-featured computer. Individual or home users are very likely to want a modem, better multimedia hardware, and a stronger software bundle—items that are commonly included with consumer-oriented desktops such as Dell's WebPC (our Best Buy in the budget section of this month's *Top 15 Home PCs*; see page 224).

Still, corporations looking to save money and space on their Windows network may find that the IPaq or the E-Vectra makes a nice, trim fit on cubicle surfaces. The ClientPro Cf, meanwhile, might appeal to businesses willing to pay a slight premium for a more traditional PC in a reduced form.

—Carla Thornton ►

Get Your Own Private Fotomat

PRINTERS

IT'S ONLY LOGICAL: When you print digital photos, you want results that look, feel, and last as if they came from a photo lab. Two new photo printers—Epson's \$299 **Stylus Photo 870** and Sony's \$389 **UP-DP10**—come as close as any that I've seen to achieving this goal. I tested shipping units equipped with preproduction drivers.

At first glance, the Stylus Photo 870 behaves like a typical ink jet. It prints black text and color graphics on plain paper, and has both USB and parallel ports. But this device really struts its stuff when you print your photos on Epson's special paper. The resulting images are gorgeous, with accurate, subtle colors and a continuous-tone look belying their ink jet origins. And although most ink jet photos are notoriously prone to fading, Epson says prints on its new paper will last as long as traditional silver halide photos.

In my tests using a USB connection, the Stylus Photo 870 printed an 8-by-10-inch

photo in about 4 minutes; 4-by-6-inch snapshots took around 90 seconds apiece. A 4-by-6-inch print costs about 50 cents for special paper and ink. My one big gripe: Epson's roll paper, which you can use



STAND-UP SONY: The svelte UP-DP10 prints photos only.

to print edge-to-edge snapshots, is cumbersome to handle. You have to cut strips of photos apart manually. And as with previous Epson photo printers, black text prints on plain paper a tad fuzzily. Even so, this versatile printer is a find for serious digital shutterbugs. (A wide-format version, the \$499 Stylus Photo 1270, prints at sizes up to 13 by 44 inches.)

Epson Stylus Photo 870

PRO: Excellent photo quality; versatile device; produces fade-resistant prints.

CON: Printing edge-to-edge snapshots is a hassle; text quality could be crisper.

VALUE: Great choice for digital-photo fans.

Street price: \$299

Epson America

800/463-7766

www.epson.com

Sony UP-DP10

PRO: Respectable print quality; matte, glossy, and textured options; convenient slim design.

CON: Steep price for a snapshot-only printer.

VALUE: Not bad, but the Epson edges it out.

List price: \$389

Sony Electronics

800/686-7669

www.sony.com/digitalphotography

PRODUCT INFO NO. 715

SONY'S SKINNY PRINTER

ONE LOOK TELLS you that Sony's UP-DP10 is a highly unusual photo printer: Its skinny, upright shape fits easily in tight quarters. The compact design is crucial, given that this unit won't be your

only printer: It produces only photos, none larger than 4 by 6 inches.

Each costs about 60 cents, comparable to what you would pay for film and prints at a mid-range photo finisher. And each photo took about 90 seconds to print in my tests using a USB connection. (Both printers offer parallel-port connections, too, but you'll get slower speeds if you use them.)

The Sony creates prints that most folks will think you just received from the minilab—especially since you can mimic the look and feel of a glossy, matte, or textured finish. The printer uses dye sublimation, a process that many high-end color models use to avoid the ink jet's tendency to fade. The UP-DP10's image quality is better than fair but falls short of the Epson's. Contrast was a little off—details such as wrinkles in dark clothing disappeared—and lower-resolution pictures occasionally showed jaggy edges.

If you're comfortable invest-

Affordable, Easy Image Editing

DON'T HAVE THE CASH for a premium image editor? **PhotoStudio 2000**, the latest upgrade to ArcSoft's flagship package, boasts many powerful tools that are typical of high-end editors—including multiple layers, batch processing, and customizable brushes—for a fraction of the cost. The \$39 PhotoStudio has a built-in link to Photolands (www.photolands.com), ArcSoft's photo-storing and -sharing Web site, so you can post images to the Web with a click of your mouse. Unfortunately, you won't get sufficient color control: The software lets you work in only two color modes (RGB and HSV), and the color palette is small. But for powerful image editing and Web storage and display on Photolands, PhotoStudio 2000 shouldn't disappoint. ArcSoft, 800/762-8657, www.arcsoft.com.

PRODUCT INFO NO. 719

—Katharine Dvorak

ing almost \$400 in a printer that handles photos only, the Sony deserves consideration.

It's especially worthwhile if you're satisfied with your conventional printer for docu-



THE STYLUS Photo 870 can print on photo or plain paper.

ments but want better photos at little loss of desk space. But the Epson's fine print quality, greater versatility, and lower price give it broader appeal.

—Harry McCracken ►



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WinFax Pro's Near-Perfect 10

FAX SOFTWARE

MOST FAX SOFTWARE makes sending and receiving faxes with your PC possible, though not exactly uncomplicated. But the unrivaled flexibility and intelligence of Symantec's WinFax Pro have long set it

apart from the crowd. The latest version adds several welcome new features, as well as support for Windows 2000.

WinFax Pro 10 lets you send faxes as e-mail attachments, complete with a built-in 60KB viewer, to people who don't

have fax numbers. This feature can be convenient if you want to send a scanned or electronically generated image of a document rather than editable text—or if you plan to transmit a document to multiple recipients, some of whom

lack fax machines. Also new is a photo-quality mode, which reproduces illustrations and photographs much better than standard fax mode (though the faxing time doubles).

Other improvements: The program can now draw fax phone numbers directly from the address books of Outlook Express and other popular personal information managers. You have more flexibility in defining when to dial 1 and the area code before dialing a number—useful now that some cities are moving to ten-digit phone numbers. A software mechanism will delete faxes from known junk-fax phone numbers.

My shipping copy locked up during one test of the e-mail fax feature (it worked fine on subsequent attempts). And sometimes WinFax Pro inexplicably invoked the log-in routine of Outlook Express. Symantec said it was looking into these problems.

Despite these rough edges, WinFax Pro 10 remains king of the fax programs. A \$120 street price may be the package's biggest drawback for new buyers; owners of all earlier versions can send for a \$50 rebate. That offer helps make the upgrade sensible for serious fax users.

—Mitt Jones ►

WinFax Pro 10

PRO: Full-featured fax software.
CON: Pricey if you send faxes only occasionally.
VALUE: Package of choice for frequent faxers.
 Street price: \$120
Symantec
 800/441-7234
 www.symantec.com

PRODUCT INFO NO. 716

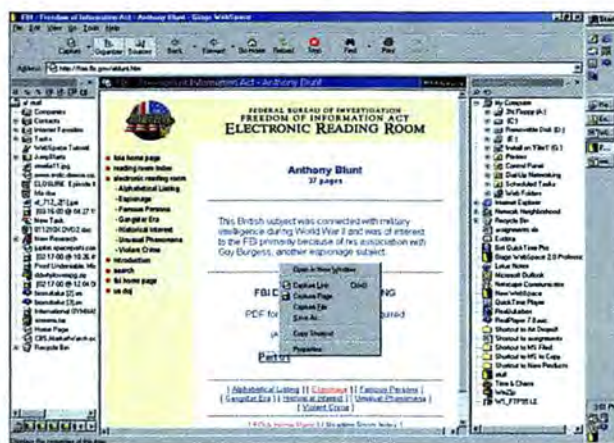
Two Capable Tools for Organizing Web Content

WEB UTILITIES

FINDING information on the Web is easy; organizing it can be a nightmare. AskSam's \$30 **SurfSaver Pro 2** and Giage's \$179 **WebSpace Professional** go beyond browser bookmark tools to help you save and organize information—in very different ways.

SurfSaver Pro 2 adds special search and page-save features to Internet Explorer that permit you to store material in a virtual file cabinet. You can share files with users on a network, and assign keywords, notes, and other properties to pages—useful for subsequent searches. Links on saved pages remain live; when you click one, SurfSaver checks for a local copy. A free desktop-only version of the program displays ads while saving content.

WebSpace Professional in-



FILE ANYTHING: Store and organize related Web content, e-mail, and even contact information in multipaneted WebSpace Professional.

corporates Internet Explorer technology into multipanel WebSpaces (virtual file cabinets that differ from SurfSaver's). You can collect information from such disparate sources as the Web (while you surf), e-mail, and your contact database. And you can view

Outlook 2000 e-mail and contacts from within WebSpace.

While SurfSaver and WebSpace handle many complex Web formats, both stumble on JavaScript. WebSpace does recognize more types of files, but it lacks an internal search engine—a SurfSaver feature.

If you need instant archiving of basic Web pages, SurfSaver Pro 2 qualifies as an excellent solution. WebSpace Professional, on the other hand, is worth a look only if you can take advantage of its Outlook integration; otherwise, you'll find similar help for less money elsewhere.

—Melissa J. Perenson

SurfSaver Pro 2

PRO: Fast saves, easy searching.
CON: No support for multimedia or other files.
VALUE: A well-designed bargain.
 Street price: \$30
AskSam Systems
 800/800-1997
 www.surfsaver.com

PRODUCT INFO NO. 717

WebSpace Professional

PRO: Supports many file formats.
CON: No search engine; expensive.
VALUE: Most useful for Outlook users collecting disparate info.
 Street price: \$179
Giage
 513/562-8700
 www.webspace.com

PRODUCT INFO NO. 718

From 20 to 200 servers, only a scalable Power Array™ gets reliability done *right*

APC Symmetra® Power Array™: N+1 redundancy for 100% uptime

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Installing or reconfiguring your modular Power Array couldn't be any simpler.



"Not having a Symmetra in place would have resulted in lost data, corrupted hard drives and lost time to recover. The Symmetra system has more than paid for itself during this one outage."

– Bob Lesher and Charlie Bise, Information Technology, Exel Logistics

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APC Symmetra® Power Array™ was recently granted US Patent No. 5,982,652.

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Legendary Reliability™

Applica, Buddy Make Two PCs out of One

PC SHARING

WISH YOU HAD a second PC for your home or office but don't want to spend a lot of money? The **Applica Multimedia** and Vega Technologies' **Buddy B-210A** offer users on tight budgets the next best thing to another desktop system. Both products allow you to connect a second monitor, keyboard, and mouse to your existing Windows 95 or 98 PC so two users can share applications, files, printers, a modem, and a single Internet connection.

The \$249 Applica Multimedia and the \$169 Buddy use the same core technology (Vega licenses it from Applica), but they have slightly different features. Both come with add-in PCI cards, which provide graphics support and connections. Applica's package also includes a sound chip for shared system audio. To install the Applica, you plug a



MY BUDDY: The B-210A uses standard network cabling and a small "Buddy" box to support connections up to 50 feet away.

microphone and a second monitor, mouse, keyboard, and speaker set directly into the back of the card. (A 25-foot extender cable is available from the vendor for an additional \$30). With the Buddy, you plug one end of the included 50-foot Category 5 network cable into the card and the other end into a small "Buddy" box, which also accepts connections from the second monitor, keyboard, and mouse. The product does not support sound, though.

RECOMMENDED RAM

APPLICA ADVISES you to use at least a Pentium II-300 system with the Multimedia; Vega says the Buddy will work with a Pentium-133 PC. Both vendors' RAM recommendations vary depending on the operating system you use. I tested both on a PII-333-based system equipped with 96MB of RAM. Installation was a breeze; I had each product up and running in about 15 minutes. After installing the drivers and support software, I created a second user profile in Windows (a simple process that requires filling in a pop-

up menu at start-up). I could then access all the applications on the main system. To use my browser, I simply changed a setting so that it connected to the Internet via a LAN instead of dialing my ISP.

Even after you factor in the cost of the extra hardware, both the Applica Multimedia and the Buddy B-210A deliver a second PC at minimal cost, and without forcing you to manage the chore of setting up a new operating system and applications. As its audio support suggests, Applica's entry is focused at gamers. And by the time you read this, Applica expects to ship a new version with enhanced graphics and sound—for \$50 less. For small business, however,

PocketMail for Palms

GOT A PALM in your pocket—and want to check your e-mail over the telephone? PocketScience, whose PocketMail service works with devices such as Sharp's Tel-Mail TM-20 and JVC's HC-E100, has developed a \$99 device that extends the \$10-a-month service to Palms. Basically a modem with an acoustic coupler, the **PocketMail BackFlip** snaps onto the docking port of any Palm handheld—from the Palm Professional/IBM WorkPad to the Palm VII. Just dial up the service (a toll-free number in the United States), push the speaker and microphone at the rear of the BackFlip against the phone receiver, push a button, and in seconds your mail is on its way. You can configure your PocketMail account to retrieve and forward mail from your other POP3 e-mail accounts, and the unit's background-noise cancellation technology lets it work in loud environments. PocketScience will have a tough time getting this one back from me! PocketScience; www.pocketscience.com; 800/390-5036.

PRODUCT INFO NO. 670

—Andrew Brandt

the Buddy's lower price, long connection cable, and easy setup make it a better choice.

—Stan Miastkowski ▶

Applica Multimedia

PRO: Provides audio support.

CON: Extender cables cost extra (\$30 for a 25-foot length).

VALUE: Great choice for gamers.

Street price: \$249

Applica

800/487-2243

www.applica.com

PRODUCT INFO NO. 668

Buddy B-210A

PRO: Easy connection at distances up to 50 feet from main PC.

CON: No audio support.

VALUE: Better fit than the Applica for small businesses.

Street price: \$169

Vega Technologies

888/654-5415

www.vegatechnologies.com

PRODUCT INFO NO. 669



SOUND DECISION: Applica Multimedia supports sound and connects equipment up to 25 feet away from the main PC.

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40	\$ 133	\$ 175	\$ 213	\$ 253	\$ 298
45	\$ 190	\$ 243	\$ 290	\$ 348	\$ 418
50	\$ 255	\$ 320	\$ 428	\$ 495	\$ 643
55	\$ 360	\$ 418	\$ 585	\$ 1,280	\$ 2,618
60	\$ 503	\$ 608	\$ 880	\$ 4,313	\$ 4,313
65	\$ 818	\$ 983	\$ 1,970	\$ 5,400	\$ 5,400
70	\$1,363	\$ 2,010	\$ 3,820	\$ 7,055	\$ 7,055
75	\$2,613	\$ 5,158	\$ 6,840	\$ 9,500	\$14,613

Male Premiums

Age	10 YEAR	15 YEAR	20 YEAR	25 YEAR	30 YEAR
35	\$ 115	\$ 143	\$ 183	\$ 243	\$ 290
40	\$ 145	\$ 193	\$ 258	\$ 340	\$ 410
45	\$ 210	\$ 305	\$ 385	\$ 480	\$ 578
50	\$ 330	\$ 495	\$ 600	\$ 730	\$ 1,193
55	\$ 500	\$ 695	\$ 825	\$ 1,910	\$ 3,333
60	\$ 783	\$ 1,123	\$ 1,265	\$ 5,023	\$ 5,023
65	\$1,330	\$ 1,790	\$ 3,130	\$ 6,470	\$ 6,470
70	\$2,435	\$ 3,658	\$ 5,370	\$ 8,518	\$ 8,518
75	\$4,105	\$ 8,100	\$ 8,100	\$11,323	\$20,488

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AD CODE: PCW 05/00

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New IntelliMouse: Mousing Without Grousing

INPUT DEVICE

WHEN MICROSOFT'S IntelliMouse Explorer appeared last fall (see November 1999 *New Products*, www.pcworld.com/nov99/intellimouse), I praised its groundbreaking optical tracking technology—which replaced the traditional rolling mouse ball—but criticized its righties-only design. Microsoft has fixed that problem and improved overall functionality. The \$55 IntelliMouse Optical

IntelliMouse Optical

PRO: Ambidextrous, no moving parts, can be used on any surface.

CON: Uses 29MB of hard disk space.

VALUE: Exceptional comfort and convenience for lefties and righties.

List price: \$55

Microsoft

800/426-9400

www.microsoft.com/mouse

PRODUCT INFO NO. 665

costs \$20 less than the Explorer, seems sturdier, and is ambidextrous.

Like its predecessor, the IntelliMouse Optical has no moving parts. As a result, it can maneuver easily without requiring periodic cleaning or a mouse pad. An eye on the underside captures 1500 images per second of any surface the mouse rests on. The IntelliMouse Optical connects to either a USB port (Windows 98 and later) or a PS/2 port.

The mouse's ingenious scroll shape, with left and right buttons and a middle scroll



SMOOTHIE: The IntelliMouse Optical has no moving parts.

wheel/button, comfortably accommodates either hand. You can program all five buttons (two on either side of the mouse plus the scroll button) to perform mouse or navigational functions (like double-clicking or moving forward and

back). The Optical demands 29MB of hard disk space versus less than 2MB for Logitech's customizable Mouseman+. But most people can spare the space—and this state-of-the-art input device certainly repays the sacrifice.

—Michael S. Lasky

A Keyboard That Pushes the Right Buttons

MICROSOFT'S \$55 *Internet Keyboard Pro* adds 19 hot keys and two USB ports to a traditional flat 104-key keyboard. Some extra keys control Web browser navigation buttons; others work with your CD player; and two are programmable to open a specified app or document. The Mail key works with almost all POP3 and corporate e-mail programs (including Lotus Notes). Touch-typing was effortless, and the USB ports reduce cable tangling by letting you relocate some hookups away from the PC. I had to look down from the screen to find the right browser navigation buttons, though I liked the CD player controls. The IntelliType software takes up 35MB, but in the age of massive hard drives, that's tolerable. Microsoft; 800/426-9400; www.microsoft.com.

PRODUCT INFO NO. 667

—Michael S. Lasky

HP's Pricy Internet Fax/E-Mail Machine

FAX/E-MAIL

SOME PEOPLE like to receive business documents through e-mail. Others prefer faxes. If you want to distribute paper documents electronically, the HP Digital Sender 8100C lets you cater to both types—without a PC. If you connect the Sender to a corporate network with access to Internet e-mail and fax services, you can scan paper documents and distribute the images as e-mail attachments or faxes. But this fax machine look-alike costs \$1299, and for that money you could buy a serviceable PC and a scanner.

The Digital Sender is easy to

use. Choose a delivery mode (e-mail attachment or fax) by pressing a button; then use the device's keyboard to type in the recipient's fax number or e-mail address, or pick from an internal address book that holds up to 200,000 entries. Insert the document into the attached automatic document feeder, or place it on the scan bed. Select the document type (black-and-white, color document, or photo), and hit send. The Digital Sender can print to some HP network printers, too. High-volume corporate users will appreciate the Digital Sender's 25-page capacity

and its ability to accept double-sided and legal documents.

Setup is straightforward, but the LCD panel lacks backlighting, so you may have to squint. Touch typists won't like how the Sender's keyboard repositions many non-QWERTY keys. Output from the Digital Sender's scanner matches that from a typical \$100 scanner, but you can't crop the Digital Sender's images. Last, if you choose to e-mail your image as a PDF or TIFF file attached to an e-mail, you can't add a personalized message.

Busy medium-size and large offices that need instant docu-

ment delivery by e-mail and fax and like the flexibility of a stand-alone device may find the Digital Sender worth buying. But most people will be better served by investing their money in a PC and scanner.

—Kalai Murugesan ►

HP Digital Sender 8100C

PRO: Networked, PC-free e-mail/fax machine scans paper documents and sends high-quality images.

CON: Expensive, can't crop images, hard-to-read LCD control panel.

VALUE: Might work for fairly large offices with heavy fax/e-mail traffic.

List price: \$1299

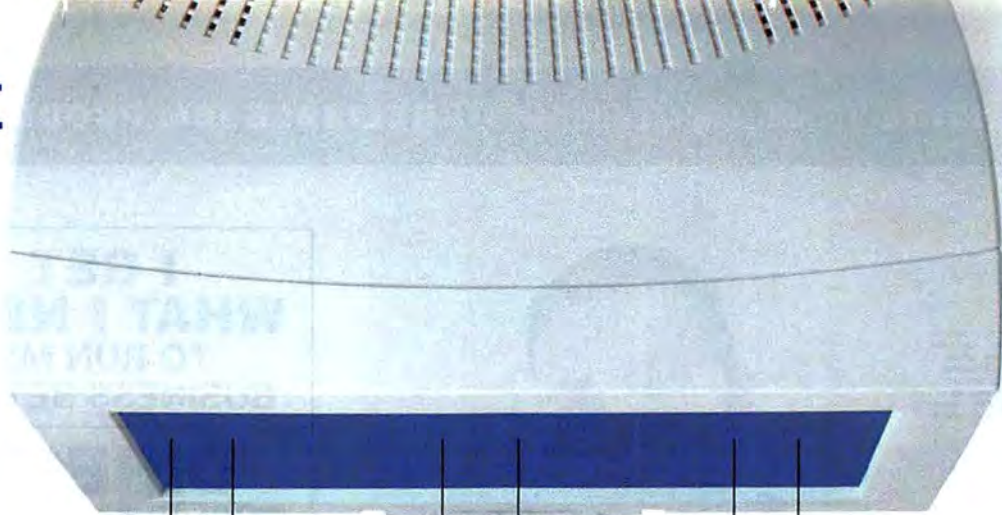
Hewlett-Packard

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www.digitalsender.hp.com

PRODUCT INFO NO. 666

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Inetcam Delivers High-Quality Web Video

WEBCAM

IF YOU WANT to broadcast first-rate, live video from your Web site, try Inetcam's **VTS 8500 Color Video Transmission System**. At \$430, it costs more than most Webcams, but it also includes a second camera, packs more features, and produces better-looking video.

VTS 8500 Color Video Transmission System

PRO: Great image quality, extensive broadcasting controls.

CON: Expensive, software takes time to master.

VALUE: Top-quality color Webcam kit justifies its premium price.

Street price: \$430

Inetcam

858/558-7200

www.inetcam.com

PRODUCT INFO NO. 663



The VTS 8500 acts as a self-contained system for sending full-color live video

over the Net on a Windows 95/98, NT, or 2000 PC. It includes software, cabling, two analog color cameras, a video switcher that supports four cameras, and a power supply for the switcher. You must supply the video capture device. Inexpensive Webcams perform poorly at distances beyond 30 feet, but Inetcam claims its Webcam will deliver good-quality



DOUBLE VISION: Inetcam's color Web video system has two cameras.

video to the host PC across hundreds of feet of cable.

I tested the VTS 8500 on a P-200 system with 64MB of RAM, using an ATI All-in-Wonder graphics card as the video capture device. I put the two cue ball-size cameras on their stands, mounted them to the switcher via the included 10-foot-long category-5 cables, and linked the switcher to the PC's ser-

ial port and the ATI card's video-in port. The switcher software handled the cameras; a video-streaming app set up the Web broadcast. Inetcam offers ample guidance, but the software features took time to figure out.

You may broadcast on your own Web site, using the video-streaming software, or let Inetcam's site host your videocast. Visitors can view your video stream in any Java-enabled browser—and people who use Java-less browsers can see it as a series of JPEG stills.

My cousin in New Jersey marveled at the excellent quality of the images I transmitted from my California home with the VTS 8500. This system is well worth its price for anyone who wants to transmit high-grade video over the Internet.

—Richard Jantz

Camera Has MicroDrive, Maxi Storage

DIGITAL CAMERA

BIG CAMERA, big storage, high resolution, hefty price: The only petite attribute of Casio's \$999 **QV-3000EX 3.34 True Megapixel** digital camera is its removable IBM MicroDrive—a 340MB hard drive the size of a matchbook. That's enough room to save 245 images at this innovative 3.34-megapixel camera's top resolution of 2048 by 1536. Alternatively, you can use the unit to capture scores of 30-second AVI video clips at 320 by 240 resolution—or some combination of still shots and video. Unfortunately, there's no micro-

phone for recording audio.

The camera has a high-speed (f2.0), razor-sharp Canon 3X zoom lens (which you can increase to 6X, with the electronic zoom activated). The QV-3000EX runs on a set of four rechargeable nickel-metal hydride AA batteries but the energy-hogging MicroDrive can exhaust them in as little as an hour, so be sure to keep a spare quartet of batteries on hand.

The QV-3000EX's long list of modes and features will especially appeal to power users. You can fine-tune image quality and appearance, shoot panoramas,

take time exposures in low light, and capture portraits with soft backgrounds. The camera's best feature may be a bundled software application: Casio's Photo Loader automatically launches and downloads all images when the camera is attached to the IBM MicroDrive adapter or to a USB port.

The QV-3000EX yields excellent images. Colors look pleasing—strong rather than realistic—and images come out sharp and well defined. This complex camera may overwhelm novices and will force even experienced users to do some learning. But the

great-looking images it produces and the MicroDrive's huge storage capacity (which alone commands a street price of \$399) make it an excellent value for serious photographers.

—Daniel Grotta

QV-3000EX 3.34 True Megapixel

PRO: Feature-rich, high-resolution camera; drive can store scores of high-quality images.

CONS: Awkward, bulky design; complex controls.

VALUE: Fair price for excellent performance and features.

Street price: \$999

Casio

800/962-2756

www.casiohpc.com

PRODUCT INFO NO. 664

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*Internet access charges may apply. ¹Price shown is for the HomePage Creator Basic Plan. Other plans and prices may vary. Offer expires 6/30/00. ²MHz denotes microprocessor internal clock speed; other factors may affect 80% of maximum performance mode. ³GB means one billion bytes when referring to hard drive capacity. Accessible capacity may vary. ⁴Variable read rate. Actual playback speed will vary and is often less than the maximum. ⁵Currently limit maximum download speeds to about 53Kbps. Actual speeds depend on many factors and are often less than the maximum possible. Some software may differ from its retail version (if available), and may not include all features. ⁶Memory Upgrade Part #76H0294, USB Hub Part #00N8215; ThinkPad Model #2644-5AU, UltraSlimBay Drive Part #05K9122, Memory Upgrade Part #20L0241, UltraBase Part #05K5340; ThinkPad Model #2645-4EU, Memory Upgrade Part #33L5019, IDE Drive Part #33L5001, PC 300 Model #6564-R3U, Monitor Model #65470AN, IDE Drive Part #00N9967, 4-pk Media Part #00N9967, Flatbed Scanner Part #10K3596; PC 300 Model #6564-P2U, Monitor Model #65470AN, without notice. ⁷SuccessLease is offered and administered in the US and Canada by third-party providers of business financing who are approved by IBM Global Financing. All SuccessLease terms and conditions are provided in the SuccessLease agreement. ⁸Payment due at lease signing. All taxes are additional. Other terms and financing structures are available. Offer may be withdrawn or changed without notice. Options must be leased with system unit. ⁹Includes battery, weight and shipping. ¹⁰Out notice. SuccessLease and all product names are registered trademarks or trademarks of International Business Machines Corporation. Intel, the Intel Inside logo and Pentium are registered trademarks and Celeron and i are trademarks or service marks of others. ©2000 IBM Corp. All rights reserved.



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application performance. For Intel Mobile Pentium III processors featuring SpeedStep™ technology, this denotes maximum performance mode; battery optimization mode is approximately 1/3 the performance of maximum performance mode. *These modems are designed to be capable of receiving data up to 56Kbps from a compatible service provider, and transmitting data at up to 31.2Kbps. Public networks currently do not support these speeds. **Prices shown are prices available from IBM directly; reseller prices may vary for ThinkPad Model #2621-542, Carrying Case Part #33L3850, Memory Upgrade Part #20L0254, SelectaBase Part #12J2467, Battery Part #12J2464; PC 300 Model #6563-88U, Monitor Model #65470AN, Memory Upgrade Part #33L3136, IDE Drive Part #1#65470AN, Memory Upgrade Part #33L3137, IDE Tape Drive Part #20L0549, Back-up Power Supply Part #09N3855. IBM price does not include tax or shipping and is subject to change without prior notice. Amount of monthly payments based on 36-month term, full payout lease, to qualified business customers installing in the US. A documentation fee and first month's payment may vary due to vendor components, manufacturing process and options. †Weight and thickness may vary due to vendor components, manufacturing process and options. ‡Available while this offer without prior notice. Offer expires May 31, 2000. All products ship with an operating system. IBM reserves the right to alter product offerings and specifications at any time, without prior notice. SpeedStep are trademarks of Intel Corporation. Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. Other company, product and service names may vary.

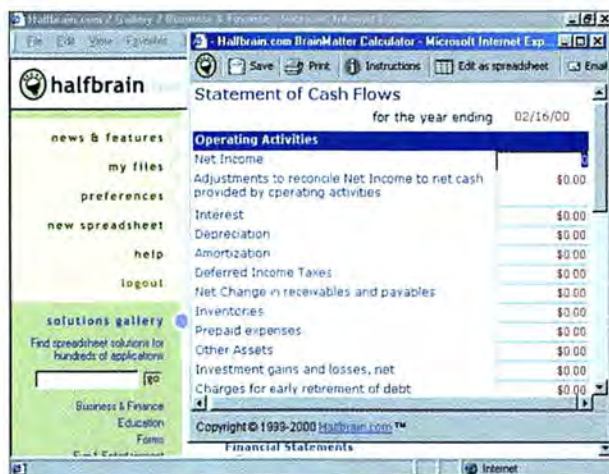
Calculating Web Sites Let You Go Figure

WEB-BASED APPS

IF YOU TRAVEL a lot and need to use a spreadsheet or database at different work sites, you now have a choice: You can lug around a notebook containing your apps and data files—or you can travel light, find a PC with an up-to-date browser, and use the free online tools offered by Halfbrain.com and Bitlocker.

These ad-supported Web sites offer free spreadsheets and databases, respectively, to anyone with a 4.0 (or later) version of Netscape or Internet Explorer. Granted, they aren't open-ended programming environments like Microsoft Excel and Access, but they do offer functionality that would cost hundreds of dollars in a shrink-wrapped application package.

Preconfigured templates range from quickie calculators and list generators to robust business tools. For example, Halfbrain.com's BrainMatter spreadsheet contains hundreds of preconfigured worksheets in mainstream business categories—profit-and-loss statements, budgets, and other financial reports; business forms (for example, purchase orders and expense



WHO NEEDS EXCEL? Halfbrain.com's BrainMatter isn't for macro maniacs, but this Web-based spreadsheet may be all you need.

reports); and human-resource tools like timesheets and employee reviews. These worksheets contain most popular (and some exotic) spreadsheet functions, packaged in an interface so similar to Excel that you can skip training time.

EXCEL 2000 SUPPORT ONLY

HALFBRAIN'S SINGLE sheets (no workbooks) were chosen to satisfy the needs of spreadsheet users, not hard-core macro slingers. But you can customize BrainMatter to your heart's content or upload your own Excel 2000 data and formulas (you must save them to

HTML format first). You get unlimited on-site storage, too.

Database design is a bigger challenge, and Bitlocker's inventory of preconfigured databases is less impressive than Halfbrain's spreadsheet offerings. But you'll find templates for business contact management, inventory and pricing data, employee evaluations, and meeting or product schedules. The site also maintains consumer-oriented address books, photo albums, recipe and gift lists, and templates for tracking music, wine, or Beanie Baby collections. Like BrainMatter's, Bitlocker's templates are easy to customize, and you can build your own database from scratch or import data in comma- or tab-delimited format. One quibble: Between the navigational bars and the banner ad, the workspace is a bit cramped.

Bitlocker sets aside 25MB of storage space for your files. Meanwhile, an ad-free, \$100-a-year premium service gives you 100MB of storage space

WordPerfect Office 2000 Has Accounting

THE FIRST major office suite to incorporate an entire accounting program (Peachtree Accounting's First Accounting) is Corel's **WordPerfect Office 2000 Small Business Edition**. Suitable for firms with five employees or less, First Accounting lets you invoice customers, pay supplier bills, and do payroll and inventory tracking.

Regrettably, First Accounting isn't well integrated with its suitemates. For example, you get tools to set up a Web storefront, but you can't import online orders because the program doesn't let you track sales orders.

Still, at \$449 for new users, the suite costs 10 percent less than Microsoft's Office 2000, which has no accounting program. And the \$159 price for upgraders runs just \$89 more than for First Accounting alone. Corel; www.corel.com; 800/772-6735.

PRODUCT INFO NO. 671

—Richard Morochove

and priority customer support.

Even on a dial-up connection, both sites are zippy. In fact, Halfbrain.com is exceptionally fast, thanks to its use of Dynamic HTML. Both resources pledge to protect your data and promise not to hassle you with marketing pitches unless you permit it. If you're not used to performing routine business tasks online, leaving your desktop package may be unwise. But for easy access to basic spreadsheets or databases wherever you go—and insurance against software obsolescence—these free office apps are worth a try.

—Mike Hogen

BrainMatter

PRO: Offers fast, free spreadsheets through any current Web browser.

CON: Imports and exports files in Excel 2000 HTML format only.

VALUE: Great for itinerant spreadsheet users or a quick calculation.

Free

Halfbrain.com

415/576-9500

www.halfbrain.com

Bitlocker

PRO: Good, free collection of small-business and consumer databases.

CON: Small on-screen workspace, banner ad at top of screen.

VALUE: Works best if you can use one of the prebuilt databases.

Free

Bitlocker

650/330-1350

www.bitlocker.com

Still Snappy After All These Years

IMAGE CAPTURE

IN A WORLD of gadgets that deliver less than they promise, Snappy has long been a refreshing exception. The latest edition of this cell phone-size mechanism for capturing still images from video continues the tradition: It's handier and more versatile than ever.

Like earlier versions, **Snappy 4** screws into your PC's printer port and works with input from a camcorder, VCR, or DVD player. The device generates great-looking stills in 17 file formats (10 of them previously unavailable to Snappy



GRAB THAT PUPPY: Snappy creates instant, high-resolution digital images from many video sources.

users), making a huge range of additional graphics and image-editing apps accessible to it. Image cropping is easier, and a new rotation feature lets you correct for tilted images. A new slider bar lets you preview

your images at different compression ratios; that's handy if you intend to post captured photos on the Web or e-mail them to others.

The new version includes

Snap Pad, a display that resembles a film strip and archives thumbnails of all your snapped images; and Play Performer, a utility that lets you turn your snapped images into a self-running show replete

with video-like transitions (wipes and fades, for example), titles, and canned music.

If you're a satisfied owner of a previous release, you needn't upgrade to Snappy 4, but the new version does make a good product even better.

—Stan Miastkowski

Snappy 4

PRO: A breeze to use; excellent-quality output.

CON: Nothing major.

VALUE: Delivers more than it promises at a fair price.

Street price: \$170

Play

800/306-7529

www.play.com

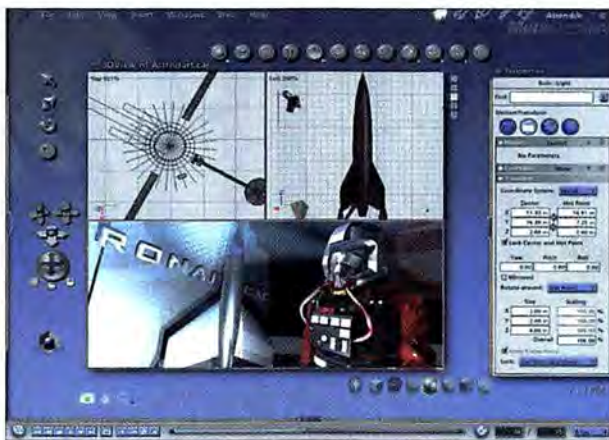
PRODUCT INFO NO. 672

3D Modeling Muscle With MetaCreations

GRAPHICS

NAMED AFTER Michelangelo's favorite marble quarry, MetaCreations' \$399 **Carrara** is billed as the "complete" 3D modeling tool for artists and designers. Inspired by its siblings Ray Dream and Infini-D, Carrara collects more than 600 impressive features inside a stylish interface. It will gratify picky pros and hobbyists, but may daunt novices.

Carrara's interface resem-



FLOW OR FLOUNDER: Carrara's five-room interface provides many spectacular 3D modeling effects, if you take the time to learn them.

bles that of MetaCreations' Bryce landscape creation software: Icons glow when activated, navigation knobs allow fluid maneuvers through 3D scenes, and preview screens let you accelerate work on special effects. Trays slide out from the sides of the screen to reveal animation controls.

property settings, or libraries of preset objects and effects.

Different stages of model production occur in five separate rooms (Assemble, Model, Storyboard, Texture, and Render), each one equipped with suitable tools and effects. The Model room, for example, makes available six model-

making modes for shaping organic forms, creating models from math formulas, turning TrueType fonts into 3D logos, or sculpting fantasy landscapes. The only thing missing: a Drop Object command to help ensure that your models rest on the ground.

Carrara mimics real-world nuances beautifully, distorting a rubber ball as it bounces off a wall or straightening an arm when you tug on a character's hand. Optical and atmospheric effects (such as blurring fast-moving objects or simulating dusty beams of light) are equally cool. And unlike most 3D apps, Carrara renders these effects lickety-split.

Carrara imports and exports images and models in most popular 2D and 3D formats, including JPEG, GIF, AVI, QuickTime, VRML (1 and 2), and MetaCreations' MetaStream format. For the tools it delivers, Carrara is a bargain.

—John Goddard ■

MetaCreations Carrara

PRO: Rapid rendering, extensive 3D effects, fair price.

CON: Not for novices.

VALUE: First-rate professional 3D modeling package for print, video, and the Web.

Street price: \$399

MetaCreations

800/846-0111

www.metacreations.com

PRODUCT INFO NO. 673



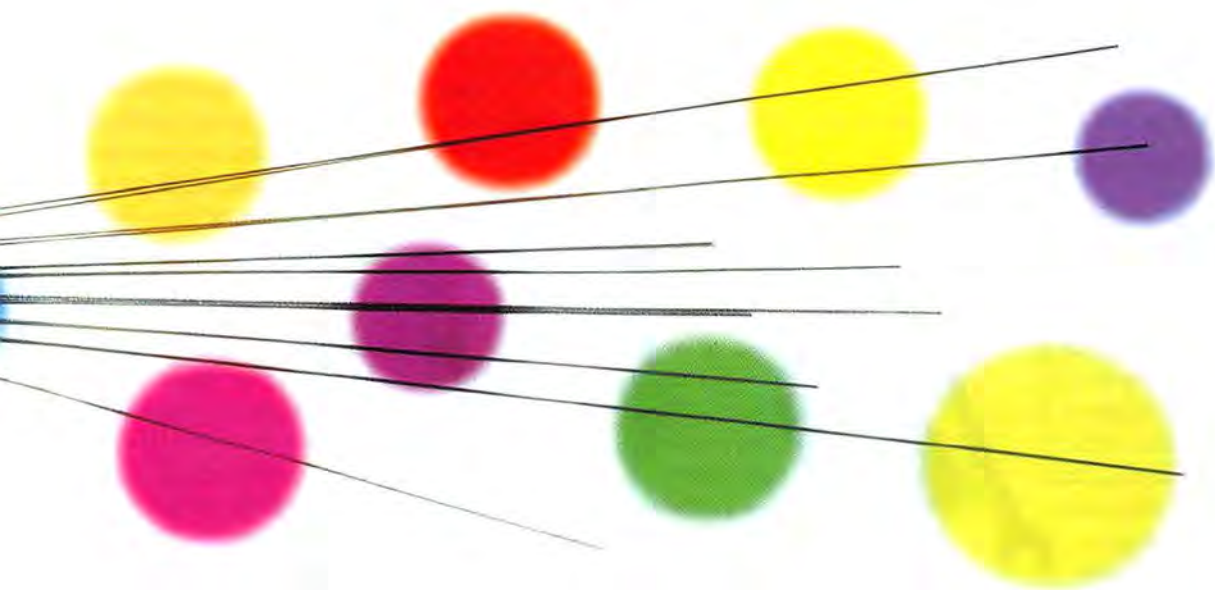
You've heard mixed reviews of cable modems and DSL.
We're here to tell you that once you get broadband
up and running, you'll never go back to analog again.



BROADBAND

By Rick Overton

ACCORDING TO AESOP, the slow and steady tortoise beats the fast and flighty hare. But wouldn't it be great if that dang rabbit hunkered down and delivered on its promise? That's what consumers hope will happen in the world of high-bandwidth Internet access. Folks at home who want a fast connection to the Net must choose from a bewildering array of broadband technologies, among them ISDN, cable modem, and an alphabet soup of DSL varieties, including ADSL, SDSL, and G.Lite. But for people with money to burn, new superfast technologies make huge promises that sound awfully enticing.



OR BUST

Last November, researchers at the University of Washington and engineers at Microsoft figured out how to move data at 2.4 gigabits per second (a gigabit is one billion bits) over an Internet-style network. That same month, designers at Lucent Technologies' Bell Labs developed an optical networking technology that transfers data at more than 1.6 terabits per second (a terabit is one trillion bits). That's over 25 million times faster than a 56-kbps modem—or about half the speed of Superman.

Meanwhile, most of us still live with

tortoise-like analog modem speeds. Achieving state-of-the-art bandwidth velocity at home means paying for cable modem service or DSL (G.Lite, a technology that might make DSL easier to install, has not yet been deployed). These two early broadband leaders promise that for about \$50 a month you can hit the Web at data transfer rates up to 1.5 mbps (1500 kbps). Both remain connected to the Internet full-time, so you need never wait while your PC dials up an ISP. Both are available in densely populated areas and are

creeping into the countryside.

But as the hype about speed builds up, users' broadband experiences don't always keep pace. People who can buy the services in their vicinity—and many still can't—may survive a traumatic installation only to discover that they've bought a fast portal onto a slow Internet.

We took a long look at the state of high-speed access, and the results surprised us. Road

bumps notwithstanding, most cable modem and DSL users seem delighted with the connection. In a survey of nearly 2500 *PC World* readers, we discovered that most broadband users give these services the thumbs up (see "Happy High-Speed Customers," page 104). "I think [cable modems are] the greatest thing since sliced bread," says John Sly, a governmental employee in Boca Raton, Florida. To separate truth from fantasy, we take a systematic look at broadband installation, cost, speed, security, and availability. ►

INSTALLATION

IT WILL BE A great day for Web surfers when they can just plug their computer into the wall and get the Internet instantly, as if it were National Public Radio on their stereo. But at this point we're nowhere near that kind of plug-and-play simplicity.

In the case of cable modems and DSL, different companies supply different parts of the service. The wire comes from your cable provider or phone company, and choices are limited to those in your area. Analog modems sell in stores; you just plug them in and go.

But installing DSL or cable entails a visit from a technician. (Some providers, such as US West, mail you the equipment and walk you through installation over the phone.)

Once you're connected, an ISP supplies the Internet services—maintaining your e-mail address, news server access, and IP address. Your phone or cable company may offer to serve as your ISP, and with DSL you can also choose from other providers. For now, cable companies still require you to use them as your ISP, but that may change (for example, AOL



claims it will open its cable lines to other ISPs). Moving to broadband may sound daunting, and the past is littered with grim horror stories (see February's "Broadband Blues," www.pcworld.com/feb00/broadband), but that situa-

tion is changing rapidly. Typically you can get started with cable modem or DSL service sooner than you might think. In our reader survey, 80 percent of cable modem users were promised installation within two weeks—and the same percentage had their broadband access up and running within that time frame. DSL services were a bit tardier: Only 60 percent of DSL customers were assured of installation in under two weeks, and about 54 percent got it that quickly. Even so, few of the readers we surveyed waited longer than a month to get hooked up.

PLEASE HOLD

WHAT'S THE holdup for people who do have to wait? For starters, most providers ship you the equipment, and you must arrange with the installation technician to get it set up, if you don't do it yourself. Network engineers then add hardware to the phone company's network hub to accommodate the new signal.

DSL uses the phone line that runs from the telephone pole to your house. Inside your home, it travels via wiring that connects to an existing or newly installed phone jack. Cable modem service comes into your house the same way cable TV does—through a coaxial cable. If your computer is in the same room with a cable-connected TV, a technician will add a splitter in that room to provide two lines and will put a filter in the line for the TV. Either you or a technician will need to install an ethernet card inside your PC (if it doesn't already come with one). Finally, a cable runs from the wall to an external modem, and then an ethernet cable spans the last few inches or feet from the modem to the ethernet card within your PC. (Some newer PCs are equipped with internal DSL modems, eliminating the need for an external box.)

COST

ANY DISCUSSION ABOUT the cost of fast home Internet access must start with a look at your current phone bill. Most folks with a family or a home business figured out long ago that tying up the phone line with an AOL connection makes it hard to call out for pizza.

As a result, many people who wanted to be connected shelled out between \$15 and \$30 per month for a second phone line. Add that to the monthly cost of an ISP (typically about \$20 per month for unlimited access but potentially higher), and millions of Americans could be paying \$50 or more each month for poky 56-kbps dial-up Internet access.

Cable modem and DSL services were pricey a few years ago when they were introduced, but competition between the two technologies has driven the cost down to levels approaching that of a second ana-



log phone line. Bruce Steidel, director of a major paper manufacturer in Princeton Junction, New Jersey, buys cable service from Comcast and uses AT&T@Home as his ISP; for the combined service, he pays \$40 to \$45 a month. Closer to home—my home, that is—I buy 284-kbps DSL service from my local telephone company, US West. My connection costs \$30 a month, and US West offered to sell me ISP services for an additional \$13. But I figure that the phone company already gets enough of my money, so I pay \$20 monthly for ISP service from

Micron.net, bringing my total monthly high-speed bill to \$50. And because voice traffic and high-speed data can share the same wire (the phone line uses a much lower frequency) my local phone line is

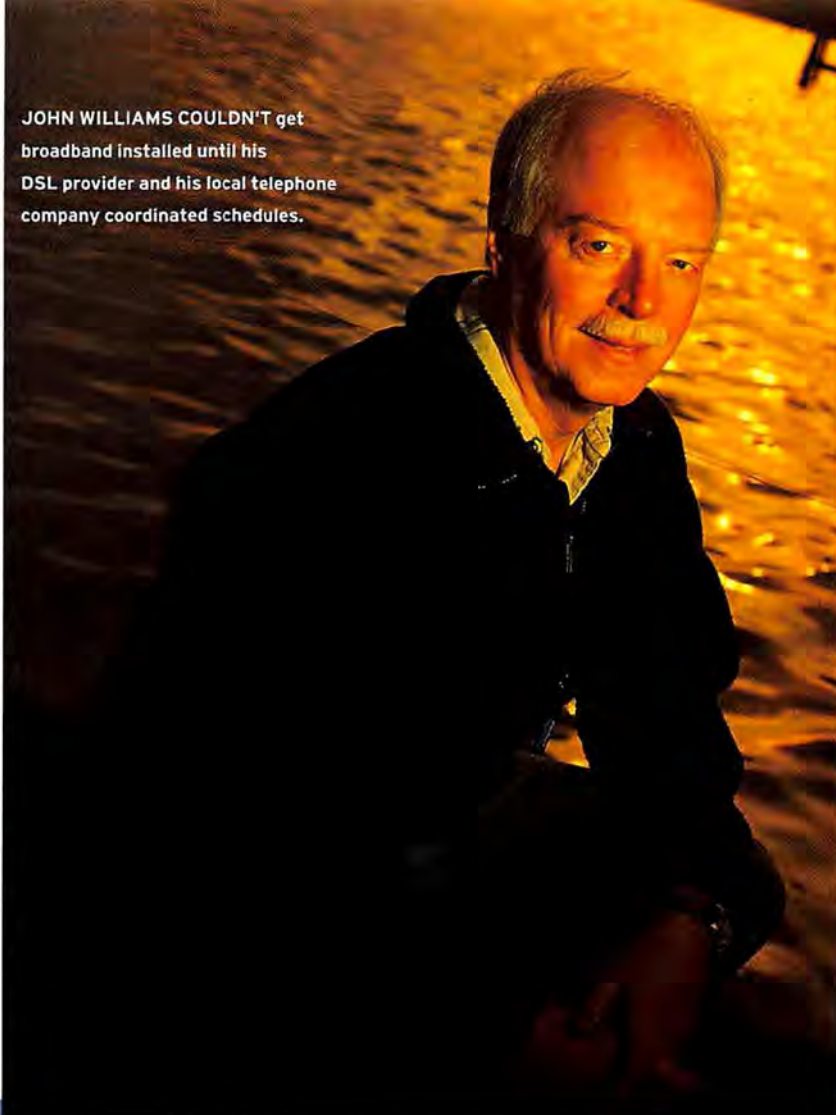
Happy High-Speed Customers

A WHOPPING 2445 broadband users responded to our online survey, and most gave their service high marks overall. Users were happy with the speed and reliability of their cable modem or DSL service, though DSL rated higher in both categories. Even so, both cable modem and DSL companies earned middling marks for support—and DSL users waited longer for installation. See highlights of our results at right.

It may sound straightforward, but not every customer experiences a smooth installation. John Williams, an engineer in Severna Park, Maryland, signed up for DSL service from Covad and Toadnet, his dial-up ISP, in November 1999. He ran into trouble, he says, because Covad relied on Bell Atlantic (a DSL competitor) to participate in the installation, and the Bell Atlantic technicians kept missing appointments. "It became obvious that the local phone company was stalling. If I were the phone company I would be pushing [DSL]," he said, "but [big companies] are hard to change." Ultimately, Williams got his connection, but only after several phone calls and false starts.

One hope for the future is over-the-counter DSL and cable modem kits, available from select major retailers across the nation. Though they supposedly permit do-it-yourself installation, these kits aren't quite up to par yet. There are myriad slightly different versions of both technologies, and many of the kits work only with a specific provider in a particular geographical area. To see for ourselves, we tested a DSL kit—and ran into nothing but trouble (see "DSL From Hell," www.pcworld.com/feb00/dsl_hell).

JOHN WILLIAMS COULDN'T get broadband installed until his DSL provider and his local telephone company coordinated schedules.



included in the price I pay for DSL. Cable companies can offer customers discounts on cable service as an incentive to sign up, but so far they can't give you a dial tone.

The price you pay depends on such fac-

tors as the speed of the package you buy. Most companies have set-price deals that allow you to receive data at one transfer rate and to send data to the Net at a lower rate. (When this asymmetric arrangement

is applied to DSL, it's called ADSL. When you get symmetric speeds downstream and upstream, it's called SDSL.) John Williams buys SDSL service rated at a snappy 768 kbps from Covad in Maryland, but due to lack of competition he has to pay a premium. "I don't like the price," he says. "It's about \$99 a month, and it should be half of that. I have friends with cable modems in Florida paying less, but this is the price you pay when you deal with the local phone company." Lower-transfer-rate packages and ADSL service deals often cost much less. Covad, for example, charges \$59 per month for its basic home ADSL package but up to \$349 for its high-end, business-focused SDSL.

Besides paying for the service, you'll need to buy or rent additional hardware, since neither DSL nor cable modems come standard on most new PCs. Usually, the company that sells the service also supplies the modem. But because a ►

- Promised installation time (in weeks) for most cable modem and DSL subscribers: **2**
- Percentage of surveyed users who received cable modem/DSL service within the promised time: **80/54**
- Typical monthly cost for cable modem and DSL: **under \$50**
- Percentage who think their cable modem/DSL service is as fast as promised: **79/84**
- Percentage who think their cable modem/DSL service is as reliable as promised: **77/82**
- Percentage who think their cable modem/DSL service is as secure as promised: **78/88**
- Approximate percentage of cable modem and DSL users who experienced significant problems with their service, requiring assistance: **30**
- Average ranking (on a scale of 1 to 5, where 5 is best) by surveyed users of cable modem/DSL technical support: **3.35/3.46**
- Percentage of surveyed users satisfied overall with cable modem/DSL: **87/86**
- Percentage of U.S. households the Yankee Group predicts will have access to cable modem/DSL service by year's end: **41/24**

Survey conducted by Research Results in coordination with the PC World Research Department.

—Karen Silver

modem that works in one area with one provider may not work elsewhere with another, you'll have to swallow the cost of the hardware your service supplies.

DSL providers will probably sell you the modem because they're not eager to manage equipment leases. Cable companies, on the other hand, are accustomed to leasing equipment and may add the modem's lease rate to your monthly bill. Leasing a modem typically involves a lower up-front expense, but it can cost more in the long run. Martin Trisdorfer of Fairfax, Virginia, pays \$45 a month for cable modem access from Cox Communications—\$15 of it for the modem. In two years, he'll have spent hundreds of dollars on rental hardware.

Sticker shock hits home with the price

Comparing Broadband Costs: A Sample Selection

PROVIDER	Service type	Installation fee	Monthly broadband service ¹	Monthly ISP service	Equipment purchase	First month's cost ²	Continuing monthly cost ³
AT&T@Home	Cable	\$150 ⁴	\$40 ⁵	Included	Included	\$190	\$40
Charter Communications	Cable	\$30	\$50	Included	Included	\$80	\$50
Comcast	Cable	\$149	\$43	Included	\$299 ⁶	\$491	\$43
MediaOne RoadRunner	ADSL	\$50	\$45	Included	\$50	\$145	\$45
Pacific Bell	ADSL	n/a	\$49	Included	\$198	\$247	\$49
US West	ADSL	\$150 ⁷	\$20	\$18	\$245	\$433	\$38

¹ Rates are lower for current subscribers. ² Includes installation, monthly service, and equipment. ³ Charges may vary depending on your location; steep promotional discounts are common. ⁴ If no new cable outlet is needed, cost is \$100. ⁵ Service in a few select cities costs \$30. ⁶ Or you can lease a cable modem for \$7 per month. ⁷ Activation fee is \$69 if you perform the installation yourself.

SPEED

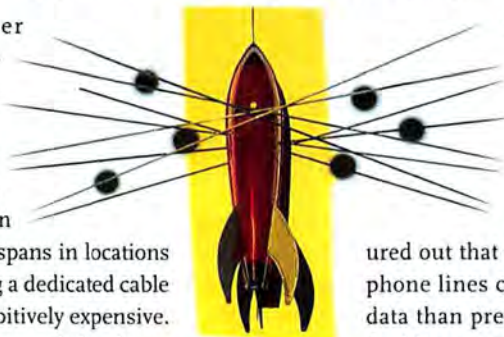
LET'S PUT THOSE home speeds in perspective by taking a glimpse at how corporations connect to the Internet. Starting at the top, most companies use T1 lines (rated at 1.5 mbps) or T3 lines (rated at up to 4.5 mbps), leased from the phone company at a cost of more

than \$1500 per month. Wireless networks currently rated at 11 mbps are another option, but they function

best over short spans in locations where installing a dedicated cable would be prohibitively expensive. They also require costly hardware and must be configured very precisely.

Satellite dishes work for people in rural areas or in places with no other service options, but they move data downstream only, so you must use your analog modem to upload. (Two-way dishes are expected by year's end.) Satellite service is expensive for businesses. Compare two deals from Hughes DirecPC: \$35 a month for 100 hours of single-user service versus \$110 for 200 hours of service with four e-mail accounts and four networked seats.

That leaves the simpler, more affordable options of DSL and cable modems as the best choice for small-business and home-based users. The technology underlying these is not especially complicated, but a look at how they developed will help clarify



fy how they differ in speed and performance.

DSL technology arose after telephony engineers figured

out that copper and fiber phone lines could carry more data than previously thought.

And because signals transmit-

ting the human voice move at a relatively low frequency, phone conversations occupy just a tiny fraction of the telephone network's total capacity. DSL technology is simply a way to send data at a very high frequency so that it doesn't interfere with voices traveling along the same physical line at a lower frequency.

Meanwhile, cable companies figured out something similar about their lines. The thick, black coaxial cables that bring C-SPAN and MTV into your television can simultaneously carry data to your PC. Since those wires are fatter than your phone line, you might expect that the cable companies would generate higher data transfer speeds than your local Baby Bell. But it's not that simple.

CABLE CAPACITY

UNFORTUNATELY, THE CABLE television infrastructure lines were designed to send data downstream only. You can send data upstream, but not as efficiently. Thus, when cable modem users upload something to the Net (e-mailing a photograph, for example), they're running at about half the speed of a download. That's only a problem for users who need exceptionally fast uploading: They should select a more specialized package such as SDSL. For the rest of us, cable modems are fine (and they upload just as quickly as ADSL).

The theoretical limits of their lines aside, cable modem and DSL providers restrict the amount of bandwidth they guarantee to each user. For this article, our San Francisco-based PC World Test Center subscribed to four DSL services, each with a different data transfer speed and price rate. From Covad Communications, we leased business ADSL rated at a maximum of 1.5 mbps downstream and 384 kbps upstream (for \$349 per month) and SDSL services rated at 1.1 mbps down- and upstream (also priced at \$349 per month). From Pacific Bell, we leased the mainstream Basic DSL service, rated at a maximum of 1.5 mbps downstream and 128 kbps upstream (for \$40 per month), and the high-end Enhanced DSL, which claims to provide service as speedy as 6 mbps downstream and 384 kbps upstream (for \$199 per month).

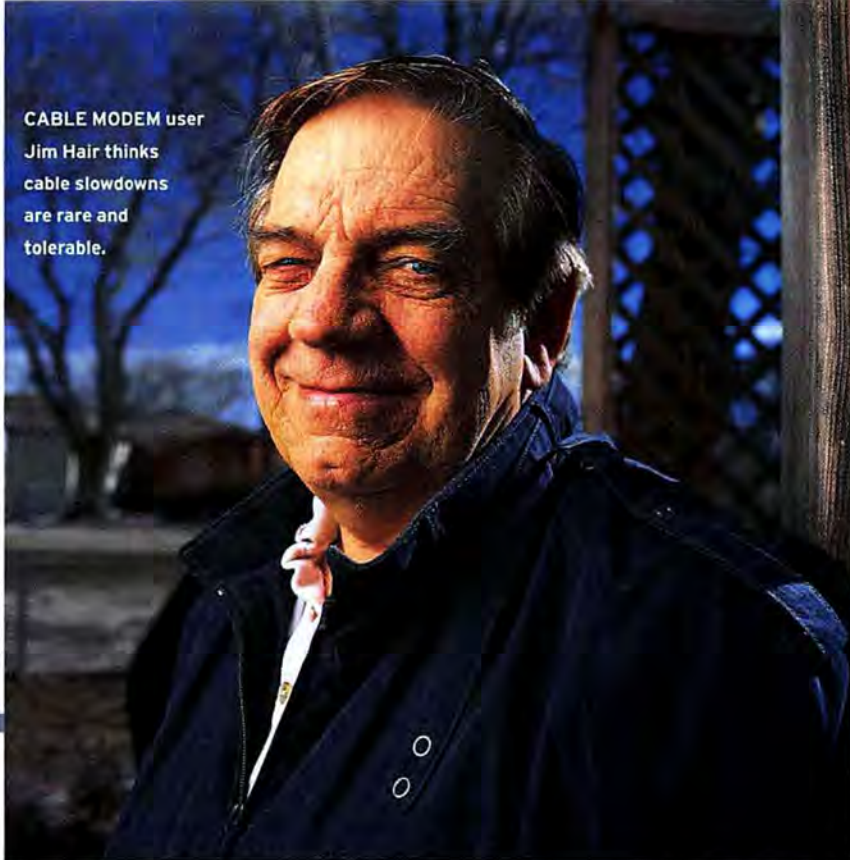
of installation: Expect to pay \$75 to \$150—and potentially much more—to cover a technician's house call, the cost of cables, processing fees, and a litany of teeny expenses that providers lump together under the vague heading of "installation." I got off cheap: US West provided me with a DSL router and installation for just under \$80, but I did the actual installing myself. (To minimize the price you pay, watch for promotional offers.)

Several companies now offer free DSL, but you have to put up with immobile, unshrinkable (and annoying) ads on your screen whenever you surf. For the dirt on free DSL, see our April report, "Beware of New No-Cost Broadband Options," www.pcworld.com/aproo/dsl.

SET UP FOR SPEED

BECAUSE OUR OFFICE building isn't wired for cable, we couldn't hook cable modem service up at our Test Center. So instead, one of our editors connected to AT&T@Home Cable from her residence in Santa Clara, a thoroughly wired town in the heart of Silicon Valley. The company wouldn't quote specific data transfer rates, but a technical support representative of the service estimated transfer speeds of 300 kbps downstream and 128 kbps upstream—not at all uncommon for an entry-level cable modem service—at a charge of \$40 per month. Another *PC World* editor connected to Charter Communications from Altadena, a community 10 miles northeast of Los Angeles, which provided cable modem service with a downstream speed rated at 384 kbps and an upstream speed rated at 128 kbps for a modest \$35 per month.

CABLE MODEM user
Jim Hair thinks
cable slowdowns
are rare and
tolerable.



To assess how well these services delivered on their promised transfer rates, we repeatedly uploaded and downloaded 1.5MB image files and downloaded Web pages—including one that was big, slow, and graphics heavy. After running the tests at different times and over multiple days, we found little difference in performance either between service providers or between cable modem and DSL. All delivered close to their rated speeds (and in the case of AT&T@Home, close to or above the estimated speed). A complex, multi-image Web site, for example, took an average of 3 seconds to download, with little variation between services offering the same rated speeds.

By and large, our survey respondents confirmed these findings. Most *PC World*

readers who participated in the study were pleased with the performance of their high-speed access service: 79 percent of cable modem customers and 84 percent of DSL users said that their service delivered its promised transfer rates. As cable modem user Bruce Steidel put it, "I do see differences depending on hours of the day. But compared to logging onto the Net via AOL, it's like night and day."

WHERE THE BOTTLENECKS ARE

AFTER EXPERIENCING the first flush of Internet acceleration that comes with a high-speed connection, most users discover an unwelcome truth: Having broadband service does not guarantee a great Internet experience. "I thought the Net was going to be blazingly fast," DSL ►

Hints for High-Speed Access

GETTING BROADBAND service is like planning a wedding: You have to make many little decisions, but it's worth the effort in the end. Here are five easy pointers for avoiding installation hassles and getting the most out of your service.

Think about your location. DSL lines work best within a few miles of the telephone company's central office. If you live in the boon-docks, start shopping for cable modem (or even satellite) service.

Choose your ISP. The company that brings you DSL will try to

sell you its own ISP services, but don't rush into anything. Get the names of other local DSL ISPs and shop around for the best deal.

Hedge your bets. If you can't afford to be disconnected, keep your analog modem and either maintain the old dial-up ISP account or confirm that your broadband provider also offers analog dial-up.

Get into the closet. Many apartments run phone lines into a locked phone closet. Make the necessary arrangements in advance to let the installation technician in.

Install jacks for all trades. Identify all rooms (including children's bedrooms) where you might eventually want to use a PC, and have all the jacks installed at once. This will cost less in the long run.

user Williams reflects. "It is fast, but not as fast as I thought it would be." Blistering speeds may be the norm, but slowdowns still happen.

The bottlenecks that slow everyone's Internet experience occur in many places, not just in the phone wire or cable that runs into your house (what engineers like to call "the last mile"). The ISPs get overloaded; the Web sites get backed up; and even the trunk lines of the Internet—its very backbone—can go through episodes in which the data traffic trying to use them resembles rush hour on the Los Angeles freeways. To deal with the overflow, network companies are installing faster hubs, routers, switches, and lines at a furious pace; but it's like trying to build a bunch of new on- and off-ramps during the morning commute.

"I think the bottlenecks are scattered around," says Solom Heddaya, chief technology officer at InfoLibria, a firm that helps ISPs manage their services. "But I think the greatest bottleneck is the backbone itself and the crossing points between major networks. If you have to cross the backbone, you doom the user to

narrowband. I estimate that the backbone needs to be 100 times faster than it is today, to satisfy people during prime time."

REAL-LIFE DOWNLOAD TIMES

ONE USEFUL APPROACH is to focus on average download time. According to data from NetForecast and Keynote, which measure and analyze Internet traffic, a user in 1995 could fetch a normal Web page in 12 seconds. Today, with faster

Network companies are rushing to bolster the Internet's backbone, but it's like trying to build new on- and off-ramps during the **morning commute.**

access technology, faster PCs, and larger Web pages, Keynote and NetForecast estimate that the same user can download the average Web page in 6 seconds. But that trend toward faster access might reverse itself in the future due to increased network congestion and the larger number of routers on the Internet. In 2003, Keynote says, the same user may need 9 seconds to grab a page. The Net may speed up, but traffic is increasing, too. The leisurely pace

of improvement is likely to prove frustrating to the average PC user accustomed to CPU speeds that double each 18 months.

One potential solution is local caching. Companies like InfoLibria, Akamai, and Sandpiper (which recently merged with Digital Island) have set up networks of local computer servers to cache the Web sites that enjoy the highest traffic. Local copies of popular sites can be retrieved more quickly, so someone in Seattle who

wants to browse CNN.com's home page doesn't have to wait for the data to cross the country. Your ISP may already be using one of these local caching services to increase the speed of downloads to its customers.

Caching can't accelerate upload speeds, however. As the hobby of digital imaging (using output from devices such as digital cameras and camcorders) explodes, the traffic caused by Web users commandeering bandwidth to post and e-mail their photos and to upload their movies will only get worse.

The cable modem system's design affects speed, too. This system links as many as 1000 customers together. When you introduce high-speed data into this neighborhood, a collection of neighbors ►

TEST REPORT

DSL and Cable Modem Go Head-to-Head on Speed

On downloads, we didn't see much performance difference among service providers or between cable modems and DSL. Upload speeds varied because we ordered services with different maximum upstream rates. The higher the transfer rate, the faster the performance. You get what you pay for.

CONNECTION	Downstream speed (rated)	Average download speed (tested)	1.5MB file downloads (seconds)	Upstream speed (rated)	Average upload speed (tested)	1.5MB file uploads (seconds)	Mixed-text-and-graphics Web page (seconds)	Graphics-heavy Web page (seconds)
AT&T@Home Cable Santa Clara, California	300 kbps ¹	1.1 mbps	11.3	128 kbps ¹	490 kbps	25.1	3.4	5.4
Charter Communications Cable Altadena, California	384 kbps	425 kbps	28.9	128 kbps	97 kbps	127.1	3.8	20.4
Covad ADSL San Francisco	1.5 mbps	1.1 mbps	11.0	384 kbps	315 kbps	39.1	2.9	7.8
Covad SDSL San Francisco	1.1 mbps	800 kbps	14.9	1.1 mbps	900 kbps	14.0	2.7	10.4
Pacific Bell Basic DSL San Francisco	384 kbps-1.5 mbps	1.1 mbps	11.3	128 kbps	96 kbps	127.9	2.7	8.4
Pacific Bell Enhanced DSL San Francisco	1.5-6.0 mbps	2.7 mbps	4.4	384 kbps	287 kbps	42.8	2.8	3.0

TEST HOW WE TEST We timed Web page loading and file transfers under Windows 98 on a Quantex Pentium II-350 0P6 350 M2X with 64MB of RAM, 512KB of L2 cache, and an 8.6GB hard drive. The Web server used was a Dell Pentium-133 with 32MB of EDO RAM and 256KB of L2 cache running Windows NT Server 4.0 and IIS. All tests were performed over the Internet, connecting to a private Web site; Web pages were downloaded with Internet Explorer 5. Times reported represent averages of at least 15 passes performed over two days. File downloads and uploads were tested using a 1.5MB .zip file. Your performance may vary depending on Net traffic and your service provider. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

¹AT&T@Home does not rate its cable modem service, but a tech support representative provided these estimates.



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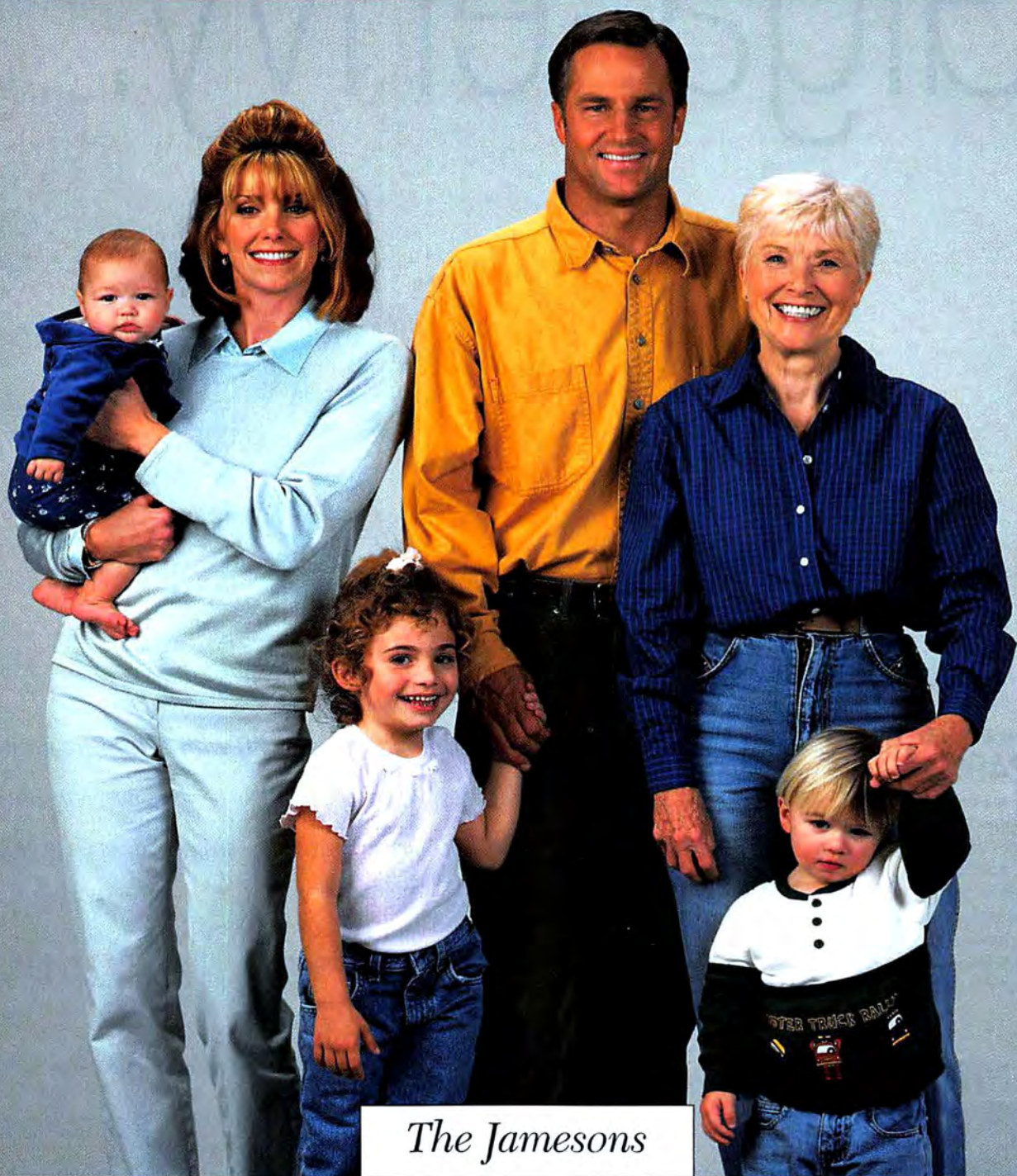


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(called a node) draw data through a single pipe. During times of moderate use, this interconnected arrangement works just fine. But if 50 people in your neighborhood have cable modems and the whole crowd sits down at 6:00 p.m. to browse news sites—or worse, to connect to sites

that feature bandwidth-hogging streaming video—the cable running through your neighborhood must suddenly accommodate a lot of data, which can make everyone's connection feel more sluggish. Cable companies overcome this performance hit by dividing the neigh-

borhood into smaller, more numerous nodes as demand goes up. "It slows down once in a while," says Jim Hair, a cable modem user in Pueblo, Colorado, "but even when it does, it's usually not worse than a [56-kbps] modem, and it only slows down for awhile."

SECURITY ONE BENEFIT OF DSL and cable modems

is that you're always online. But this advantage also makes your PC vulnerable to outside scrutiny or attack. When you dial up with an analog modem, your ISP assigns you a dynamic IP address, a kind of temporary Internet ID. Since you have a different identity every time you log on, it's difficult for a snoop to track your actions over time or hack into your PC via the temporary connection. However, most DSL and cable modem connections come with static IP addresses, which means that your device is tethered to the Internet for days on end—a phenomenon not unlike being a sitting duck. (You can't be tracked if your PC is turned off, so power down when you can.)

Andrew Brandt, an associate editor at



PCWorld.com who specializes in security issues, found that only weeks after hooking up DSL service at his home he was being pinged, an electronic version of what dogs do to each other when a new one shows up at the park. Complete strangers were sniffing around Brandt's PC, trying to determine whether his system might contain something of value to them.

Brandt suggests taking some precautions (you'll find his recommendations and instructions in "Unsafe at Any Speed:

Securing your Broadband Connection," www.pcworld.com/jan00/unsafe). The simplest step is to turn off all your file-sharing options. Some users also set up simple firewalls—hardware- or software-based systems that examine each incoming or outgoing message and halt any that don't meet a specified security standard—but they can be pricey. Williams, for example, has three PCs at home that access his family's DSL connection (by way of a small local area network that he installed), so he bought a simple firewall. Brandt also recommends installing a basic anti-hacking program, such as the \$40 BlackICE Defender from Network ICE (www.networkice.com) or the \$50 ConSeal Private Desktop application from Signal 9 Solutions (www.signal9.com, recently purchased by McAfee.com). Another option is Norton Internet Security (www.symantec.com), a \$60 package designed to block cookies, ads, and intrusions. ►

Get Web Faster: Online Resources for Speeding Up Your Access

CABLE MODEMS AND DSL are well represented on the Net. Sites abound that explain the technologies in detail, discuss their relative worth, and identify where each service is currently available. (Be sure to check back often, since availability changes regularly.) Here are a few of our favorite resources for broadband research.

CABLE MODEMS

Cable Modem University (www.catv.org/modem/frame/deploy.html). Ugly but eminently useful, this extensive site details cable modem availability by vendor and by state, among other offerings.

Cable Modem Help (www.cablemodemhelp.com). Run by Johannes Ullrich, a subscriber to the RoadRunner cable modem service in Albany, New York, this simple and personal Q&A site answers a multitude of queries in clear, concise language.

Cable-modem.net (www.cable-modem.net). This site offers a clean, comprehensive presentation of news, speed test information, and links to broadband content providers.

DSL

DSL Forum (www.adsl.com/dsl_forum.html). In coordination with the Universal ADSL Working Group, the comprehensive DSL Forum supplies brief explanations of all forms of the technology, user case studies, FAQs, tutorials, and deployments.

XDSL.com (www.xdsl.com). Run by TeleChoice, a market research company, XDSL.com tracks breaking news, lists providers, maintains online glossaries, and posts white papers.

DSL Reports (www.dslreports.com). From "DSL Life" to an interactive "DSL Decider" to a range of highly personal comments about particular providers, this funky site is a must-see.

BOTH

Modem Central (www.56k.com). Independent and proud of it, this site provides vast quantities of information and message boards devoted to all types of Net connections, including ISDN, satellite, cable modem, DSL, and wireless.

—Karen Silver

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Cable modems, which also stay online all the time, have the same IP security problems as DSL, plus some others. The cable system's shared-wire design means that packets of data traveling from your PC are available to your neighbors' PCs on their way to the open Internet. As a result, a computer-savvy neighbor has access to your e-mail address, to URLs of the sites you're visiting, and maybe even

to data you're sending or receiving. You can get around the problem by encrypting your data, or you can ignore it and simply trust your neighbors not to pry into your data packets as they float by. Meanwhile, many cable companies are working to plug this security hole, but so far implementation is inconsistent.

In our survey of *PC World* readers, more cable modem users than DSL users were

worried about security, but most said they were satisfied with the protection their service provided. Specifically, 88 percent of DSL users and 78 percent of cable modem users said their service was as secure as promised, to the best of their knowledge. Still, it probably pays to ask your provider some specific questions about security—such as whether your DSL company offers dynamic IP addressing.

AVAILABILITY IDEALLY, EVERYONE could freely decide between local cable modem and DSL services. Unfortunately, most areas offer one or the other, but not both. Many users we spoke with felt fortunate to have even one service available. Cable-modem user Stei-

del, however, got a rare choice:

When he looked for fast data access, he found cable cost only \$40 a month while DSL ran a stiff \$80. The lesson? If you take time to do the research before you buy, you may be able to save a bundle of money. (For a short list of reliable online resources

that are dedicated to cable modems and DSL, see "Get Web Faster," page 112.)

According to a recent survey by the Yankee Group, about 41 percent of all U.S. households will have access to cable modem service by the end of this year, and some 24 percent will have access to DSL in the same period. Logically, DSL would seem to be easier to get. After all, every home has at least one phone line. But instead the cable companies have taken the lead.

DSL'S LIMITATIONS

ONE REASON FOR DSL's slower rollout is the so-called "3-mile rule." The DSL signal degrades rapidly as it travels from the provider's central office to individual homes receiving the service, and after about 3 miles it becomes too faint to sustain a reliable connection. Cable doesn't have this problem, so it reaches many more suburban and semirural customers.

Many people who live beyond the reach

of high-speed access are plumb out of luck. Some may resort to costly, slow-uploading satellite systems.

Other folks, like Charles Arnold, a radiology technologist who lives in a rural area outside Bend, Oregon, will have to make do with dial-up analog modems. Customers like Arnold, who

will probably never have access to cable modem or DSL service, must wait until other fast-access technologies (such as wireless) become widely available.

THE FUTURE OF CONNECTIVITY

THOUGH YOU'VE probably read many horror stories about installation delays, high costs, and glitch-filled technology, most cable modem and DSL subscribers seem delighted with their service. "Our initial reaction is quite positive," says Williams. "The family's happy—and when the family's happy, I'm happy." But six months or a year down the road, when the novelty has worn off, will broadband users go back to their simpler, cheaper analog modems? Hell, no.

In our reader survey, 87 percent of cable modem users and 86 percent of DSL subscribers said they were satisfied with their high-speed access. Not surprisingly, some folks encountered frustrations at the start,

but those were resolved quickly. "It had a couple of little bugs at first, but they sent techs out right away," says cable modem devotee Martin Trisdorfer. "Since that first month, it has been smooth sailing."

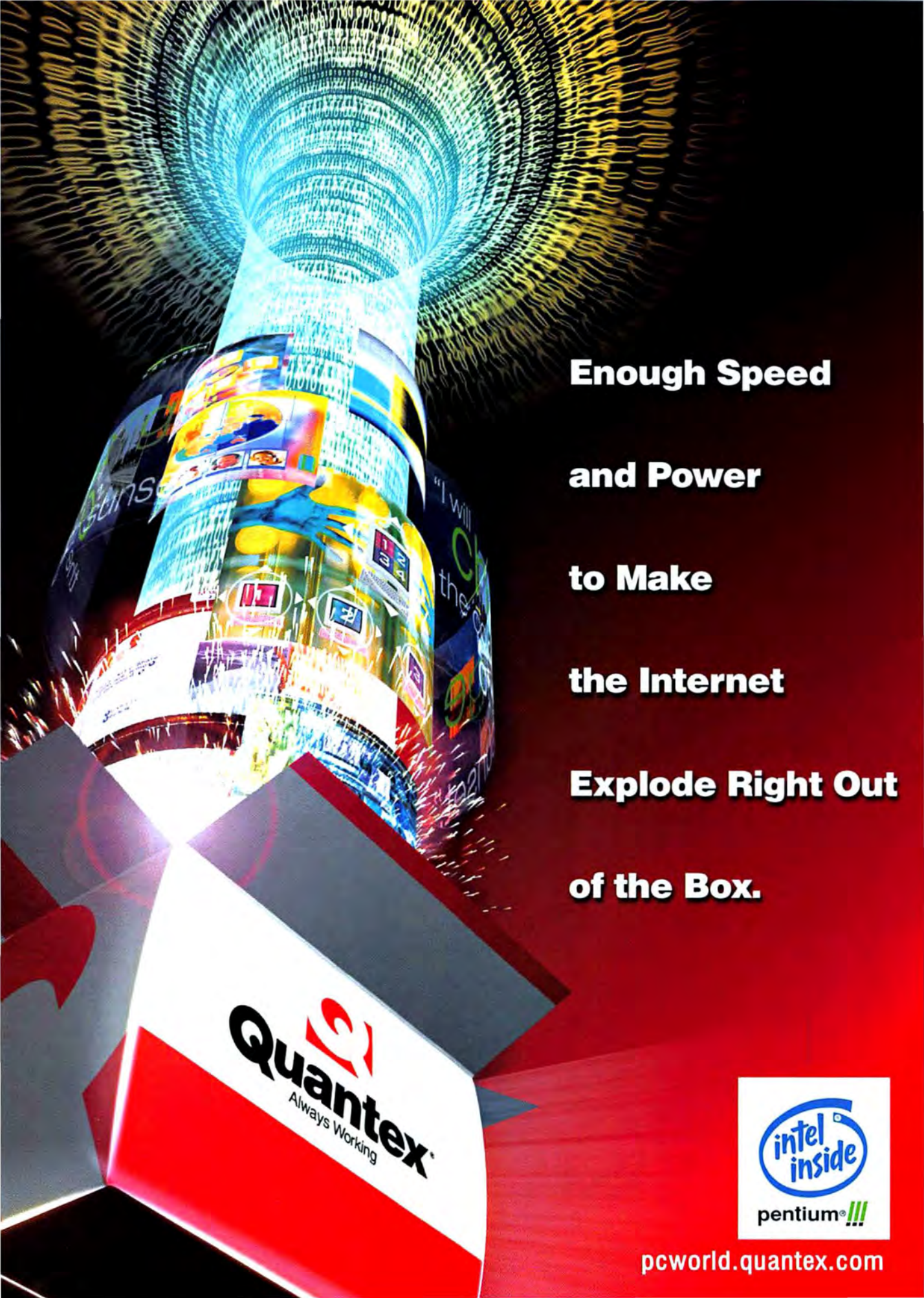
Yet both cable and phone companies still have room for improvement on technical support. About 30 percent of our surveyed readers had run into a significant problem with their DSL or cable modem service; and only 20 percent of cable modem users and 36 percent of DSL subscribers said they were very satisfied with the support they received.

THE JOY OF RELIABILITY

TECHNICAL SUPPORT hiccups may persist, but a recent experience of my own highlights one benefit of high-bandwidth access versus a dial-up connection: reliability. While I was writing this story, all of the telephone lines in my home office went dead for two days. Interestingly, my DSL connection never wavered during the blackout, despite using the same phone line that wouldn't give me a dial tone. A telephone repair technician who arrived the following day identified a short in the wires and immediately fixed it, restoring the dial tone. He explained that it's not uncommon for high-frequency DSL signals to jump over shorts that disable low-frequency signals. If I had still been using an analog modem, not only would I have lost my phone for two days, but I'd have had no online access either.

Now if that's not a nice omen for the future of high-speed connectivity, I don't know what is.

Rick Overton is a freelance writer based in Boise, Idaho. Karen Silver is a senior editor at PC World.



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Internal Zip Drive
12x Max Variable Speed DVD-ROM Drive
56K V.90 Internet Fax/Modem
Aureal Vortex2 PCI Sound, A3D 2.0 Technology
Altec Lansing ACS-33 Speakers w/ subwoofer
Corel WordPerfect Office 2000

\$1899

Business lease: \$69/Mo., 36 Mos.

❗-QUOTE NUMBER: pcw05s21

Peripheral Upgrades: Canon MultiPass C560 Printer/Scanner/Fax/Copier... add \$299. Epson Stylus 860 Color Printer... add \$149 (after \$50 rebate). 48-bit USB Color Scanner... add \$99. Brother HL-1240 Laser Printer... add \$289. MS Sidewinder Precision Pro Joystick... add \$49.

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Quantex SM866z Performance Desktop Pictured

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Power, performance, pure adrenaline-pumping speed. That's what the new Internet demands. And that's exactly what the new desktops from Quantex deliver. At their heart is the astonishing Intel® Pentium® III processor, with speeds up to a scorching 866MHz! Suddenly, you're seeing web graphics in brilliant 3D. Experiencing full-screen, full-motion video. You can even run the most cumbersome multimedia applications in record time. And the Internet itself becomes a more productive—not to mention, more dazzling—place to be. All this, coupled with Quantex's award-winning service and reliability. There's never been a better way to present yourself...with the future.

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QUANTEX M533c

High Performance, Great Value

Intel® Pentium® III Processor 733MHz
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Intel 2D/3D Graphics Accelerator
Internal Zip Drive
3rd Generation DVD-ROM Drive
56K V.90 Internet Fax/Modem
Aureal A3D Sound Technology, Speakers w/subwoofer
Corel WordPerfect Office 2000
Canon BJC-3000 Color Printer, add \$99 (after rebate)

\$1399

Business lease: \$51/Mo., 36 Mos.

QUOTE NUMBER: pcw05m39

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Intel 2D/3D Graphics Accelerator
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56K V.90 Internet Fax/Modem
Aureal A3D Sound Technology, Speakers
Corel WordPerfect Office 2000
Canon BJC-2100 Color Printer, add \$69 (after rebate)
APC TEL-Per7T Surge Protector, add \$30

\$999

QUOTE NUMBER: pcw05m02



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Modular 6x Max Variable Speed DVD-ROM Drive
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Quantex Deluxe Carrying Case Included!
MS Windows 2000 Professional, MS Office 2000 SBE

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1-QUOTE NUMBER: pcw05w36

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featuring Intel® SpeedStep™ Technology
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Modular 6x Max Variable Speed DVD-ROM Drive
PCI 56K V.90 Internet Fax/Modem
ATI Mobility P Graphics w/8MB, TV-Out
Quantex Carrying Case
MS Windows 2000 Professional, Corel Office 2000

\$2399

Business lease: \$87/Mo., 36 Mos.

1-QUOTE NUMBER: pcw05w15

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64MB SDRAM Memory
6GB Ultra ATA Hard Drive
Modular 24x Max Variable Speed CD-ROM Drive
ATI Mobility M Graphics w/8MB
56K V.90 Internet Fax/Modem
Quantex Carrying Case
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Corel WordPerfect Office 2000

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Business lease: \$65/Mo., 36 Mos.

1-QUOTE NUMBER: pcw05i03



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Quantex W-1500 Notebook & SB700s Business Desktop* Pictured

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Intel 10/100 PCI Fast Ethernet Controller w/RJ-45
Aureal Vortex2 PCI Sound, A3D 2.0 Technology
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Microsoft Windows 2000 Professional
OKIPAGE® 8W Laser Printer, add \$259

\$1699

Business lease:\$62/Mo., 36 Mos.

❗-QUOTE NUMBER: pcw05b43

QUANTEX SB650t

Performance Business Desktop

New Intel® Pentium® III Processor 650MHz
128MB High-Performance SDRAM Memory
15GB 7200rpm Ultra ATA Hard Drive
17" Digital Monitor w/On-Screen Display (15.6" vis)
nVidia TNT2 Vanta AGP Graphics, 16MB
48x Max Variable Speed CD-ROM Drive
Intel 10/100 PCI Fast Ethernet Controller w/RJ-45
Aureal Vortex2 PCI Sound, A3D 2.0 Technology
Microsoft Office 2000 SBE
Microsoft Windows 2000 Professional
APC BackUPS Pro 280, add \$119

\$1399

Business lease:\$51/Mo., 36 Mos.

❗-QUOTE NUMBER: pcw05b33



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Dual Channel Ultra2/LVD SCSI Controller
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5 Hot-Swap Drive Bays, 4 Fans
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Microsoft Front Page Web Creation & Management Tool
Microsoft Internet Information Server
Intel® EtherExpress™ Pro 100 Ethernet Adapter

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-QUOTE NUMBER: pcw05q51

QUANTEX QX5000

Workgroup Server

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Dual-Processor Upgradeable
Intel L440GX+ Server Board
128MB ECC SDRAM (2GB Max)
9GB 10,000rpm Ultra2/LVD SCSI Hot Swap HD
Dual Channel Ultra2/LVD SCSI Controller
Dual Peer PCI Buses, 7 Slots
5 Hot-Swap Drive Bays, 4 Fans
Intel® EtherExpress™ Pro 100 Ethernet Adapter
Chassis-Intrusion Switch, Drive Bay Lock
Optional AMI MegaRAID 466WS, add \$399
NetWare 5.1 Server plus 5 connections, add \$949

Starting at \$1999
Business lease starting at \$73/Mo., 36 Mos.
-QUOTE NUMBER: pcw05q39

QUANTEX QX3000

Branch Office Server

Intel® Pentium® III Processor 550MHz-600MHz
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64MB ECC SDRAM (768MB Max)
9GB Ultra-Wide SCSI Hard Drive
Integrated Ultra-Wide SCSI Controller
3 PCI Slots, 1 ISA Slot, 1 Shared PCI/ISA Slot
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Business lease starting at \$49/Mo., 36 Mos.
-QUOTE NUMBER: pcw05q32

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We put Linux on a test PC, and in eight weeks it never crashed. But are you any closer to ditching Windows than you were six months ago? Here's what you need to know before you decide. ►

PHOTOGRAPHS BY ROBERT OLDING

BY MATTHEW NEWTON



Is **Linux** Right for You?

Last year was one big coming-out party for Linux. Attended by a buzz worthy of a Microsoft product launch, this Unix-like operating system arrived on the computing scene as the Next Big Thing. Existing Linux companies made plans to go public, new Linux companies sprang up like lemonade stands during a heat wave, and companies that had never heard of the OS stumbled over themselves to adopt a "Linux strategy" (and watch their stocks rise). Major Windows-only computer vendors such as Dell and IBM started offering server and desktop equipment with "Linux inside."

For Windows users, the Linux hype raises many questions.

Is Linux just another computing fad soon to disappear from the headlines, like push technology? Or is it here to stay, like the Web? Not only is it here to stay, but the number of people using it at the corporate and desktop levels continues to mushroom.

What makes Linux so special compared with other OSs? It's inexpensive to install and maintain, resists crashes better, and can run on numerous platforms—from Intel-based PCs and Apple Macintoshes to high-end Sun servers.

Could Linux become a realistic alternative to your Windows desktop? Perhaps—and sooner than you may think. Dell Computer now offers entire lines of PCs and notebooks with Linux preinstalled. A new company, Tuxtops, sells an array of competitively priced Linux-only notebooks ranging from power to ultraslim. And Corel is making desktop Linux a more palpable reality with no-sweat installation, a user-friendly desktop, and the promise of a tool that will let you use Windows applications (if your PC is set up in a networked environment).

IF YOU LOVE SOMETHING, SET IT FREE

FROM ALL THE HYPE, you probably know that Linux is open-source software—which means that Linux users can download, test, use, alter, and copy it as much as they want. Among its benefits, open-source software is supposedly more stable than proprietary, or closed-source, software. The reason is simple: peer review. When something goes wrong with open-source software, any programmer can go "under the hood," analyze what's wrong, and immediately offer solutions for all users. (Just try that approach when you find a bug in Windows.)

Windows users will find the willingness of the open-source community to respond to bug reports downright astonishing. For instance, when I found a bug in a third-party Linux ICQ client, I e-mailed the author about it, and—voilà! A new, corrected version appeared within 48 hours.

Like the Internet, Linux isn't controlled by a single company. Linus Torvalds created the "kernel"—the core of the alternative operating system—in 1991 while he was still a student at the University of Helsinki, and he chose to make it available to everyone. Developers are free to change the kernel source code for their own purposes, but all of the modifications they introduce must be made public, and many are submitted to Torvalds for incorporation in later versions of the kernel.

Torvalds himself works for a company that doesn't even produce a version (or distribution) of Linux for PCs. Instead, that

job has fallen to such firms as Caldera, Corel, Debian, and Red Hat. Each of these companies takes the Linux kernel and adds its own embellishments—a unique graphical user interface (GUI), various applications and applets, a customized setup program, system utilities that keep everything running smoothly. As a result, distributions of Linux differ much as competing brands of raspberry yogurt in a grocery store do.

Though anyone can download the latest kernel for free, Linux distributors generally charge for their particular add-ons and technical support (see "Pick Your Flavor of Linux," page 127).

People who've adopted the OS—from staff members of corporate IT departments to end users—say Linux is a stable operating system that rarely crashes. That news surely gives pause to companies considering an upgrade to Windows 2000.

Frohwitter, an international patent attorney firm, had considered upgrading its network operating system from Windows NT to Windows 2000 but opted for Linux instead.

"We wanted Linux for its stability and also to preclude the need to upgrade to Windows 2000," notes Ronald Chichester, a lawyer with the firm. "One of our staff attorneys writes chemical patent applications. She discovered that Windows NT crashed up to three times per day. But now that we run NT on top of Linux, her computer has not crashed in weeks."

Like most businesses, Frohwitter depends on an array of Windows-based applications and didn't want to lose access to them. But by using VMware's \$299 VMware for Linux (\$99 for individual, non-business users), the firm

Things You Should Know Before You Install

EACH DISTRIBUTION has a totally different setup routine. We aren't talking apples and oranges here—more like apples and orcas. Way different. Accordingly, here are a few precautions: **Get the Hardware Lowdown** Before you commit to a particular Linux distribution, check the vendor's Web site for a hardware compatibility list. Make sure all of the peripherals and components you need to use are listed. If one is not listed, check to see whether another distribution supports it. If you already have Windows running on the PC you would like to install Linux on, go into the Device Manager (right-

click *My Computer*, click the *Device Manager* tab, and click the *Print* button). Choose to print out "All devices and system summary." This data can be useful if your distribution's setup program asks for specific information about your hardware.

Free—Almost

If you have a high-bandwidth connection and don't think you'll need tech support, you can download many Linux distributions directly from the vendor and use a CD-R or CD-RW drive to burn a setup disc. If that's not an option but you'd still like to save some cash, online resellers like Linux System Labs (www.lsl.com) will sell you copies of certain distributions (including Mandrake and Red Hat) for less than \$5. Of course at that price, the OS comes with no support or bundled extras.

Test the Waters

If you have an extra PC with no critical programs or data on it, you might want to use it as your Linux guinea pig.

Know Your Resource Needs First

Make sure you have enough hard disk space, RAM, and CPU speed to accommodate and handle a Linux install—either on its own or in separate hard disk partitions on your Windows PC. Check the Linux distribution you plan to install, and ascertain its hardware resource requirements; then see what your PC has available.

Scare Up a Spare Floppy

Most distributions will prompt you to create a rescue disk installation. Have a blank floppy ready so you won't have to skip this important step.

Safety First

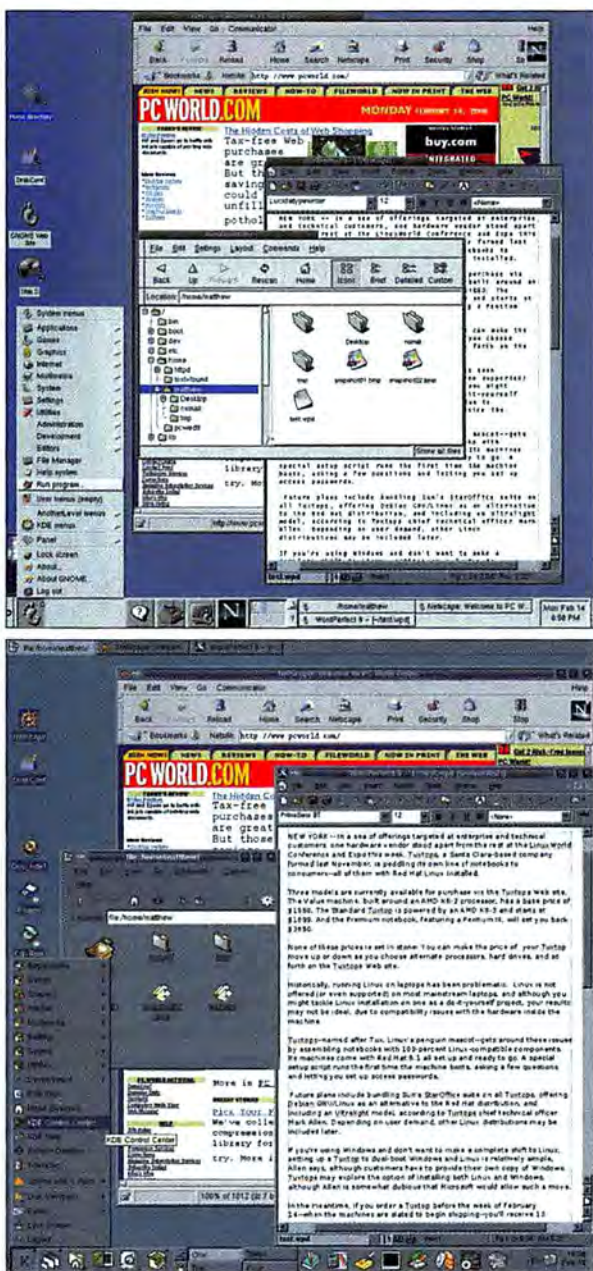
Installing a new OS is no walk in the park for your hard drive. To be on the safe side, back up all your important data on removable media before beginning the Linux installation.

can get the stability of Linux while still using Windows apps. Corel will be adding similar functionality to its Corel Linux OS, thereby enabling users to access and display Windows applications running on networked servers. Although Linux currently enjoys a 25 percent share of the server market, it commands only 4 percent of desktop operating systems sold, according to figures provided to *PC World* by sister company International Data Corporation.

Corel, which is probably best known for desktop PC apps such as CorelDraw and WordPerfect Office, is banking on the anticipated Linux juggernaut. The company is reorganizing itself and has merged with software giant Inprise/Borland in an attempt to become a Linux powerhouse. According to Derik Belair, director of strategic applications for Corel, Linux's stability and versatility are its central strengths. "Linux can power a handheld device or run a cluster of very powerful machines. And [because the architecture is open] we can make all these devices talk to each other," says Belair.

Other Linux developers share Belair's opinion. Bob Young, the chairman of Linux distributor Red Hat, notes that the operating system is ideal for thin clients (for example, PCs used exclusively to run a Web browser) and for Internet-connected appliances such as the Red Hat Linux-based TiVo set-top box for television. Even Royal—a busi-

PUT ON A HAPPY INTERFACE: GNOME (top) and KDE, the leading Linux desktop environments, look much the same as Windows.



ness machine maker since the half-forgotten days of the manual typewriter—is porting Linux to its line of low-cost DaVinci handheld personal organizers.

LINUX INSIDE?

BUT IS YOUR COMPUTER ready for Linux? Until now, a notoriously frustrating installation process stopped most people from loading Linux on their desktops and notebooks. Corel, however, has remedied this problem by introducing a simple four-step setup procedure. Corel Linux also includes a copy of WordPerfect 8 for Linux that, like the Windows version, ►

can read and save documents in Microsoft Word and other common formats.

Hardware compatibility, especially for printers, has posed another obstacle to using Linux on your PC. Hardware vendors have traditionally been slow to offer driver support for the OS, but in response to the massive growth of the Linux user base, peripheral makers have begun to come up with the necessary drivers. "Now that we have the public support of the major PC vendors, says Red Hat's Bob Young, "they are putting pressure on their suppliers to ensure that the components they use support Linux."

ATI, 3dfx, S3, and a number of other major video graphics card producers now accommodate Linux and cooperate with the open-source community to make drivers available. Among PC vendors, Dell offers a whole range of OptiPlex and Dimension desktops, as well as Latitude notebooks, with Red Hat Linux preinstalled and full support for Sound Blaster audio, CD-ROM drives, and 56-kbps V.90 modems. The upcoming Linux kernel release 2.4 will bring USB and IEEE 1394 (FireWire) support to Linux, and Corel has been spearheading an effort to standardize Linux's printer support.

The final roadblock facing Linux has been the lack of popular software that will run on it. The absence of Linux versions of big-time business and personal applications like Microsoft Office, Adobe Photoshop, and Intuit Quicken still hampers the OS, but PC users no longer have to choose between running Linux and using their favorite apps. Third-party solutions—notably VMware and GraphOn's Bridges—let Linux PCs run Windows 9x and NT software, so native Linux versions aren't necessary.

LOOKING FOR THE KILLER APP

LINUX ADVOCATES expect the software situation to improve soon. Corel is investing not only in its own distribution of Linux, but in a Linux version of its massive Windows-based WordPerfect Office suite, which includes the Quattro Pro spreadsheet, the Paradox database, Corel Presentations, and Corel Central (a personal information manager). So far, WordPerfect Office is the only major business-oriented application suite to cross the Windows/Linux divide.

But will the advance stop at Corel? Analysts believe that further Linux versions of popular Windows apps are unlikely unless someone develops a killer app to get desktop adoption of Linux rolling on a Windows-imperiling scale. (A killer app is a program with such outstanding benefits that its underlying

technology—say, Linux—is worth adopting.) Certainly a lot of techies and tech visionaries feel a strong affinity for Linux. That's why Tony Iams, a senior analyst with D. H. Brown Associates, says he wouldn't be shocked by the emergence of a Linux-based killer app. "In fact," he says, "[such development] could be happening in some garage right now."

The twin arrivals of Corel's \$90 Linux OS Deluxe and its \$109 WordPerfect Office Suite Standard Edition (which comes packaged with a copy of Corel Linux OS) establish Linux as an affordable, viable desktop alternative to Windows. Considering that a Windows 2000 Professional upgrade costs \$219, and an Office 2000 Professional upgrade goes for \$349 (that's \$568 for the set), Linux wins on price as well as on stability. Linux enjoyed a banner year in 1999, and there's no reason to believe that the ride is over yet.

In light of Linux's impressive progress over the past six months, the choice between Windows and Linux has gotten a lot more difficult to make. To simplify the situation, we've formulated several questions you should ask yourself before deciding whether to make the jump or stand pat.



LINUX TO GO: While a number of PC companies are preinstalling Linux on desktop PCs, Dell and Tuxtops include it on notebooks.

Your Linux Questions Answered

Can I put Linux on my PC?

A Of course. But getting it to work properly might take some work—or even require that you replace hardware. As noted earlier, one longtime problem with Linux has been its hardware support. You can't install Linux on just any PC and expect it to work perfectly. For instance, you might have trouble making graphics hardware work under Linux, because vendors only recently began working with the open-source community to provide drivers for Linux's graphical user interface, XFree86. The situation is steadily improving on this front: The latest release of XFree86 provides support for NVidia's entire line of graphics accelerators—including the GeForce 256—plus new adapters from S3, ATI, 3dfx, and others.

Modems are another source of trouble, though any external modem and many internal ones will work with Linux. Problems arise with devices called Winmodems. They work like regular modems (and are sold as full-fledged units), but Winmodems rely on your computer's CPU to handle much of the processing that standard modems do themselves. This makes them cheaper but also leads to conflicts with Linux, since the software that makes the magic happen runs exclusively under Windows. Modem manufacturers, fearing support troubles and reluctant to give away their secrets, have declined to provide open-source developers enough technical information to create third-party Winmodem drivers. As a result, these widely distributed devices are, for the moment, useless under Linux.

Previously, built-in printer support for Linux was minimal. Most current Linux applications (and most Unix apps, in general) produce output in PostScript—a page layout that only expensive, high-end printers tend to support. A utility called

Ghostscript lets these apps talk to non-PostScript printers, but Ghostscript drivers can't support the universe of printers sold at your local computer or office supply store. (In addition, some apps provide their own set of printer drivers.) The bottom line: If your printer is a few years old or a high-end model, you have a better chance of being able to make it work. The printing situation should improve significantly over the next year because Corel has open-sourced the printer routines developed for its office suite and HP says it is developing Linux printers.

How do I know whether my current hardware will support Linux?

A First check with the makers of the various Linux distributions. Most maintain extensive hardware compatibility lists online. For modems, your best online resource is Rob Clark's database page called Winmodems Are Not Modems (www.oz.net/~gromitkc/winmodem.html); check here to determine whether your unit is a true modem or a Linux-incompatible imposter. The Printing HowTo Support Database (www.picante.com/~gtaylor/pht/printer_list.cgi), a similar database from engineer Grant Taylor, may help you figure out whether your printer will work under Linux. Yet another set of third-party Web pages on the University of Texas Web site (www.cs.utexas.edu/users/kharker/linux-laptop) tells you which notebook computers (past and present) will properly run Linux.

Can Linux coexist with Windows?

A Yes. If you want to install Linux but you don't want to jettison Windows from your system altogether, you can arrange to put Linux in a separate area on your hard drive (most dis- ➤

Pick Your Flavor of Linux

THE RIGHT DISTRIBUTION OF LINUX for you should reflect your priorities in such areas as price, ease of setup, and bundled components.

DISTRIBUTION	Price	Comments
Caldera OpenLinux 2.3 www.caldera.com	\$50	Caldera prides itself on easy installation (you can play a game of Tetris as the OS installs); it focuses mainly on business users.
Corel Linux OS 1.0 linux.corel.com	\$59 (Standard edition)	The new kid on the block, the 1.0 release has a few rough edges but is the easiest, friendliest Linux yet.
Debian GNU/Linux 2.1 www.debian.org	\$1-\$5	Corel built on this distribution to create its own product. Debian does not yet market its distribution directly, but you can grab a CD from online resellers for less than five bucks. No support is included.
Linux Mandrake 7.0 www.mandrake.com	\$55 (PowerPack edition)	Originally an offshoot of the Red Hat distribution, Mandrake now has a comprehensive Linux installation program. Macmillan bundles it with additional tools and retails the package in stores for \$29 and up.
Red Hat Linux 6.1 www.redhat.com	\$30 (Standard edition)	One of the oldest, most trusted distributions around, Red Hat has long been considered by Linux veterans to be the best distribution for Linux servers.
Slackware Linux 7 www.slackware.com	\$40	The granddaddy of Linux distributions—think of it as a “by hackers, for hackers” offering. Walnut Creek CD-ROM distributes and markets Slackware.
SuSE Linux 6.3 www.suse.com	\$50	This German distribution is most popular in Europe but also has a loyal U.S. following. It sets itself apart from the rest of the pack by shipping with hundreds of applications—six CDs worth.
TurboLinux Workstation 4.0 www.turbolinux.com	\$50	The most popular distribution in Asia, TurboLinux is gaining support in the West among IT professionals who tie many PCs together to act as one powerful computer (a technique known as clustering).

tributions need approximately 500MB of space). Whereas Windows uses just one hard-drive partition, Linux generally requires at least two. Some Linux distributions—such as Caldera's—will safely shrink your Windows partition and then create the new partitions for you. Others, however, require you to run a utility like PowerQuest's PartitionMagic first, to get your hard drive ready for Linux. Then, when your machine boots, a tiny program called LILO (the Linux Loader) will let you choose which OS to run.

If you want to enjoy both the stability of the Linux operating system and the breadth of software available for Windows, VMware's new VMware 2.0 can help: It permits you to run Windows 9x, NT, or 2000 on top of Linux—or Linux on top of Windows NT/2000. It accomplishes this by creating a "virtual PC" inside the host operating system—your main OS. You can then install a secondary OS on the virtual machine. The technology isn't perfect, but it works much better than you might expect. GraphOn's Bridges lets Linux boxes use Windows applications, but it works across networks, the Internet, or dial-up and requires a Windows-based server.

I've heard that, unlike Windows, Linux doesn't have a standard graphical user interface. Is this true?

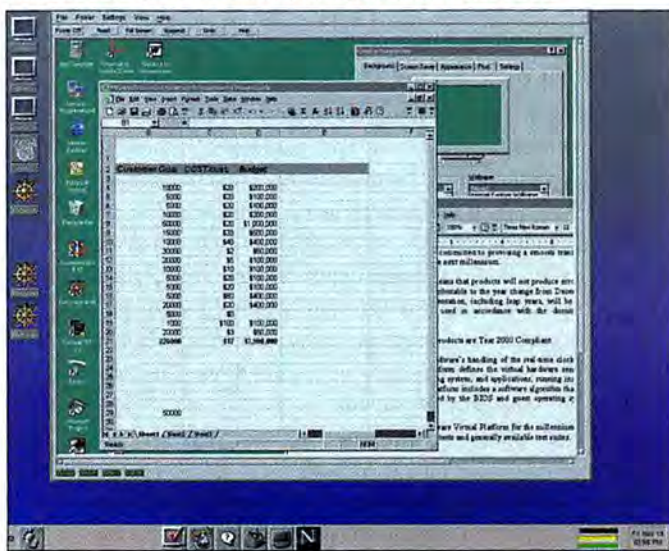
A Yes. But don't get scared. A Windows system's look and feel are determined by the OS itself: Windows defines what menu bars, scroll bars, dialog boxes, and so forth will look like. Linux doesn't provide any such definitions—XFree86, the GUI architecture that ships with all Linux distributions, doesn't dictate the look and feel of the interface. Another piece of software, called a *window manager*, handles that job. The window manager you select (there are many to choose from) determines what your on-screen windows, menus, and buttons look like, but it may not provide other features, such as a taskbar. Your desktop environment handles that.

The two main desktop environments currently vying for Linux supremacy are GNOME and KDE. Despite some differ-

ences in software architecture, both provide a taskbar, an application launcher resembling the Windows Start menu, and various applets (notepad, calculator, CD player, and so on). Corel Linux OS and Caldera OpenLinux ship with KDE. Red Hat Linux and Linux-Mandrake ship with both environments, but Red Hat defaults to GNOME whereas Mandrake defaults to KDE.

Neither environment is

YOU CAN RUN WINDOWS APPS in Linux by using VMware 2.0, which runs a Windows 9x, NT, or 2000 session on top of Linux, or vice versa.



superior to the other. Both put a clean, straightforward interface on top of Linux—so most Windows users who have never seen Linux before can start to work right after the installation. Both the GNOME and KDE environments are open-source, collaborative efforts, and the development teams for each are striving to build free office applications that will one day be integral parts of their respective environments.

This may sound complicated, but remember it all happens behind the scenes. Your Linux distribution will set things up so that, when you boot Linux, you'll arrive at a familiar desktop.

How many major apps are available for Linux?

A More than you'd expect, but probably fewer than you would like. The most popular business application suite in the world—Microsoft Office 2000 Professional for Windows—is not available for Linux, and Microsoft says that it currently has no plans to port Office to Linux. In contrast, Corel has spent more than a year porting its WordPerfect Office suite to Linux, and the finished product should be available by the time you read this. One of the Corel suite's main goals is to achieve interoperability with Microsoft Office.

In some instances where popular apps are unavailable in Linux versions, open-source alternatives are plentiful. So even though Adobe doesn't make a Linux edition of Photoshop, there's an excellent free alternative, The Gimp (www.gimp.org). This package matches many of Photoshop's features and has a few tricks up its sleeve that Photoshop has yet to learn. Similarly, your digital camera didn't come with Linux software to view its pictures, but that's nothing to worry about: Download a free copy of GPhoto from www.gphoto.org, and you're fully equipped to view your images.

In fact, there are hundreds of Linux applications, though most of them are either highly specialized (like 3D object models) or targeted at servers (like robust databases). One ►

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exception involves Internet applications. In addition to current versions of Netscape Communicator and Navigator for Linux, there are dozens of e-mail apps, news readers, and more. Many of these apps run better than their Windows counterparts.

If I install Linux, what sort of learning curve should I expect?

A That depends on what you'll be doing with it. Performing the installation is the hardest part of becoming a Linux user (though, as we noted, Corel's distribution makes this much easier). Once you've cleared that hurdle, you'll have a very stable, very powerful, Internet-ready operating system at your fingertips. And with the GNOME or KDE desktop environment your Linux distribution sets up, you'll have an easy-to-use, handsome-looking interface that might make your Windows-using friends jealous. On the other hand, there are no drive letters for Linux: In place of them, it uses a single all-encompassing directory structure.

If you use your PC to handle a few core tasks—word processing, e-mail, Web browsing, and so on—you'll probably get used to Linux pretty quickly, though small differences might initially throw you for a loop.

The learning curve looms larger if you undertake bigger projects. Changing your hardware configuration, for instance, will produce some headaches. And if you like to tweak your OS for greater performance or a customized look and behavior, you'll have a lot of learning to do. In all such operations, don't expect your Windows knowledge to apply.

How do I choose a distribution?

A Again, that depends on what you'll be doing with your new OS. If you just want to give Linux a spin to see what it's like, Corel Linux OS is probably your best bet. With an installation process simple enough for a golden retriever to handle and a slick, customized implementation of the KDE desktop, Corel makes Linux easier than ever to set up and use. The package's inclusion of WordPerfect further enhances its appeal. See "Pick Your Flavor of Linux," page 127, for specific information and comments about the major Linux distributions.

Linux sounds like a real mixed bag. How do I know whether I should try it?

A Ask yourself this: Is your PC already doing everything you need it to? If the answer is yes, Linux makes little sense in your immediate future. If the answer is no—because you want to run a simple Internet server, say, or because you're sick of "blue screen of death" problems with Windows—then perhaps Linux is worth a look.

As we've noted, some hardware compatibility issues remain, and there is no killer app to justify Linux yet. And though a ton of software is available, it might not be the software you're looking for. Linux is growing tremendously, but it's still an infant, and infants aren't for everybody.



For additional Linux-related questions and answers, visit www.pcworld.com/mayoo/linux. Matthew Newton is a senior associate editor with PCWorld.com. ■

The Linux Almanac—Facts and Software on the Web

THE WEB IS PEPPERED with hundreds of sites devoted to Linux. Here are ten major online resources for learning about the operating system, getting help making it work smoothly, and finding software to run on it.

DOCUMENTATION AND SUPPORT	Comments
LinuxCare www.linuxcare.com	The big fish in the Linux support sea. This vast site of forums and knowledge bases is free to browse.
Linux Documentation Project www.linuxdoc.org	With contributions from Linux users worldwide, the LDP houses essential how-to documents and other data.
LinuxNewbie www.linuxnewbie.org	Offers simple-to-understand help files geared toward new Linux users.
PCWorld.com's Linux How-Tos www.pcworld.com/heres_how/linux	Step-by-step instructions for installing and getting started with Linux. Watch this page grow.
SOFTWARE DOWNLOADS	
Freshmeat www.freshmeat.net	Updated daily, this site features new Linux utilities, apps, games and software—all free for downloading.
GPhoto www.gphoto.org	Hook up your digital camera to a computer running Linux, and view your shots.
LinuxApps www.linuxapps.com	More free Linux software at a clean, organized site that makes it easy to find what you're browsing for.
Sun StarOffice www.sun.com/products/staroffice	Grab a copy of Sun's free office suite here.
The Gimp www.gimp.org	Think of it as Photoshop for Linux.
TUCOWS Linux linux.tucows.com	If you're familiar with the TUCOWS site for Windows software, you'll feel right at home at TUCOWS Linux.

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128-voice Wavetable sound	128-voice Wavetable sound	Aureal Vortex2 Superquad digital PCI audio
Speakers	Speakers	Satellite speaker system w/subwoofer
3Com USRobotics V.90 WinModem	3Com USRobotics V.90 WinModem	3Com USRobotics V.90 WinModem
5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty
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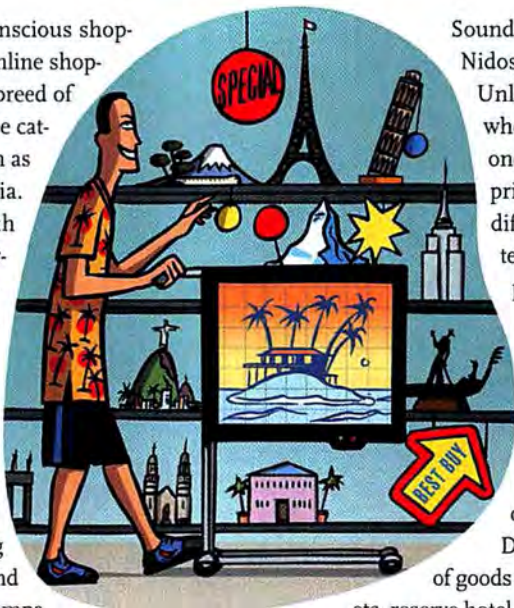
Whether you're after a **dream vacation** or a **palmtop**,
a new wave of **shopping sites** let you **negotiate rock-bottom prices**.
Before diving in, find out **when they work** and when they don't. ►

By Roberta Furger

Rolando Zamora loves to travel.

But like many people, the control systems engineer from Wilmington, Delaware, couldn't afford luxury accommodations or the high price of last-minute plane tickets. All that changed when he discovered Priceline.com, an innovative service that lets travelers name their price on hotel rooms and airline tickets. Now Zamora routinely stays in four-star hotels at discounted rates that don't strain his budget. And as for those impulse trips—well, let's just say he's always got a bag packed.

Zamora, like many other bargain-conscious shoppers, has discovered the next wave in online shopping: dynamic-pricing sites. This new breed of Web merchant can be divided into three categories. First, *name-your-price* sites, such as Priceline.com and a section of Expedia.com, let shoppers specify how much they're willing to pay for an item or service in the hopes that participating businesses (airlines, car dealers, hotels, and the like) will take them up on their offer. In another category, *reverse-auction* sites, like NexTag.com and BuyersEdge.com, combine features similar to those of shopping bots (software agents that prowl the Web in search of big bargains) with the price-matching service of the name-your-price sites. And finally, *group-buying* sites, such as Accompany.com, C-Tribe.com, and Mercata.com lure buyers with the premise that the price of a product will drop as the number of purchasers for that item increases.



Sound complicated? It can be, says Rebecca Nidositko, analyst with the Yankee Group.

Unlike with traditional online shopping, whose mechanics don't vary much from one Web site to the next, each dynamic-pricing site seems to have established a different set of rules for shoppers to contend with, and various hidden catches in pricing, ordering, and service policies can make this kind of shopping a challenge. "There's a huge usability issue with these sites," Nidositko adds, noting that many consumers prefer the ease and speed of a more typical, fixed-price Web retailer, even if that option means paying a little more.

Dynamic-pricing sites sell a wide variety of goods and services. You can book airline tickets, reserve hotel rooms, buy video games for your kids, or pick up home electronics, computer hardware and software, small appliances, groceries, jewelry, and even automobiles. Although each type of Web site offers the potential for big sav-

WEB SITES

FEATURES COMPARISON

DYNAMIC-PRICING SITE	Type of merchandise/services	Back-and-forth negotiation	Sale transaction time	Sales tax included	Free shipping	Other fees
Name-your-price	Expedia.com	○	Immediate	●	○	○
	Priceline.com	○	Up to 1 hour	Varies by item	○	● ³
Reverse auction	BuyersEdge.com	○	Up to two days	Varies by supplier	Varies by supplier	○
	MyGeek.com	○	Up to seven days	Varies by supplier	Varies by supplier	○
	NexTag.com	●	Immediate	●	Varies by supplier	○
Group buying	Accompany.com	○	Open-ended	Varies by supplier	Varies by supplier	○
	BazaarE.com	○	Open-ended ⁴	Varies by supplier	○	○
	C-Tribe.com	○	Open-ended	●	●	○
	Mercata.com	○	Open-ended	● ³	●	○
	MultiBuyer.com	○	Open-ended	Varies by supplier	○	○

● Yes ○ No

¹ Price-matching hotel service limited to 16 cities.

² Grocery service limited to certain geographic areas.

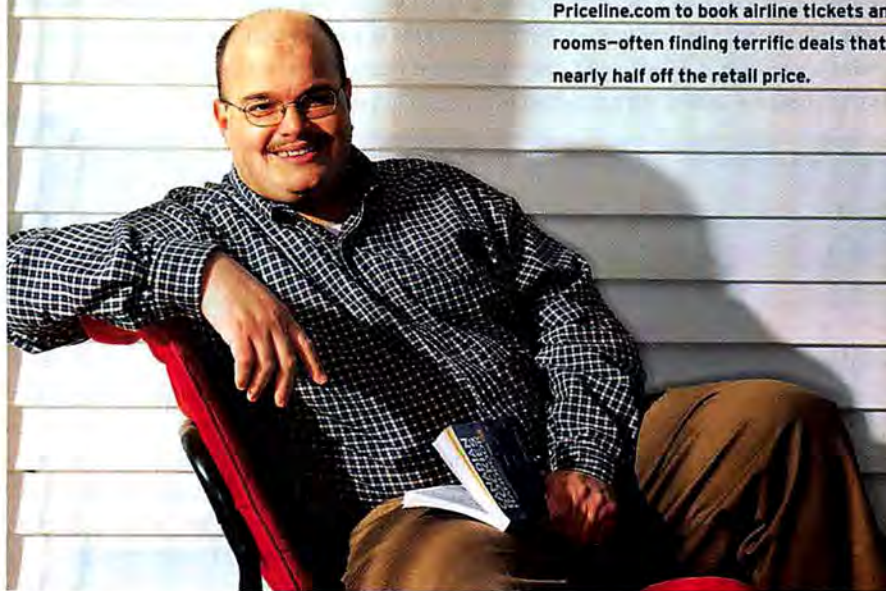
³ \$200 charge for cancellation of car purchase.

⁴ Buyers determine how long to keep request open to sellers.

ings, deep discounts are by no means guaranteed. In our own shopping experience, as well as through interviews with several consumers, we found some amazing deals—from Zamora's \$80 room at the fancy Fairmont Hotel in Chicago, where a room will generally go for \$159 and upwards a night, to home electronics devices and computer equipment at prices well below retail. But we also talked to consumers who had discovered that their great deal was no bargain after all—they either wound up paying too much, or realized late in the process that the item they had ordered was out-of-stock or had been discontinued.

How can you ensure that you'll end up on the winning side of the equation? In a word, research. That means calling your local retail stores to find out current prices, scouring the Web to stay abreast of the best deals, and then waiting—sometimes for days or even weeks—until you've found the item or the service you're looking for at a price you're willing to pay. If you're too eager to wait or too busy to do some homework, these new dynamic-pricing sites are probably not for you.

FREQUENT TRAVELER Rolando Zamora uses Priceline.com to book airline tickets and hotel rooms—often finding terrific deals that are nearly half off the retail price.



Name-Your-Price Sites

You Call the Shots

OF ALL THE dynamic-pricing models, none offer a higher potential for savings—or have more restrictions—than name-your-price sites. Priceline.com started the revolution in 1998 when it began offering low-cost airline tickets for travelers willing to sacrifice choice, convenience, and frequent flyer miles in exchange for big discounts on published airfares. Since that time, the site has added hotel rooms, groceries, home financing, and cars (for sale or for rent) to its mix. Long-distance phone service is planned for later this year. In late 1999 Expedia.com jumped on the name-your-price bandwagon, prompting a patent infringement suit by Priceline that was still in court at press time. Like Priceline, Expedia offers airline and hotel discounts for savvy travelers, but Expedia's price-matching service covers hotels in only 16 U.S. cities compared with Priceline's coast-to-coast service.

HOW THEY WORK

ALTHOUGH BOTH OF these services have their own quirks, each lets you name the price you want to pay for a hotel room or an airline ticket. Then, depending on availability, the site's highly automated database system responds with either a match or a denial. Priceline and Expedia don't always directly contact partner airlines or hotels to generate a response to each new bid. Each site uses predetermined rules governing availability, rate structures, and other factors.

Like most bargains, these discounts involve some important trade-offs: Although you can specify the dates you want to travel and your departure and arrival cities, you can't pick the time ►

Items refundable	Comments
<input type="radio"/>	Hotel selection is limited, up-front tax and fee information simplify airfare bidding.
<input type="radio"/>	Easy-to-navigate Web site features plenty of help; coast-to-coast discounted hotel rooms.
Varies by supplier	Competitive prices, but suppliers are typically smaller, little-known retail or online stores.
Varies by supplier	A great source for hard-to-find merchandise rather than for bargains on commodity items.
Varies by supplier	A must-stop for computer equipment and home electronics, but selection is limited in other categories.
Varies by supplier	Worth a visit, but this young site needs a wider selection—and more buyers—before it reaches the top of our shopping list.
Varies by supplier	An innovative idea (consumers form group-buying units), but this still-new site is complex and needs more customers to drive prices down.
<input type="radio"/>	This easy-to-use site is the place to go for discounts on gift certificates for national retail stores and restaurants.
<input checked="" type="radio"/>	If you time your visit right, you'll find great bargains on home electronics, computer goods, and more at this entertaining site.
Varies by product*	Great bargains on a few highlighted items; so-so deals and limited selection otherwise.

* Except for California and Washington residents.

* No returns on gift certificates or software.

Let's Make a Deal: Shoppers' Paradise, With a Few Snags

HOW MUCH CAN YOU SAVE at a name-your-price site? It varies, depending on the product and when you happen to make your purchase. We shopped for the popular Palm V handheld and found that the \$255 price at Accompany (a group-buying site) was much lower than at many online shops and most retail stores. However, Accompany's price depended on at least 251 shoppers joining the buying pool—the more buyers, the lower the price.

DYNAMIC-PRICING SITES

Accompany.com: \$255
Mercata.com: \$273
NexTag.com (from Egghead): \$263

ONLINE STORES

Buy.com: \$264
NECX.com: \$289
PC Zone: \$328

RETAIL STORES

Circuit City: \$299
CompUSA: \$330
Staples: \$330



All prices include shipping if applicable, but not sales tax, which varies according to your location. Prices quoted as of 3/2/00.

of day or the airline. You also must agree to at least one stopover during each leg of a round trip. Similarly, with accommodations you can't pick the hotel chain you want to stay in. Instead, you simply provide the dates of your stay, the general location, the number of rooms you want, and the class of hotel.

Airline and hotel reservations are nonrefundable and non-changeable. And you must bid carefully, since you're allowed only one hotel request per trip—unless you'll change your criteria and, say, expand the general area you're willing to stay in or agree to a lesser hotel. Airline bids are slightly less restrictive—you can resubmit a bid for the same trip after seven days.

Assuming you can live within these confines, the bidding and buying process is relatively straightforward. Once you place a bid, the site gets back to you with a confirmation or denial. Expedia responds on-screen almost immediately; Priceline e-mails you within an hour of the time you made your request. If your bid is confirmed, the service makes the reservation and charges your credit card for the ticket or room.

CHEAP FARES, NO CHOICES

SHERYL MEXIC, FOUNDER AND ADMINISTRATOR of the Priceline and Expedia Bidding board on EZboard (pub4.ezboard.com/bpricelineandexpediabidding.html), has used both Expedia's and Priceline's name-your-price services. She swears by these Web-site services when it comes to booking luxury hotels for family, friends, and coworkers but cautions that the sites can be impractical for booking work-related flights.

"I can't imagine any business using a name-your-price service for airline travel," says Mexic, who answers dozens of queries a week from hopeful bidders looking for tips and tricks. "[Business travelers] need control over arrival and departure times and to be able to make changes in reservations," she adds—options that Priceline and Expedia don't offer.

The same restrictions that make the airline discounts inappropriate for business travelers can also make quick weekend getaways impractical and inconvenient. Since the ticket that you wind up with could put you on a plane anytime between 6 a.m. and 10 p.m., that weekend trip could require a late-evening departure on Friday and an early-morning return on Sunday, leaving

you with little more than a single day to spend at your intended destination.

And even some typical, relatively uncomplicated itineraries are out of the question, as we discovered when we attempted to book a vacation flight from San Francisco to Barcelona with a one-week layover in London. It turns out that both Priceline and Expedia can book only round-trip single-destination tickets—a limitation that makes their services useless for any journey that involves a visit or two along the way.

Should you consider using

Expedia or Priceline to book your airline travel reservations? Yes, as long as your travel schedule is flexible enough to accommodate a wide range of possible departure and arrival times, or if you find you have to make travel plans at the last minute and would otherwise be forced to pay an exorbitant price for the privilege of booking a flight at short notice.

Rolando Zamora has used Priceline's service several times—once, for example, to book a vacation to Calgary, Alberta, and twice for spur-of-the-moment getaways. In each instance, he snagged his last-minute tickets for the same price he would have paid if he'd bought it a month in advance. One last-minute airfare, from Philadelphia to Kansas City, Missouri, cost him just \$240 on Priceline, compared with the \$800 he would have had to pay most other airlines directly for the same trip. His Calgary fare was equally impressive: \$300 for a round trip from Philadelphia (including all fees and taxes), compared with the \$600 fares he saw advertised elsewhere. The one catch: Zamora wound up with an afternoon cross-country flight that touched down in Cal-



GO SHOPPING for a hotel room at Priceline or Expedia, and you can specify the areas and classes of hotels that you're willing to accept.

gary at 9:30 at night. "The whole day was shot," says Zamora; he would have preferred a morning flight that gave him more time to enjoy his stay in Calgary.

LUXURY HOTELS AT MOTEL PRICES

BOTH ZAMORA AND MEXIC say that the real value of name-your-price sites is that they allow you to book reservations in top hotels, including such well-known chains as Fairmont, Sheraton, and Westin, for a fraction of the price that you'd pay through a travel agent or by booking direct. Consider recently available bargains like a room in the Sheraton Russell in midtown Manhattan for \$80 a night, a night at a beachfront hotel in San Diego for \$50, and a weekend stay at the former Ritz-Carlton in Houston for a reasonable price of \$100.

"Without a doubt, [these sites are] the best deal around for getting four-star hotel rooms at discounted prices," says Mexic. Both Mexic and Zamora have encountered one problem with their bookings, though:

Hotels did not always have a record that a room was paid for—even though the credit card was charged at the time of the booking. In the past, Mexic and Zamora have had to make duplicate payments on their rooms, then phone Priceline to sort things out. However, this problem seems to have been resolved in recent months, say Mexic and Zamora.

Buoyed by the prospect of huge savings, we decided to use Priceline and Expedia to nab discount hotel reservations for a trip

SHERYL MEXIC finds great rates for luxury hotels at name-your-price sites, but she says the cheap airfares aren't ideal for business travel.



to Seattle. We knew that rooms in four-star downtown hotels ran \$150 to \$300 a night. We tried Priceline first, entering arrival and departure dates, room requirements, and credit card info. Our bid: \$50 per night for a luxury hotel. Minutes later an e-mail advised us that we had no takers on our offer. Undaunted, we tried the same bid at Expedia. In a few seconds, a message popped up on screen saying our offer was denied again. We bumped our bid up to \$75 and added the nearby Bellevue/Redmond area. ►

GEZERK (a screen name) is looking for a pair of tickets to the Champions on Ice performance at the Centerplex in Macon, Georgia. Fendes wants an 8mm reel-to-reel movie projector. Capco is hoping to find a couple of investors for his Internet start-up.

What do these three consumers have in common? They all posted their want ads on IWant.com.

This and similar sites, such as EWanted.com, work much like high-tech versions of the classified ads. Shoppers post the items or services that they're interested in acquiring, then sellers respond with their offers (unlike at an online auction, where buyers compete against one another to purchase a particular item). Although IWant.com and EWanted.com both focus on person-to-person transactions, small businesses typically mix it up as well—much as happens at online auctions.

FINDING RARE GOODS

UNLIKE OTHER DYNAMIC-PRICING sites, IWant and EWanted are best suited for finding collectibles or other elusive items, such as coveted concert tickets or a mint 1965 Camaro. Here's how it works: Consumers post a want ad describing the item they're

looking for and, if they choose, divulging how much they are

willing to spend. They then decide how long to keep their request posted—from a couple of days to several months. Offers that come in are forwarded to the buyer via e-mail or can be reviewed on the Web site.

All participants remain anonymous until a buyer initiates contact with a seller—an important feature to help buyers avoid being deluged by seller queries or winding up in the marketing databases of dozens of companies. Buyers can negotiate directly with one

or more sellers or keep the want ad open until a better offer comes along. At IWant only the buyer can review offers, whereas EWanted lists all offers alongside the original ad—a nice feature, since it encourages a little friendly competition among sellers interested in capturing the business.

GETTING YOUR STUFF

LIKE AUCTION SITES, IWant and EWanted serve only as intermediaries between buyers and sellers. It's up to the two parties involved to negotiate price and arrange delivery and payment. Neither site offers an escrow service, but an EWanted feature enables members to rate buyers and sellers with whom they've done business. As is the case at many auction sites, all sales are final.

The services are currently free to buyers, but both of these sites hint that they may charge a service commission down the road. IWant currently charges a fee for sellers.

HIGH-TECH WANT ADS

Again, no luck at either site. Finally, we expanded our criteria to include three-star hotels, keeping our bid at \$75.

Bingo. The system came back with news that our latest offer had been accepted. We were the proud owners of reservations at the Holiday Inn Express in downtown Seattle. Not exactly a four-star establishment, but we saved \$24 off the lowest price that the hotel had to offer (including an American Automobile Association discount) when we called directly.

TRAINS, PLANES, AND EVEN AUTOMOBILES

ALTHOUGH MOST CONSUMERS WHO use price-matching services are looking for hotel rooms and airline tickets, Priceline also lets you name your price for groceries, cars, home loans, and by the time you read this, it plans to be selling gasoline. Like accommodations and air travel, these categories have their own restrictions that limit the usefulness of the name-your-price option. Once a dealer accepts your bid on a new car, for example, you have 14 days to finalize the sale with that dealer, or pay a \$200 service charge to Priceline. The bottom line: Read the rules carefully, and do your homework before placing a bid.

A relatively new Web site, Ebix.com, has begun offering a name-your-price service for all types of insurance. Ebix lets users specify the type of insurance they're looking for, from auto insurance to health coverage (with specifics about deductibles, number of people to be covered, and other important details) and state the amount they're willing to pay for premiums. Insurance agents then bid on the policy. Unlike with hotel and airline reservations, however, there's a fair amount of back-and-forth between the consumer and the insurance agent before a policy is agreed upon. (For more information about buying insurance online, see this month's *Consumer Watch*, page 31.)



Reverse Auctions

Negotiate Yourself a Bargain

WOULDN'T IT BE GREAT IF you could haggle with Web stores the way you bargain with merchants at a swap meet? That's the concept behind reverse-auction sites like BuyersEdge.com, MyGeek.com, NexTag.com, and others. In this category, shoppers put their product and pricing knowledge to work by bargaining for a wide variety of consumer goods with multiple online sellers.

Sites in this arena vary widely in product selection and in the negotiating and buying process. At NexTag, you submit a query about the product you're interested in purchasing, and NexTag returns a list of merchants selling the product, along with the price they're offering. With NexTag acting as the intermediary, you then have the opportunity to counter with a lower price in the hopes that an inventory glut or other business dynamic (such as the introduction of a new product model) will prompt one or more merchants to drop their price. Vendors may match your price, meet you part way, or stay put. Responses are almost immediate—you offer a price, and up pops a list of vendor responses.

GET TO KNOW THE SUPPLIER

EACH OF THESE SITES maintains relationships with a variety of merchants. The list of participating sellers is still relatively short, however, a factor that can limit your savings. At NexTag, for example, only three booksellers—1BookStreet, A1Books.com,

NexTag.com: Seller Details - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Location: <http://www.nextag.com/buyer/ProductTags.jsp?product=243962>

Instant Message Internet New and Cool Look Up NetCaster RealPlayer

Add this item to "Saved List" | E-mail this page to a friend

Select	Seller	In Stock	Seller Price	+Tax	+Shipping	Total Price	You Offered To Pay	Status
<input type="radio"/>	BooksAMillion company info	Yes	\$7.00	\$0.00	\$3.95	\$10.95		
<input type="radio"/>	Amazon.com company info	Yes	\$7.00	\$0.00	\$3.95	\$10.95		
<input type="radio"/>	Borders company info	Yes	\$7.00	\$0.00	\$3.95	\$10.95		
<input checked="" type="radio"/>	AlphaCraze.com company info	Yes	\$9.38	\$0.97	\$3.95	\$14.30	\$9.50	Seller has responded

COMPARING PRICES: Once you tell NexTag how much you're willing to pay for an item, it lists the vendors that have matched your bid and provides additional details about the sale, including comparable retail prices, applicable taxes, and shipping fees.

and AlphaCraze.com—have signed on. The best deal we could get on a copy of Barbara Kingsolver's *The Poisonwood Bible* was \$14, including shipping. Borders.com and Amazon, in contrast, were selling the book for \$11, including shipping—no haggling required.

We had much better luck when we went to NexTag in search of a SmartMedia memory card for an MP3 player. The card was selling for about \$100 at real-world retailers, slightly less at traditional Web stores. We went to NexTag to see if we could strike a better deal. Our search turned up several vendors offering the product for about \$80, including tax and shipping. We fired back with an offer of \$55—not expecting any takers. Our hunch was right, but one online merchant, Sparco, came back ►

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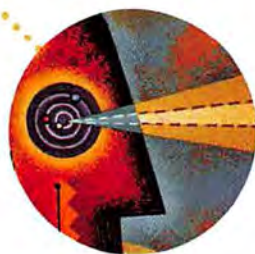
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WHAT IS YOUR INDUSTRY? _____	TOTAL NUMBER OF EMPLOYEES _____
WHAT ARE YOUR ORGANIZATION'S ANNUAL REVENUES OR ASSETS? _____	
WHAT IS YOUR ANNUAL IT BUDGET? _____	
YOUR NAME AS YOU WANT IT TO APPEAR ON YOUR BADGE _____	
NAME OF COMPANION (IF PARTICIPATING IN COMPANION PROGRAM) _____	

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with an all-inclusive offer of \$70. Though other merchants had negligibly lower prices, we chose Sparco because other shoppers were saying that it has a good reputation for service, and NexTag said Sparco had the item in stock.

However, shortly after we finalized the sale, we checked the status of our NexTag order and discovered the SmartMedia card was now listed as out of stock. We tried contacting Sparco at the e-mail address listed in NexTag's help section, but the message bounced back. We contacted NexTag's customer service department by e-mail and got an unhelpful response. Finally, we went to the Sparco site directly and e-mailed customer support (we couldn't use Sparco's tracking feature, since we had no account name or password). Although you can go to Sparco's in-stock indicator, NexTag's in-stock indicator for Sparco doesn't operate in real time, so a product may briefly be listed as available even after the stock is depleted. The card arrived ten days after we placed the order.

OTHER WAYS TO HAGGLE

OTHER SITES IN THE reverse-auction category, including BuyersEdge.com, MyGeek.com, Respond.com, and CarPrices.com, streamline negotiations. (CarPrices.com is currently available only in San Diego, although it will be offered nationwide later this year.) Instead of first displaying a list of vendors' prices, they let you begin the process by saying how much you're willing to pay for an item; then they get back to you with a list of merchants who've responded to the request. Buyers can specify whether they want information from all merchants or just those who can match the price.

Some of these sites respond immediately to offers, while others may take several days. In almost every case, you can either have the site e-mail you each time a merchant responds to your offer, or view a summary of the counteroffers. In one instance we found a great deal on a portable CD player through BuyersEdge (matching our \$129 requested price); the seller was a small East Coast retailer we had never heard of, so we ended up not buying the product. If you are looking for hard-to-find merchandise, such as a 1965 Mustang or an original Batman lunch box in mint condition, both Respond and MyGeek specialize in obscure and collectible goods but don't excel at lining you up with commodities, like palmtops.

Unlike group-buying sites, where every participant gets the same price on an item, bidders operate in a vacuum at reverse auctions. Two different buyers may purchase the same product on the same day from the same merchant and pay two different prices. To make sure you get the lowest price possible, investigate what the product is selling for on the Web and in retail stores. Remember that under the law of demand, the most popular items are typically not discounted. And finally, don't be afraid to log off if merchants aren't willing to deal.

Group Buying Sites

The Lure of the Volume Discount

IF YOU LIKE THE THRILL of online auctions, you'll love group-buying sites like Accompany, C-Tribe, Mercata, and others. Although the products and rules vary, each site's premise is the same: The greater the number of people who buy a particular product, the greater the discount.

Mercata and Accompany, the two most-established sites in this category, boast the largest selection of merchandise (see features comparison, page 136) and the greatest number of buyers—the component critical to making this model work. As with auction sites, a new selection of products goes on sale every day, with buying cycles (the length of time a product is available for purchase) lasting several hours to several days. Only when a significant number of people get in on the purchase does the price start to drop—sometimes a little, sometimes a lot.

REELING YOU IN

ALTHOUGH EACH SITE GIVES the impression that prices change dynamically based on the number of buyers, complex rules determine just how quickly (and how far) the price of a product will drop. At Accompany, the pricing schemes are spelled out so you know just how many buyers are needed to reach a certain savings level. On one of our visits, for example, we found a listing for a kit of travel accessories for a Palm V (\$50 retail), which began its buying cycle at \$43. We could see that 6 people had already signed up for the kit, bringing the price down to \$38. The second drop (of \$2) was scheduled to kick in after 21 people had signed on to purchase the product. At 41 buyers, the price would dip to \$33. The more expensive the item, the greater the incremental savings.

At Mercata, buyers have no way of knowing when or how much the price of a product will drop. Instead of simply signing on to purchase an item, shoppers place bids—and Mercata must accept the bid before the price changes. There's not much chance that Mercata would accept a \$10 bid on a \$150 VCR, for example, so that bid would not change the price. A \$140 bid, on the other hand, might well receive the green light, driving the price down for everyone, even those whose initial bid was higher.

After scouring the Web and calling local retail stores, Susan Mills of Florence County, South Carolina, wound up buying her Sharp 600U DVD/CD player at Mercata for \$159—\$60 less than the lowest price she had found anywhere else. She spotted the item as a Mercata Power Buy (the site's term for a featured product), and in less than a week she was munching popcorn and ►



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- 1 Li-Ion battery
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- 3-Year limited warranty⁴

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- 1 Li-Ion battery
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Lease for: \$92/month*

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- Dual Wide-Ultra2 SCSI controller
- 8 Bays: 4 removable, 4 hard drive
- 32X Max CD-ROM drive²
- 12/24GB DAT tape drive w/QuickStart software
- 10/100 TX UTP NIC (WOL)
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COMPAQ

TIPS & TRICKS

Getting the Best Deals

READY TO SHOP at a group-buying site or name your price for a hotel or airline reservation? Here's what you need to know to strike the best deal online.

■ **Know your price.** Don't place a bid or join a group buy without scouring Web merchants and calling retail stores for pricing and availability information. Uninformed buyers could wind up overpaying.

■ **Research the merchant.** Many sites are merely intermediaries between merchants and the consumer. Investigate the seller by visiting its Web site directly before you final-

ize a purchase. Pay close attention to the seller's policies on privacy and security.

■ **Read the fine print.** Each merchant has its own unique set of rules and restrictions that can affect your purchase significantly. Taking the time to learn the ins and outs of a site can save you time and money in the buying process. Pay particular attention to return and refund policies, any added fees for using a site, and the point at which you're committed to a purchase.

■ **Play hardball.** Priceline bounces back offers it deems too low to be accepted and encourages a bidder to enter a higher price. Don't be deterred from trying a low bid anyway, says Sheryl Mexic, founder and administrator of the Priceline and Expedia Bidding board on EZboard, noting she's had many seemingly unreasonable bids accepted.

■ **Go to the source.** If you're in the market for a cheap airline ticket, visit several airlines' Web sites and sign up for their e-mail newsletters. Many of the airlines offer Internet-only specials that may yield greater savings—and more flexibility—than either Priceline or Expedia.

■ **Don't forget the extras.** Take sales taxes, shipping, and hidden fees such as hotel taxes or airport fees into account. Some sites factor all these extras into their final pricing. Others leave it up to the buyer to do the math.

■ **Don't be greedy.** Don't pass up a bargain at a Web store or forgo a discounted airfare in the hopes of getting a lowball bid accepted on a dynamic-pricing site. Snatch up deals wherever you find them—they may not come around again.

watching her first DVD movie. And Kevin Womack, a systems analyst at the University of South Florida in Tampa, bought a copy of NFL Blitz, a video game for the Sega Dreamcast, for just \$6 from Accompany. The game retails for \$50, though Womack had seen it selling elsewhere for as little as \$30.

TIMING IS EVERYTHING

BOTH MILLS AND Womack were lucky: They shopped at the right time and snagged items at bargain prices. Fortunately, Accompany can notify you when a price drops to your sweet spot. And you'll always get the final price—even if your bid was higher.

BazaarE.com, a smaller, newer group-buying site, lets shoppers post a notice indicating their interest in a specific product; other buyers join in to create a pool. When the pool closes, BazaarE's merchants (primarily small and midsize retail stores) bid on the business. Buyers can choose, individually, to go with the same merchant or different ones, or decide not to buy at all.

At MultiBuyer.com, the selection is small and the on-screen help is minimal, but a few deals are attracting plenty of attention. During our first visit to the site, hundreds of buyers were taking advantage of a \$25 gift certificate for online merchant CDnow selling for \$12.50. (On subsequent visits, however, the gift certificate offer was limited to first-time CDnow buyers.) Another nice feature: Buyers can change their mind and drop out of a group at any point before the buying cycle closes, usually seven days—an option not offered at Accompany or Mercata.

C-Tribe.com, another newcomer, features discounted gift certificates for a variety of retail chains, including KB Toys and Foot Locker, as well as restaurants such as Chili's. Depending on the number of buyers, discounts can be as deep as 20 percent. You

can buy multiple certificates, so the potential savings are even greater. Unfortunately, certificates can be redeemed only at retail stores, not at their online counterparts—odd, given the venue in which they are being sold.

Simply put, using a group-buying site makes sense whenever you find goods or services you want at an attractive price. Featured products change daily, so there's no guarantee that a DVD player on sale one week will still be available the next, and best-sellers such as the Palm V are

not always in stock. Return policies also vary considerably from one site to another, so read the fine print closely before you buy.

HARD WORK, BIG SAVINGS

SMART TRAVELER ZAMORA acknowledges the hurdles inherent in shopping at any of the new dynamic-pricing sites, but he says he's more than willing to make a few sacrifices and spend a little extra time learning the ropes if it means saving big money.

"Sure, there are some trade-offs," acknowledges Zamora. "But the savings are incredible." And for bargain-hungry consumers, that's what it's all about.

Roberta Furger is a contributing editor for PC World.



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With the right hardware and software, anyone can turn a PC into a digital movie studio.



THOSE OF US WHO GREW UP IN the '50s and '60s may be suppressing memories of old home movies.

Remember how Dad filmed every picnic, school play, and graduation day, then spliced the reels with tape and made the family endure his shaky, out-of-focus productions?

Fast-forward to the present. Modern camcorders offer automatic exposure and focus, technology to steady shaky pictures, and CD-quality stereo sound. Plus, we can watch finished movies on a television—no need to lug out a big white screen or find empty wall space. But more important, PCs are finally powerful enough to let us edit our amateur footage and create professional-looking movies.

Further helping matters, the newest generation of camcorders store images in digital format on special tapes, resulting in better quality. Older, analog camcorders store video as a gradation of electrical signal strengths with an infinite number of possible values. Due to ►

PHOTOGRAPHS BY ROBERT CARDIN



limitations in hardware and media, the signal will never be captured, transmitted, or transferred with 100 percent accuracy. Its quality will degrade further with each reproduction—just like a photocopy. In contrast, a digital camcorder encodes information as a sequence of ones and zeros, so when it's transferred, you either get it or you don't. Likened the difference between analog and digital to shades of the truth versus a yes/no answer.

To produce polished movies, you must transfer video from the tape to your PC and massage it with software. Fortunately, new capture cards and applications make importing video into your PC easier and less expensive than in years past. We tested a cross-section of products designed for everyone from beginners looking to clean up their home videos to semiprofessionals who want to produce corporate training films or even independent cinema.

VIDEO EDITING CHECKLIST

PRODUCING YOUR CINEMA VERITÉ involves three distinct phases: capturing the "raw" video from your camcorder, editing it on your PC, and writing the finished product to either a computer file or videotape. You'll need a camcorder, of course, and at least a midrange Pentium computer with 64MB of RAM. Video editing is one of the most demanding tasks for a computer, so you'll get better results with a faster PC and more memory. You'll need ample hard drive space, because video takes up gobs of it. In addition, you'll generally have to install an expansion card that provides input ports for connecting the camcorder.

Most digital camcorders come with a high-speed IEEE 1394 port, sometimes called by different trademarked names such as FireWire (Apple) or i.Link (Sony). To import video from a digital camcorder, you'll need an IEEE 1394 expansion card for your PC, unless it came with the ports. Most new Sony and Apple computers have integrated 1394 ports, and other makers, such as Compaq, include them on select models.

You can buy a video capture card and editing software either as stand-alone products or in bundles that include both. The combination packages are the best choice if you're just getting started in video editing (because the items cost less than if you'd bought them separately), but stand-alone software offers a wider range of capabilities. For this roundup, we concentrated on products designed for digital camcorders, because they will provide the best quality, speed, and ease of use when combined with a properly outfitted PC. Those products included eight digital capture cards bundled with software, another digital card without software, and three stand-alone editing applications. But we also tested two products designed exclusively for analog camcorders, plus another card that captures both analog and digital video.

IMPORTING ANALOG VIDEO INTO YOUR PC

IMPORTING VIDEO INTO YOUR PC is the first step in the editing process. Using a digital camcorder and digital capture card will better preserve the original quality. However, if you already own an analog camcorder (VHS, VHS-C, 8mm, or Hi-8) and

VIDEO EDITING

FEATURES COMPARISON

PRODUCT	Street price (02/03/00)	Description	Platform	Recommended CPU/RAM
INTEGRATED PACKAGE				
ADS Technologies Pyro Digital Video 1394DV 800/888-5244 www.adstech.com	\$99	Digital capture card, Ulead VideoStudio 4 editing software	Windows 98/2000	Pentium II-333/64MB
Digital Origin EditDV 2.0 650/404-6000 www.digitalorigin.com	\$799	Digital capture card; EditDV 2.0 editing software	Windows 98/NT	Pentium-200/64MB
Digital Origin IntroDV 650/404-6000 www.digitalorigin.com	\$199	Digital capture card; IntroDV editing software	Windows 95/98	Pentium-200/64MB
Digital Origin MotoDV Studio 2.0 650/404-6000 www.digitalorigin.com	\$899	Digital capture card; Adobe Premiere 5.1 editing software	Windows 98/NT	Pentium-200/128MB
Matrox Marvel G400-TV 800/361-1408 www.matrox.com/mga	\$299	2D/3D graphics card with analog capture capability; Avid Cinema editing software ¹	Windows 95/98	Pentium-133/32MB
Pinnacle Systems Studio DC10plus 800/522-8783 www.pinnaclesys.com	\$229	Analog capture card; Studio DC10plus editing software	Windows 95/98	Pentium-133/32MB
Pinnacle Systems Studio DV 800/522-8783 www.pinnaclesys.com	\$199	Digital capture card; Studio DV editing software	Windows 98	Pentium MMX-233/64MB
Pinnacle Systems DV500 800/522-8783 www.pinnaclesys.com	\$999	Analog/IEEE 1394 capture card; Adobe Premiere RT 5.1 editing software	Windows 98/NT	Pentium III-500/256MB
STAND-ALONE SOFTWARE				
Adobe Systems Premiere 5.1 800/833-6687 www.adobe.com	\$549	Editing software	Windows 95/98/NT	Pentium MMX-133/64MB
MGI Software VideoWave III 888/644-7638 www.mgisoft.com	\$99	Editing software	Windows 95/98/NT	Pentium II-350/128MB
DIGITAL CAPTURE CARD				
Adaptec HotConnect Ultra 8945 800/442-7274 www.adaptec.com	\$699	IEEE 1394 capture card with Ultra Wide SCSI interface	Windows 98/NT	Pentium-166/32MB

n/a = not applicable

¹ For more information about the products listed in this table, select number 901 on the product information card or visit www.pcworld.com/productinfo.

² Only most-popular export formats shown for Adobe Premiere.

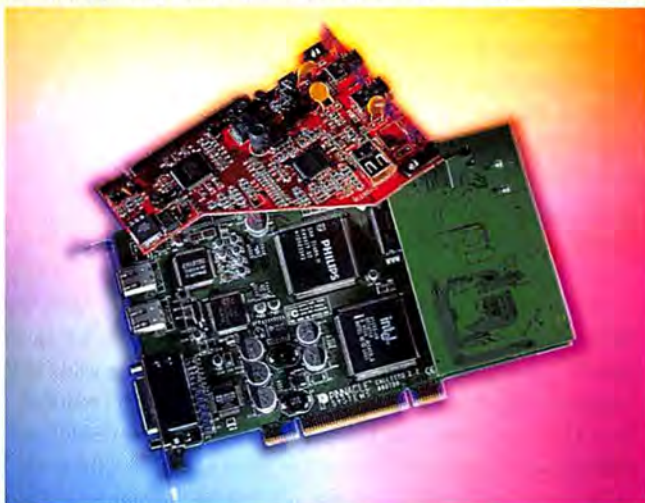
piles of analog tapes, you can use an analog video capture card for converting the footage to a digital format that you can edit on the computer.

We tested three cards that offer analog capture capabilities: The Matrox Marvel G400-TV (\$299), the Pinnacle Systems Studio DC10plus (\$229), and Pinnacle's DV500 (\$999). The Matrox is a 2D/3D graphics card with built-in video capture circuitry, and it includes an external "breakout box." This box, about the size of a paperback book, connects to the back of the graphics card with a thick cable and allows you to connect a camcorder, VCR, and television to the card without having to crawl around behind your PC. The G400-TV also includes a built-in TV tuner, which allows you to watch television in a window on your desktop.

Pinnacle's Studio DC10plus is an add-in capture card that provides inputs and outputs for analog video from VHS and 8mm camcorders, as well as the higher-quality (but still analog) S-Video produced by Hi-8 camcorders. (Digital camcorders can also output S-Video, but you'll get better results with digital output ►

YOU GO HIGH, I'LL GO LOW: The video capture cards and editing software from Pinnacle Systems make cinematography so easy, you'll wonder why Spielberg and Scorsese get all that money. We found the \$199 Studio DV—an integrated package of IEEE 1394 capture card and video editing software—one of the simplest editing packages to use. But it still provides features to create everything from a sappy tear-jerker to a film noir. Its burly cousin, the \$999 DV500, includes a capture card with IEEE 1394 ports, plus a breakout box for connecting analog video sources. It also comes with Adobe Premiere RT, a version of the high-end editing package that renders most transitions and effects on the fly.

PINNACLE SYSTEMS'
\$199 Studio DV (top) and
\$999 DV500 (packing
Adobe Premiere RT).



MOVIE Stars

Special features	Ease of installation	Learning curve	Export formats	Comments	Product info number ¹
Three IEEE 1394 ports, optional wizard interface, 100 transitions, can use MP3 audio	Good	Moderate	Composite (NTSC) video, S-Video, DV, AVI, QuickTime, MPEG-1, MPEG-2	Wizard-based interface makes it simple to produce basic movies, but single-window display makes editing difficult.	610
Optimized for DV, batch capture, supports QuickTime plug-ins, still capture	Good	Moderate	DV, QuickTime, AVI	Powerful DV-focused editing environment for more-advanced users; editing software is easier to learn than Adobe Premiere.	611
Real-time rendering, still capture	Excellent	Easy	DV, QuickTime	Good choice for beginners. Extensive export capabilities.	612
Real-time rendering, 3D transitions, plug-in DV capture	Moderate	Difficult	Composite (NTSC) video, S-Video, DV, AVI, QuickTime, MPEG-1, MPEG-2 ²	Powerful package for professional-level work. But getting the most from Adobe Premiere takes time and effort.	613
Advanced graphics card; breakout box with analog and S-Video inputs and outputs	Moderate	n/a	Included editing software has been discontinued and was not evaluated	Excellent graphics card upgrade, built-in TV tuner, but no digital video-capture capabilities.	614
300 titles and transition effects, automatic fill music	Good	Easy	Composite (NTSC) video, S-Video, AVI	If you have an analog rather than a digital video camcorder, this package offers excellent features and is easy to use.	615
Can capture low-res preview-quality video, 300 titles and transitions, automatic fill music	Excellent	Very easy	DV, AVI, MPEG-1, QuickTime	Best choice for beginners, yet is chock full of features for more-advanced users.	616
Real-time rendering, breakout box	Moderate	Very hard	Composite (NTSC) video, S-Video, DV, AVI, QuickTime, MPEG-1, MPEG-2 ²	Powerful features for advanced users at a ground-breaking price. Handles both analog and DV.	617
Slick effects and transitions, multiple export options, third-party plug-ins available	Moderate	Very hard	Composite (NTSC) video, S-Video, DV, AVI, QuickTime, MPEG-1, MPEG-2 ²	Powerful capabilities but difficult to learn. Requires a hefty CPU and lots of RAM for optimum use.	618
Special effects such as blur and ripple, 3D transitions and titles, video overlays	Excellent	Moderate	Composite (NTSC) video, S-Video, DV, AVI, MPEG-1, MPEG-2	Easy to use for basic moviemaking. Inexpensive, yet comes with extensive capabilities.	619
SCSI interface offers support for dedicated hard drives	Moderate	n/a	n/a	Expensive, but the logical choice for serious users who want to connect SCSI drives for storing video.	620

and a digital capture card.) The Pinnacle DV500 provides IEEE 1394 ports on the card and a breakout box with analog inputs. All three products come with capture and editing software.

Digitizing analog video poses some inherent challenges. First, video must be highly compressed for importing into your PC. Then, after editing the video, it gets decompressed for writing the finished product to tape. The video remains compressed—and may be further compressed—if you're creating a RealVideo file for a Web site or an AVI file for a CD-ROM.

The amount of compression is governed by a *codec* (compressor/decompressor) algorithm. Both the Matrox Marvel G400-TV and the Pinnacle DC10plus use the M-JPEG (Motion-JPEG) codec, the most common for video work. M-JPEG, however, is a "lossy" codec, meaning it actually

discards part of the video to decrease its file size. Often the process can degrade the image quality. The degradation won't be as visible if you start with high-quality video, like that produced by a Hi-8 camcorder. But if you start with the lower-resolution video produced by a VHS, VHS-C, or 8mm camcorder, the quality loss can be dramatic. You may not require the highest quality if you're editing backyard family videos, but you may feel differently if you're shooting company training films or an "event video," such as a wedding.

The Pinnacle DV500, in contrast, uses the "lossless" digital video (DV) codec that doesn't discard data, even for storing captured analog video. That codec preserves better quality than M-JPEG, even with video from low-resolution cameras. But the best results still come from a high-quality analog original or from a digital source. As always: Garbage in, garbage out.

TUNE IN, DROPOUTS

EACH SECOND OF VIDEO is made up of 30 individual frames—still images that your brain assembles to form the illusion of full motion. At less than 30 frames per second, video can look choppy, especially in scenes with a lot of movement. Unfortunately, frames are sometimes lost, or "dropped" when video is imported to a PC.

Many things can cause frames to drop. If your PC's processor can't digitize the data fast enough or its hard drive can't spin fast enough to write it, you may lose frames. That becomes more likely if you have other applications running in the background, hogging system resources. Sometimes we saw dropped frames at the beginning of a capture session because the camcorder took a few seconds to come up to speed.

Some capture cards are also more prone to dropping frames. Both the Matrox Marvel G400-TV and Pinnacle DC10plus cards dropped frames in nearly every capture session, causing the video to look jumpy sometimes. In our repeated tests, both the Matrox and Pinnacle products lost anywhere from a couple to several dozen frames during 15-minute capture sessions. The Pinnacle DV500 seldom dropped frames when capturing analog video.



When it did, it tended to lose only one or two at the very beginning of a capture—making the bad footage easy to trim.

You won't notice the occasional dropped frame. But put enough of them together, and your finished video starts to look like a film that was spliced too many times. You can minimize the damage by capturing at a lower resolution, choosing a different codec (some require less CPU power), or reducing the quality setting within the codec. Also, close all other applications—if your e-mail automatically checks for messages in the middle of a capture session, you'll probably lose frames. In addition, we found that video editing performance bogs down if your PC is connected to a network.

The Matrox Marvel and the Pinnacle DC10plus are relatively easy to set up and use, despite minor problems with dropped frames, and both work well for most purposes. We especially liked the Pinnacle DC10plus's bundled capture and editing software, which provides features similar to those in the company's Studio DV (covered below). For the serious video maker, the pricey Pinnacle DV500 will take more effort to learn, but it will give much better editing results.

For analog capture, however, our nod goes to the Matrox G400-TV because it accelerates 2D and 3D graphics performance and includes a few useful extras, such as the breakout box.

IMPORTING DIGITAL VIDEO

IMPORTING DIGITAL VIDEO into your PC is considerably easier than capturing and digitizing analog video, because you're merely copying digital data from the camera to the PC across a high-speed link—just like copying files from any PC storage peripheral. Think of a DV camcorder as a digital tape backup drive, with each standard one-hour tape holding 13GB of data.

Digital camcorders have their own on-board circuitry that compresses the video data coming from the CCD (charge-coupled device) before it's written to the digital tape. And unlike the lossy M-JPEG compression used by most analog capture cards, the industry-standard DV codec is lossless, resulting in very high-quality images. In addition, the video never suffers from the deterioration incurred by analog-to-digital-to-analog conversions (which happens when you capture video from our analog camcorders, edit it, then export back to the camcorder).

Even when you import digital video into your PC via the fast IEEE 1394 interface, you can't transfer it any faster than your ►

BREAKOUT: The Matrox Marvel card (below) comes with a breakout box (left) for connecting cables.





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camcorder can play a tape: Five minutes of tape take 5 minutes to transfer. No digital (or analog) camcorder offers a higher transfer rate, mainly because transferring at normal playback speed is already taxing for most PCs.

The various bundles we reviewed that come with both an IEEE 1394 capture card and editing software include Pinnacle's Studio DV (\$199), Studio DC10-plus (\$229), and DV500 (\$999); Digital Origin's IntroDV (\$199), EditDV 2.0 (\$799), and MotoDV Studio 2.0 (\$899); and ADS Technologies' Pyro Digital Video 1394 card (\$99). Adaptec's \$699 HotConnect Ultra 8945 card doesn't include editing software, but it does have an Ultra Wide SCSI interface for connecting fast hard drives to store the video.

We installed each 1394 capture card in our test systems without much difficulty. Windows detected every card on startup and asked for a driver. (You will need to be running Windows 98, and preferably Windows 98 SE for the best IEEE 1394 support.) Although Windows 98 includes its own IEEE 1394 driver, it's crucial that you use the driver that comes with the card you install: We found that Windows' generic driver invariably caused more dropped frames.

PUTTING IT IN THE CAN

DV CONTENT STREAMS from the camcorder to your PC (and back when you write to tape) across the 1394 bus at 3.6MB per second. A little math shows why you need a big (and fast) hard drive: Just 15 minutes of captured video, for example, will take up more than 3.24GB of hard disk space. To be safe, you should have a hard drive capable of writing 4MB of data per second (most modern drives can handle that). A slower drive may interrupt the data flow, resulting in dropped frames.

Overall, we found that IEEE 1394 cards did a good-to-excellent job at capturing digital video. But even with their ultrafast transfer rates, the cards may still drop frames occasionally. Pinnacle's DV500 card was the performance exception—it never dropped frames in DV capture. The Adaptec HotConnect Ultra 8945 card came in a close second to the Pinnacle.

All editing software uses similar methods for working on footage. Video is captured in segments that are saved as different files, or clips. You can trim either end of a clip, but you can't

Choosing a Camera

posed to the 250 for VHS-C, 350 for 8mm, and 400 for Hi-8. And because it's digital, video can be copied to a PC, edited, and copied back to a fresh DV tape without any loss of quality.

Mini-DV cameras from manufacturers such as Canon, Panasonic, Sharp, and Sony use a matchbox-size tape cartridge that stores an hour of video (or 90 minutes in extended mode, which degrades quality slightly). Sony's high-end digital camcorders store video in mini-DV format, but its consumer-level cameras, dubbed Digital8, store DV data on standard, less-expensive Hi-8 analog tapes instead of DV cartridges, and you can even use lower-cost 8mm tapes. Mini-DV tapes cost about \$12 each and hold one hour of footage; Hi-8 tapes cost \$6 to \$10 (depending on quality) and hold two hours.

Most digital camcorders (mini-DV and Digital8) include IEEE 1394 ports for copying video to and from your PC. Standard features on nearly every unit include CD-quality stereo sound, automatic focus and exposure, image stabilization (a mechanism that reduces jumpiness in video), and flip-out LCD viewfinders.

Best of all, prices of DV camcorders are falling rapidly, with models starting at about \$700. Higher-priced models (in the \$1200-\$1500 range) offer advanced features such as built-in special effects and the options of manual focusing, exposure, and shutter speed.

PANASONIC'S PV-DV910
digital camcorder records
on mini-DV tapes.



cut anything out of the middle unless you further subdivide it into smaller files whose ends fall into the areas you want to edit.

Every DV-enabled software package we tested has an interface that allows you to control your camcorder (play, pause, fast-forward, and so on), thereby turning your PC into a video-editing tape deck. You can preview your video in a small window on the PC, but you can also connect your camcorder to a standard television or video monitor. To import video from the camera to a computer, simply click a capture button on your screen. The software will signal your camcorder to begin playing.

Pinnacle's products have software that automatically divides a tape into clips and creates a gallery of thumbnails showing the beginning of each scene. (Most of the other applications we reviewed require you to create individual clips manually.) With any of the products, you can capture clips based on jumps in the time code: All DV camcorders automatically embed a date, time, and frame code into the video signal, and all the applications can read it. However, Pinnacle's software can recognize when content has changed—a new camera angle, for example—even if you haven't stopped taping between scenes.

THE CUTTING ROOM FLOOR

AFTER YOU'VE IMPORTED YOUR VIDEO and assembled your clips, the editing begins. The nitty-gritty of the process involves putting segments of video in the order you desire and trimming them. Then you can add transitions, titles, and even background music or narration to create a polished product.

The software packages we tested accomplish these tasks in

either a "storyboard" or a "timeline" format. In a storyboard, you arrange clips containing both video and audio in linear order by dragging and dropping them into a window, then adding transitions between them. In this process, clips are represented by thumbnail images of a single frame. In a timeline format, video clips, audio tracks, titles, and transitions each have their own separate, stacked bars, which can overlap.

Putting It All Together

YOU OWN A DV CAMCORDER, and you're sitting on piles of tapes. Now it's time to put together a movie. Although the packages we looked at all have their own personalities, the basic steps are similar. Here's how it works with Pinnacle's Studio DV.

1 GRAB THAT VIDEO

The on-screen controls let you choose the video you want to import. Studio DV automatically creates discrete clips from the video stream.



2 ASSEMBLE AND TRIM



Assemble the clips in logical order by dragging them onto the storyboard. Then trim each clip to weed out the boring parts.

3 ADD TRANSITIONS

Wipes, fades, dissolves, and other effects smooth the transitions between scenes and give your movie a professional look. Drag transitions onto the storyboard between clips.



4 CREATE A TITLE



Most packages use a desktop publishing paradigm, letting you choose fonts and styles for the title. You can also use animation effects on titles, but don't overdo it.

5 ADD MUSIC AND SOUND EFFECTS



Choose a song and drop it into the timeline. (Most packages also let you import music from CDs.) Then add sound effects and narration (not shown here) if your video calls for it.

6 CHECK IT OUT

When all the edited clips, transitions, titles, music, and sound effects are assembled, you can preview the movie on screen to make sure you're happy with it.



7 LET'S GO TO THE VIDEOTAPE



When everything is just right, instruct the software to render the movie (generate the finished video) and write it back to a blank tape in your DV camcorder.

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Both the storyboard and timeline methods depend largely on dragging and dropping. We found the storyboard approach much easier and more natural for beginners. But a timeline gives you more control over the finished product because you can tweak elements individually. Most of the packages we tested feature both the storyboard and timeline options. The exceptions are the MGI VideoWave II, which offers only a storyboard, and the high-end Digital Origin EditDV, which uses the timeline format only.

Both storyboard and timeline let you insert transitions to smooth changes between video clips. All the editing packages offer a large variety of pre-made transitions, ranging from simple fade-out/fade-in to psychedelic twirling à la Batman. We found the simplest transitions (fades and dissolves) looked the most professional; the fancier ones were more jarring.

The editing software gives you the option of easily adding titles—stationary or animated words on top of the video—with a variety of fonts and colors. You can also add music and narration (though voiceovers can be tricky, because you must match them exactly to the length of clips). Each package comes with a library of sound effects and music clips. But we especially liked the Pinnacle products, which provide a wide variety of background music tracks in many different styles and automatically fit them to the length of your video.

Each editing package we tested is intended for a different audience and level of experience. Overall, Pinnacle Systems' Studio DV best combines features, ease of use, and affordability. It's the most intuitive we tested, allowing you to create basic videos in the shortest time but also offering more advanced features than you'd expect from such a low-cost package. For very simple edits, try the Ulead VideoStudio 4 software bundled with the ADS Pyro Digital 1394. It includes a step-by-step wizard for basic edits. MGI Software's VideoWave III is a well-priced package that includes some eye-popping visual effects, such as the ability to layer multiple video clips and vary their opacity.

Adobe Systems' Premiere 5.1 and Digital Origin's EditDV 2.0 are for professionals, although that doesn't preclude their use by casual filmmakers. If you invest in one of these packages, however, be prepared for a steep learning curve, especially with Pre-

miere. In addition, Premiere pushes your PC to its limits.

Pinnacle's DV500 package includes Premiere RT, an advanced version of Premiere available only when bundled with capture cards. Its real-time feature allows you to view the movie as you

create it. With other packages, you can see a video in its entirety only after you've rendered it—that is, hit a button to implement the trims, transitions, and other effects you have selected while editing.

We didn't test the Avid Cinema software included with the Matrox Marvel G400-TV, because it may no longer be available when you read this (and at press time, Matrox hadn't decided what software will replace Cinema).

LET'S GO TO THE TAPE

THE FINAL STEP in the process is rendering, in which all the parts of your movie are combined in a format that can be written to videotape or other media. The rendering time depends on several elements, including the length of your movie, the number and complexity of the effects, the speed of your PC, its available RAM, and hard disk speed.

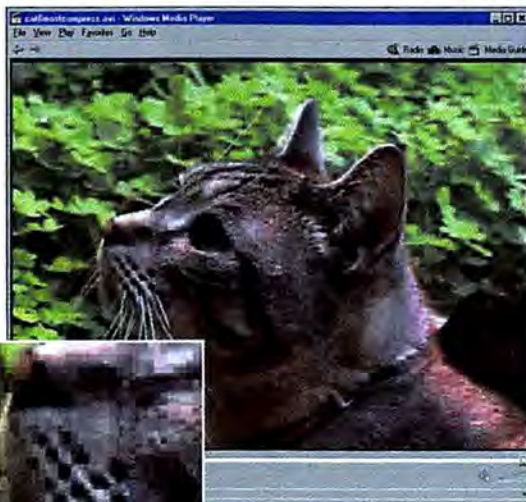
Rendering uses all your PC's resources and can last from a few minutes for a simple, short movie (say, two minutes with only a couple of transitions and titles) to an hour or more for a longer, complex project. Real-time products, like the version of Adobe Premiere included in Pinnacle's DV500, reduce rendering time because they implement many simple effects as you're editing the video. Ulead's software and Digital Origin's IntroDV both offer similar features that do some of the job in

the background as you edit. However, with these two products, you must still render the finished movie at the end.

Pinnacle Studio DV offers a "preview" capture mode that stores a low-resolution version of the raw video for your editing work. Instead of the 3.6MB of data per second required for a full DV-compressed file, the preview uses about 50KB per second. After you've put your movie together in the preview mode, simply hit a button, and Studio DV automatically captures the full-resolution video from the original DV tape, then implements all the edits and effects you've selected for the finished product. Making our edits in this low-resolution mode didn't seem to affect quality, and we liked how the process speeds up editing.

In most cases—especially with digital video—you'll want to export your finished masterpiece to a fresh DV tape in a cam-

COMPRESSED KITTY: Regular DV video is sharp and clear (top), but it can get fuzzy (bottom) if you compress it too much for the Web.



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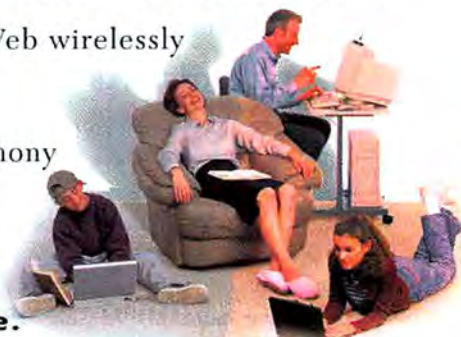
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corder. All the products we reviewed can export to DV format, but they differ in their ability to export finished video in other formats. Digital Origin's products, for example, export to QuickTime files that play on both PCs and Macs. Pinnacle Studio DV's software can save your video as AVI or MPEG-1 files that play on virtually any computer. With all of these formats, you can vary the level of compression—trading file size against quality—depending on whether the movie is destined for videotape or the Web (Studio DV can also save your output as a RealVideo file for posting on a Web site).

Some software packages offer more exotic export options. Ulead VideoStudio 4 and MGI VideoWave III can export video in high-quality MPEG-2 for writing to a DVD-ROM—assuming you have access to a DVD-ROM recorder. But the title for most comprehensive output goes to Digital Origin's EditDV, which lets you fine-tune the output for a variety of media—tape, Web, CD—using a large selection of different formats and codecs. Adobe Premiere is mainly designed for export to videotape in a wide variety of formats, including professional broadcast, but it can export to other formats as well.

AND THE OSCAR GOES TO...

IF YOU'RE A BEGINNER or you don't require professional quality, we suggest going with an integrated package such as Pinnacle's Studio DV. It will serve a wide range of users working with digital video. For those with analog camcorders, the Matrox Marvel G400-TV performs well.

If you're looking at more serious projects, such as training videos, or you dream of making your own independent movie, you may want Pinnacle's professional-level DV500 package. Although its \$999 price sounds high, it offers features and capabilities that cost \$12,000 to \$15,000 just a couple years ago.

The movies you make with these packages may not get you a call from Spielberg's people. But with a bit of effort, you'll be able to produce a quality finished project that your audience will gladly watch, even without a pot of strong coffee to keep them awake.

Stan Miastkowski is a PC World contributing editor.

ANALOG Video that is stored as a stream of varying signal strengths on tape used by VHS, VHS-C, 8mm, and Hi-8 camcorders.

CAPTURE Import video from a camcorder to a PC for editing.

CCD Charge-coupled device—a chip that converts light into electrical signals, analogous to the eye's retina.

CLIP A segment of captured video. Individual clips can be assembled into a finished movie.

CODEC Short for compressor/decompressor. A protocol dictating how

to compress video (for convenient storage and editing) and decompress it for writing back to tape.

COMPOSITE VIDEO An analog video format with all information encoded into a single signal.

DIGITAL Video stored in a binary (computer) format.

DIGITIZE Convert video from an analog source into digital format.

DISSOLVE A video effect in which one scene fades out while another fades in.

DV Abbreviation for Digital Video. DV camcorders store video in binary code (ones and zeros) instead of varying analog signal strengths.

FRAME A single still image of video. Showing frames in succession gives the illusion of movement.

HI-8 A high-quality 8mm analog camcorder format that produces 400 lines of resolution.

IEEE 1394 A high-speed serial interface (also known by brand names FireWire and i.Link) for copying digital video to a PC and back to the camcorder after editing.

LOSSLESS COMPRESSION Compression that doesn't discard data, thereby preserving the original quality. DV is an example.

LOSSY COMPRESSION Compression that discards some of the data in video to minimize the storage space required. M-JPEG is an example.

RENDERING Combining all the elements of an edited video into a format for writing to tape or other media.

S-VIDEO A video signal used by Hi-8 camcorders, in which the luminance (brightness) and chrominance (color) information are separated. Most DV camcorders also offer S-Video connections.

TIME CODE The date, time, and frame information embedded in DV recordings; it can be read by editing software to break up clips.



TOP: An IEEE 1394 cable. RIGHT: Adaptec's HotConnect Ultra B945 provides 1394 and SCSI.



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Trading Up

In an **effort** to lure **investors**, online brokerages have **added** new and better **features**. So **where** should you put your **money** today?

BY DOUGLAS GERLACH



JOHN STAPLETON, a retired sales engineer from Feasterville, Pennsylvania, has more than 40 years of investing experience. In his lengthy tenure, he has seen a sea change in the investing arena, through his accounts at full-service firms, discount brokers, and now, an online broker. "I would never again use a broker that was *not* online," he says. As an investor who makes 50 trades a year, Stapleton has been able to cut his per-trade commission down from \$30 plus to just \$8 by moving his accounts to low-cost brokerage house

Ameritrade. Stapleton figures that he saves more than \$1000 a year just in commission fees.

Stapleton isn't alone in his newfound love for online trading. According to research firm Forrester Research, 3.1 million households in the United States were trading online at the end of 1999, up from 2.2 million in 1998. That number is expected to grow to 6.7 million households by 2002 and to 9.7 million by 2003. ▶

ILLUSTRATIONS BY VICTOR JUHASZ

NET GROWTH, BIG BOOM

THE PAST DECADE has been a great time for investors. The record-breaking bull market is one reason, and for investors like Stapleton, the Web is another—it brings a new sense of financial independence to investors. All you need is a computer, an Internet connection, and an online brokerage account, and you can take advantage of all kinds of customized tools, research, and access—albeit limited—to initial public offerings to make your own trading decisions.

More than 160 companies now offer online brokerage services, although just 15 firms make up 96 percent of the online brokerage market, according to research company U.S. Bancorp Piper Jaffray. These days, cut-rate commissions aren't the only major draw of online brokers. Since our last look at online brokers (www.pcworld.com/feb99/top_brokers), most of these cyberinvestment houses have added new perks to lure customers. Now, Web traders not only can point and click their way through screens of research, they also can write checks from the funds in their accounts, pay bills online, and even apply for a mortgage.

Another promising trend is the personalization that some online brokers offer on their sites. At Charles Schwab, for instance, investors can set up a customized MySchwab page that includes financial information as well as sports news, weather reports, personal reminders, and dozens of other categories.

TRADE ANYTIME, ANYWHERE?

FOR INVESTORS WHO just can't get enough of the stock market, many brokerages are offering extended trading hours. All but one company that we

looked at, Suretrade, now offer after-hours trading—that is, sessions after the market closes usually lasting until 8 p.m. EST. But the number of stocks you can trade after-hours is limited, and stock prices can swing widely.

Don't worry that you'll have to stay tied to your PC day and night to make trades, however. Many brokers are now offering wireless trading via PCS phones or handheld devices (see also "Wireless Trading: Should You Care?" on page 187).

Online investors have another reason to rejoice besides these new services. Last year, 24-hour phone support seemed nonexistent; this year, all of the ten major brokerages we reviewed provide 24-hour toll-free support during the trading week. And in most cases, our e-mail to each broker's customer service department was answered in less than 24 hours—a far cry from last year, when some firms, like DLJdirect, ignored our e-mail to customer service altogether.

RESEARCH NOT RICH ENOUGH

IN THE GOOD old-fashioned days, brick-and-mortar brokerage houses tended to own their customers and manage the

Best Bets



YOUR MONEY IS in good hands with both Charles Schwab (www.schwab.com) and DLJdirect (www.dljdirect.com). Schwab offers lots of terrific educational tools and personalization options. And in addition to premium research for large accounts, DLJdirect has attractive minimum commission fees—it doesn't matter if you trade by phone or online.

RATING THE BROKERS

FEATURES COMPARISON

TRADING SITE ¹	Minimum initial deposit	Online trade commission	Phone trade commission ²	Maximum shares traded at minimum commission	Extras for large accounts or active traders	Access to IPOs/min. assets required	After-hours trading
Charles Schwab 800/435-4000 www.schwab.com	\$5000	\$30	\$35-\$39	1000	Exclusive research and software, discounted commissions	●/\$500,000	●
E-Trade 800/387-2331 www.etrade.com	\$1000	\$15	\$15-\$35	5000	Preferred IPO access, private message boards, real-time quotes and charts, commission rebates	●/None	●
TD Waterhouse 800/934-4448 www.tdwaterhouse.com	\$1000	\$12	\$35-\$45	5000	Customer support trading desk, futures trading	○	●
Fidelity 800/544-6666 www.fidelity.com	\$5000	\$15	\$39-\$59	1000	Discounted commissions, active traders have access to Powerstreet Pro	●/\$500,000	●
Datek Online 800/823-2835 www.datek.com	\$2000	\$10	\$25	5000	None	○	●
Ameritrade 800/454-9272 www.ameritrade.com	\$2000	\$8	\$12-\$18	Unlimited	None	○	●
DLJdirect 800/825-5723 www.dljdirect.com	None	\$20	\$20	1000	Real-time streaming quotes and news, extended research, waived fees, discounted commissions	●/\$100,000	●
Morgan Stanley Dean Witter Online 800/688-6896 www.online.msdcw.com	\$2000	\$30	\$30-\$40	1000	Free access to Morgan Stanley Dean Witter research, personal trader, VIP rep	●/\$100,000	●
Suretrade 401/642-6900 www.suretrade.com	None	\$8	\$12-\$33	Unlimited	None	●/*	○
National Discount Brokers 800/888-3999 www.ndb.com	None	\$15	\$20-\$25	5000	Multiple purchases or sales of same stock on same day with one commission	●/*	●



Best Bet

● Yes ○ No

All brokers on this chart offer 24-hour toll-free support.

¹ Online brokerages ranked in order of average trades per day. Source: U.S. Bancorp Piper Jaffray, a subsidiary of Minneapolis-based U.S. Bancorp (www.piperjaffray.com).

investments on their behalf. With the advent of online trading, brokers are providing more research and tools so customers can make their own independent trading decisions. But we are not tremendously impressed with most of these recent enhancements. For instance, the Stock Analyzer tool on Schwab's site is merely a repackaging from Microsoft's Money Central. And the Standard & Poor's Stock Reports that E-Trade and DLJdirect added is a research mainstay already available on other sites. We were also disappointed in the so-called educational articles. These often turned out to be generic warnings from the Securities and Exchange Commission.

As far as the transactions themselves go, note that all brokers except Datek and DLJdirect penalize customers for using a telephone to make trades (that applies to touch-tone service and talking to a live rep). But if you trade exclusively online, what happens when you can't access your broker's site? Most brokers will honor their online commission rate if they are



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experiencing technical problems that prevent you from connecting to their servers and you must place your order by phone. There are exceptions: Ameritrade charges the higher broker-assisted rate for all phone orders even if its servers are down.

BROKERS WITH THE MOSTEST?

AFTER THE DUST of our investigation settled, a couple of favorites emerged. We liked Charles Schwab's feature-rich package of educational resources and customization tools. We were also impressed with DLJdirect's extras for large account

holders and its standard commission structure—you pay the same minimum fee however you trade. However, despite Ameritrade's low fees, we were disappointed with its scanty research and educational tools.

In other recent developments, Discover Brokerage changed its name last October to Morgan Stanley Dean Witter Online, and at press time, there was a new kid in our midst: Investment house Merrill Lynch finally opened its doors to online traders last

December (see "Full-Service Brokers Jump Online," page 174). Finally, while more online brokers now offer access to IPOs, that option is still restricted to customers with large accounts.

In general, we were impressed with the range of trading options and new features at the brokers' sites. But before weighing each brokerage's offerings, you need to figure out what kind of investor you are. How you invest will determine where you invest. We talked to people with four distinct investing styles to learn how they use online brokerages to meet their needs. ►

Online service guarantee	Wireless trading	Free check-writing	Other financial features	Account features	Third-party research	Account customization
●	○ ³	● ⁴	Visa debit card, online bill payment	Live chats with experts, Stock Analyzer research tool, Learning Center	Briefing.com, Media General Financial Services, Quote.com, S&P's ComStock, Zacks	MySchwab by Excite
●	○	●	Online mortgages, insurance, banking, Visa card	Stock alerts by e-mail, Tax Center, live chats with experts	Baseline, ClearStation, Morningstar, S&P's, The Street.com, Zacks	○
●	○ ³	●	Visa and ATM/check card, banking through TD Waterhouse Bank	Unified research screen for evaluating current holdings	BigCharts, Briefing.com, MarketEdge, Morningstar, NewsAlert, Quote.com, S&P's Stock Reports, Zacks	○
Varies ⁵	●	●	Online bill payment, Fidelity American Express card	Chart of your portfolio	Lehman Brothers, S&P's Stock Reports	My Fidelity by Lycos
●	○	●	None	No commission charged for trades that take longer than 60 seconds	BigCharts, NewsAlert, Thomson	○
○	●	●	ECHECK Secure for transferring funds from a bank account	Guide to Online Investing that addresses basics but not Web specifics, stock alerts by e-mail	BigCharts, Reuters	○
○	●	●	Online mortgages, Gold MasterCard debit card	Free MarketSpeed trading and analysis software, e-mail alerts	Briefing.com, Lipper, S&P's MarketScope@Home and full stock reports, Thomson, Zacks	○
●	●	●	Electronic funds transfer, automatic mutual investments, direct deposit	Blue Chip Basket with Dogs of Dow strategy for low commission	MarketHistory.com, Reuters, Thomson, Zacks	○
●	●	○	Online mortgages and insurance	Very low margin rates	Briefing.com, Stockpoint, Zacks, Wall Street Source	○
●	○	●	MasterCard debit and ATM card, Platinum Visa card	DuckBucks gift certificates redeemable for commissions	Briefing.com, MarketGuide, Stockpoint, Wall Street Transcript, Zacks	○

² Where a range is noted, the lower figure is for trades via touch-tone phone; the higher is for broker-assisted trades.

³ Plans to offer wireless trading later this year.

⁴ \$100,000 balance required for check-writing from funds.

⁵ Guarantee determined on case-by-case basis.

⁶ Information about minimum assets required withheld at brokers' request.

What Is Your Investing Style?

BEFORE YOU SIGN UP with any broker, consider your investing style and level of experience. Do you plan on trading several times a month? Do you need hand-holding when you're making investments? Chances are, you fall into one of the following four categories.

THE NEWBIE

IF YOU'RE NEW TO online investing, top-notch customer service can be very important. Just ask Diane McNally. A retired landscape contractor in Martinez, California, McNally began investing two years ago, around the time she started using the Web. When her husband decided to take early retirement, the couple interviewed various financial advisers to find someone who could help them make their nest egg last. Unfortunately, McNally came away from those meetings with the distinct feeling that "nobody watches my dime as well

as I could." So, she decided to take control of their portfolio. McNally turned to Schwab for help. "I was

looking for someone to hold my hand and take away the intimidation factor while I was learning about investing," she recalls.

Many investors are reassured to know that they can visit a local branch office if they have problems. TD Waterhouse, Fidelity, and Schwab have large networks of branch offices that you can visit when there's a problem. Davis, California, pharmacist Tom Jones chose TD Waterhouse, not only for the low commissions, but for the presence of a local office.

Brokerages like Schwab and E-Trade take investor education seriously, and offer planning tools, articles, and other resources on their Web sites to help you take control of your portfolio.

THE BUY-AND-HOLD TRADER

INVESTORS WHO FOCUS on long-term returns buy stocks and then hold on to them for years. For these investors,

commission fees aren't always the most important consideration. The research and services that an online brokerage offers is more valuable than a \$15 savings per transaction. Schwab, E-Trade, and TD Waterhouse all offer plenty in this department. And DLJdirect, Morgan Stanley Dean Witter Online, and Schwab provide more research for large account holders.

Many buy-and-hold investors spread their accounts among several firms. Take Ann Dexheimer, for instance. Dexheimer, who lives in Pleasanton, California, knows what she wants from her online brokers—all five of them. She makes a mere five stock trades a year within her eight accounts held by DLJdirect, E-Trade, TD Waterhouse, Morgan Stanley Dean Witter Online, and Schwab. Dexheimer recently consolidated a bit, closing still other accounts at Ameritrade and Dreyfus (www.dreyfus.com).

Commissions aren't terribly important to Dexheimer. "I like the services and

Full-Service Brokers Jump Online

IN THE ANNALS OF ONLINE investing, it was a retreat comparable to Napoleon's departure from Waterloo. Less than two years after Merrill Lynch vice chair John Steffens lambasted Internet trading as no less than "a serious threat to Americans' financial lives," Merrill Lynch launched online trading.

Last December, facing the wrath of its army of brokers, the largest U.S. investment house created Merrill Lynch Direct (www.mldirect.com), with commissions as low as \$30 per trade. In the new program, Merrill Lynch offers three options: Clients can choose whether to trade online (without the benefit of a broker's advice) or under a broker's supervision and guidance (paying the full commission per trade); or they can pay a flat annual fee and make an unlimited number of trades. The real benefit of having an account with Merrill Lynch Direct may not be the monetary savings,

but access to the company's top-rated research. The downside? You'll have to pony up \$20,000 to open an account.

Other full-commission brokers are fast on the heels of Merrill Lynch, offering some level of online trading. Prudential Securities (www.prudentialsecurities.com) offers an asset-management account that allows investors to pay a flat annual fee (up to 1.5 percent of the account value) and trade online for \$25 per transaction. Salomon Smith Barney (www.salomonsmithbarney.com) and Paine Webber (www.painewebber.com) also offer online trading. Paine Webber, for instance, offers a full-service fee-based account with online trading; its minimum annual fee starts at \$1500.

For the most part, though, these full-service latecomers don't offer the best of both worlds. It still comes down to whether you are willing and able to take control of your portfolio (and thus trade online for a song),



or if you'd rather pay a pro to manage your investments (and pay the piper heartily). While it's too early to compare the new online features of the firms in this crowd, the leader of the pack, Merrill Lynch, already seems to stand out in terms of the wealth of research and services it makes available to its clients.

research capabilities DLJdirect gives to account holders with certain balances," she explains. "And TD Waterhouse was one of the few brokers that would let me set up Roth IRAs for my children." Dexheimer also cites TD Waterhouse's S&P's Stock Reports and DLJdirect's e-mail stock alerts as top-notch research tools.

In addition to the features Dexheimer's brokers offer, buy-and-hold investors may appreciate E-Trade's research and tools.

THE ACTIVE TRADER

SOME INVESTORS BUY and sell stocks as frequently as the weather forecast calls for smog in Los Angeles. For these active traders, low cost is key. Ameritrade and Suretrade offer no-frills service and prompt execution, as well as dirt cheap commissions.

John Stapleton, an active trader in Pennsylvania, is committed to online trading. "It's just so much more convenient to check the stock price on my brokerage's Web site, and then click to buy or sell," he explains. "Forget about touch-tone trading or waiting on the phone; point and click is much easier."

With 50 trades in a typical year, Stapleton finds low commissions important. That's why he moved from Schwab to Ameritrade. "I had three accounts with Schwab," he reports. "But the \$8 commissions at Ameritrade are much better than the \$30-plus I was paying at Schwab. So I switched."

Active traders might also be interested in the option of after-hours trading, or the promise of wireless, "anytime, anywhere" trading offered by Ameritrade, DLJdirect, Fidelity, Morgan Stanley Dean Witter Online, and Suretrade.

THE DELEGATOR

ONLINE BROKERS AREN'T for everyone. If you're not willing to take complete control of your investing decisions or don't

Name: Tom Jones
Investor type: Newbie
Online broker: TD Waterhouse
Occupation: Pharmacist
Location: Davis, California

"When I first began to invest online, I really liked being able to march into a branch office to set up the account."

want to take the time to research and analyze your stocks, then working with a full-service broker or financial adviser might be your best choice. Firms like Prudential Securities (www.prudentialsecurities.com), Salomon Smith Barney (www.salomonsmithbarney.com), and Merrill Lynch can partner you with a broker who will advise you on the strategies and investments most appropriate for your financial goals.

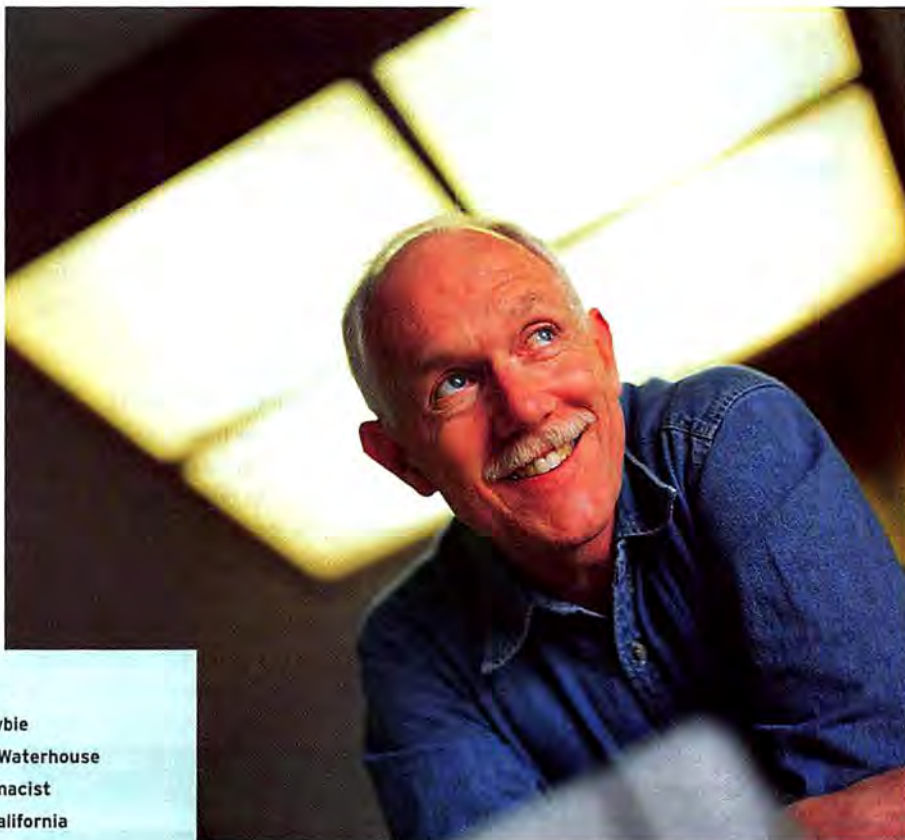
Some investors choose to split their portfolio between a full-service firm and an online discount, especially if they aren't ready to make the full leap to online trading. But if you are not prepared to manage your own account, don't jump onto the online bandwagon—stick with a full-service brokerage house you trust.

Scott and Melanie Hoyer of Lake Oswego, Oregon, have worked with an adviser at Paine Webber for several years but wanted to take advantage of the abun-

dant research, low commissions, and other investing tools offered by online brokers. Scott Hoyer moved his portfolios to Ameritrade and TD Waterhouse while his wife maintained an offline account with Paine Webber. "We've been able to bounce ideas off our adviser at Paine Webber about our other accounts, and our dialogue has worked well as an educational tool," he says.

Hoyer figures that he saves 1 to 2 percent in commissions by managing his own portfolio, while matching or exceeding the performance of his full-service broker. He is happy with TD Waterhouse's free S&P's Stock Reports, along with Ameritrade's e-mail notification service, which offers specialized portfolio alerts when news affects his investments.

The Hoyers' approach, splitting their portfolio between a full-service firm and an online discount, may make sense for people who aren't ready to convert completely to online trading. But, as Scott Hoyer points out, "Full-service offline brokers still provide a good service to those folks who are not inclined or interested in managing their own account." ▶



The Top Online Brokers

Ameritrade

SUPERCHEAP, NO FRILLS

Last year, we complained about the design of Ameritrade's Web site. We found its opening pages were slow to download. Guess what? Pages are still slow loading and unnecessarily festooned with graphics. According to Service Metrics (a Boulder, Colorado, firm that measures Web site performance), Ameritrade's site lagged behind all the brokers in our report, with pages that took an average of 7 seconds to load on a T1 connection (see "Trading on Your Broker's Site: Quick Click, or a Slow Crawl?" on page 186).

We weren't bowled over by Ameritrade's research section, either. The stock and fund departments had no particularly unusual offerings. And we were disappointed with the site's primary educational resource, the Guide to Online Investing, which should be renamed the "Online Guide to Investing," since it addresses the basics of investing but not the use of Web-based tools and trading. Finally, don't look to Ameritrade for any bonuses for large accounts or frequent traders.

So what's to like about Ameritrade? Its \$8 commissions are at the rock bottom and, unlike with most brokers, there's no limit to the number of shares you can trade at that price. The hitch? Each limit order costs \$5 extra, and touch-tone and broker-assisted trades are \$12 and \$18, respectively, and the same \$5 charge applies for each limit and stop order made by phone.

Ameritrade lets you create customized e-mail alerts that will help you stay on top of your holdings. The company also offers after-hours trading. And customer service has improved since last year, it seems: We got a prompt response to our e-mail inquiry, and in its latest Internet Broker

Scorecard, e-commerce research company Gomez.com ranks Ameritrade at number three for customer confidence.

Experienced investors with large accounts will be drawn to Ameritrade for its low commission fees. Other kinds of investors, however, may find a better partner in online brokerages with more extensive research tools and easier navigation.

Datek Online

STRAIGHTFORWARD AND SIMPLE

If you are a serious trader, you can expect fast execution and no-frills service from Datek Online. The price is right, too—\$10 commission per trade. In fact, if your order isn't executed within 60 seconds, this commission is waived. You can also trade after-hours. And Datek's site design cuts right to the chase with easy navigation and simple yet attractive layouts.

Some traders might be disappointed to



NEED HELP WITH trading decisions? Let DLJdirect's free MarketSpeed program do stock analysis for you.

find that Datek doesn't offer access to IPOs, hand-holding for newbies, or the coddling of large accounts. Its Learning Center is woefully succinct—the main feature is syndicated content from *Smart Money* magazine. Datek recently began to offer check writing to some customers, but other financial products, such as ATM and debit cards, are not offered.

Datek's site offers the bare minimum of stock research (BigCharts, NewsAlert, and Thomson). Most of its clientele doubtless have alternative sources. Investors who just want to make a straightforward transaction will appreciate Datek Online's non-nonsense, bare-bones site.

DLJdirect

FEATURE RICH



DLJdirect is the graybeard of online brokers, tracing its roots back to the days when online investing meant dialing in to your broker's computers by modem at a whopping 300-baud speed.

Even though DLJdirect has adopted the name of its full-service parent, Donaldson, Lufkin & Jenrette, the two are not intertwined. For instance, although DLJdirect offers exclusive DLJ research, you need \$100,000 in your account before you get access to those reports.

Right off the bat, the firm distinguishes itself from the rest of the pack in one respect—its minimum \$20 commission is the same whether you place a trade online, or by phone with one of its representatives. That means you don't face any obstacles if the DLJdirect site should fail, or if you want to make a trade but don't have access to your computer—a simple phone call executes your trade for the same commission.

Traders with large accounts get other perks. Waived fees, access to IPOs, discounted commissions, and real-time streaming quotes and news are provided to heavy hitters.

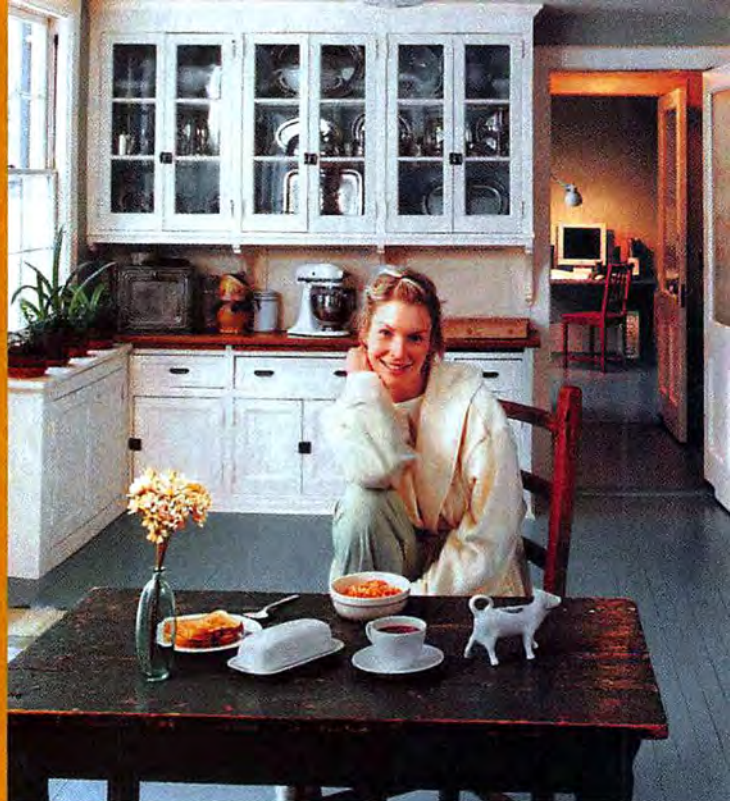
DLJdirect's roster of features also includes after-hours trading, free check-writing, an admirable collection of third-party research, online mortgages, and a Gold MasterCard debit card. The firm's free MarketSpeed trading and analysis software is a unique and innovative tool to help with trading decisions.

E-Trade

THE EVERYTHING SITE?

The party's still going strong at E-Trade, if the company's Web site is any indication. For starters, E-Trade has taken the lead in helping its customers get sociable in chat rooms and message boards. The firm now offers about 2000 boards where E-Traders can talk about their favorite stocks or pick up new tips from each other. They can also participate in weekly chats with leading mutual fund managers and other financial celebrities. And musically inclined traders should take ▶

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exactly where
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needs to be fixed.



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- 4.3GB* Ultra ATA Hard Drive
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- Intel® 3D AGP Graphics
- 40X Max CD-ROM Drive
- SoundBlaster 64V PCI Sound Card
- PC Speakers
- V.90 56K Capable* PCI DataFax Modem for Windows*
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- 15" (13.8" vis) E550 Monitor
- Intel® 3D AGP Graphics
- 40X Max CD-ROM Drive
- SoundBlaster 64V PCI Sound Card
- PC Speakers
- V.90 56K Capable* PCI DataFax Modem for Windows*
- MS® Works Suite 2000
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- 16MB ATI RAGE 128 Pro
- 48X Max CD-ROM Drive
- Turtle Beach Montego® II A3D™ 320V Sound Card
- Altec Lansing® ACS-340™ Speakers with Subwoofer
- V.90 56K Capable* PCI Telephony Modem for Windows*
- MS® Works Suite 2000
- MS® Windows® 98, Second Edition
- 3-Yr Limited Warranty* ■ 1-Yr At-Home Service*

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- 17" (16.0" vis, .24 - .25AG) P780 FD Trinitron® Monitor
- 32MB NVIDIA GeForce 4X AGP Graphics
- NEW 12X Max DVD-ROM Drive
- SB Live! Value Digital
- Altec Lansing® ACS-340™ Speakers with Subwoofer
- V.90 56K Capable* PCI Telephony Modem for Windows*
- MS® Works Suite 2000
- MS® Windows® 98, Second Edition
- 3-Yr Limited Warranty* ■ 1-Yr At-Home Service*

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- NEC Superscript 870, add \$285
- Epson Stylus Color 860, add \$199
- Epson Stylus Color 740, add \$149

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- HP® ScanJet® 6300Cse, add \$399
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Power Supply:

- APC Back-UPS Office 400, add \$99

Software:

- Family Fun 5-Pack, featuring Roller Coaster Tycoon™, add \$99

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- 1-Yr DellNet™ Internet Access¹² with 20MB of Online Access Backup,¹² add \$99



¹⁰Includes 150 hrs./month, plus \$1.50/hr. (or fraction) over 150 hours. #800/888/877 access charged \$4.95/hr. extra. Excludes taxes and telephone charges. Additional \$1.00/hr. surcharge in HI and AK. ¹¹Monthly payments based on 13.99% APR. APR FOR QUALIFIED CUSTOMERS VARIES BY CREDITWORTHINESS OF CUSTOMER AS DETERMINED BY DELL FINANCIAL SERVICES L.P. Taxes & shipping charges extra, and vary; they are due with 1st payment unless included in the amount financed. Purchase Plan from Dell Financial Services L.P. to U.S. state residents (including D.C.) with approved credit, excluding AR and MN residents. Availability may be limited or offer may vary in other states.

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The Need-for-Speed Solution

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- 128MB RDRAM ■ 40GB³ Ultra ATA Hard Drive
- 19" (18.0" vis., .26dp) M990 Monitor
- 32MB NVIDIA GeForce 4X AGP Graphics
- 12X Max DVD-ROM Drive ■ SB Live! Value Digital
- Harman Kardon HK-595 Surround Sound Speakers with Subwoofer
- V.90 56K Capable⁴ PCI Telephony Modem for Windows®
- MS® Works Suite 2000
- MS® Windows® 98, Second Edition
- 3-Yr Limited Warranty² ■ 1-Yr At-Home Service⁴

\$2699  As low as \$74/Mo., for 48 Mos.¹
E-VALUE CODE: 03749-500428b

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Congratulations. You just left Bob and his computer back there about a half a mile, standing in a cloud of your dust. Meanwhile you're cruising at Mach II thanks to the new motherboard and Intel® processors with speeds up to 866MHz. In addition, the B-series RDRAM memory technology offers up to a 116% increased memory performance gain over earlier systems.²⁸ The result — whoa! Start it up and you'll find that everything is faster, smoother, more realistic and more intense. Dell4me™ is all about helping you get the most out of your PC. Providing technology capable of warp speed, backed up by award-winning support, is just one of the ways we're making it happen.

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note: Early this year, holders of new accounts could party down with two free tickets to a Tina Turner concert. But how will wallflower investors fare at the intense cyberscene at E-Trade?

E-Trade wants to be your open-all-night, best-deal-in-town financial services super-market, aimed at anybody with a PC and a couple of bucks to invest. Need a mortgage? Click to get a loan from E-Trade

partner E-Loan. Is your insurance coverage up-to-date? Jump over to InsWeb. And before you forget, buy a few shares of stock while you're on the site, too.

Last year however, we were disgruntled with the site's three-tier system of membership, which made navigation difficult. Visitors, members, and customers each had different abilities to access areas of the site. This year, the site's organization

has improved, but the challenge of having to log in repeatedly at unexpected times is still frustrating.

Tons of research and commentary are available on the site, although sometimes the sheer abundance of information makes it hard to stay on track. And while regular customers might occasionally get a crack at an IPO, active traders get preferred access to those offerings. Active ►

Diary of a Day Trader

THE WEB HAS GIVEN birth to a new occupation: Day trading. Cheap commissions and instant access to Wall Street has some people buying and selling stocks all day long. These traders bypass online brokers like E-Trade and work from high-tech hot-houses alongside like-minded people.

Louis Forte, aged 25, is such a trader. One day in February, Forte gave us a glimpse inside his world. From the cramped offices of Broadway Trading, a block from Wall Street, he filed this report. Keep in

make money today, but most will end the day poorer than when they woke up.

8:20 a.m. Order breakfast to be delivered from local deli. Toasted bagel with jelly and orange juice. Absolutely NO coffee.

8:30 a.m. Review yesterday's price charts for three stocks: Yahoo (YHOO), JDS Uniphase (JDSU), and Qualcomm (QCOM). Buy and sell these today.

9 a.m. Market opens. Start working the keyboard. No letup whatsoever until lunch.

9:01 a.m. YHOO opened up \$2; put an order in to buy 1500 shares. Within minutes the order is filled. After another minute sell all the YHOO shares for a profit. The loudest sound in the room is the continuous clatter of computer keys.

10:28 a.m. Not even a million shares of YHOO have traded today. Sell shares of QCOM at a

loss. Darn. Talk briefly with fellow trader a few terminals down. Keep eyes fixed on monitor.

11:40 a.m. Lunch. It's slow. Don't even try to trade through it. Off to Italian deli with George Orwell's Animal Farm.

1:32 p.m. Back at work. Look at YHOO's chart—it sold off hard and then bounced back. Buy 2700 shares, then more selling.

1:42 p.m. YHOO pulls in again; buy more.

Use Watcher to put in a couple of bids to try and push it back up, but it doesn't work and the stock keeps falling. Sell for a loss.

2 p.m. One of the day traders calls a friend who works on the trading floor of a big Wall Street investment bank and puts him on a speakerphone. The voice will relay the Fed's announcement to all of us.

A Day-Trading Glossary

Short: Selling shares you don't own in the hopes that the price will decline, then buying the shares later. If the stock drops in price, you make money

Long: Buying shares of a stock, expecting that the price will increase

Pulls in: Declines in price

2:30 p.m. The Fed announces a quarter-point rate hike. Market goes a little crazy.

2:33 p.m. Try shorting JDSU for a while, but get squeezed as it rises and sell at a loss. Buy JDSU and sell it to make 7/8 on 1000 shares.

3:36 p.m. I see opportunity with QCOM, start shorting—a total of 7000 shares at around \$143 per share. I close it quickly. I just made some decent money.

3:59:55 p.m. Five seconds to go before the market closes. Place orders and close out the final positions of the day.

4 p.m. The market closes. Final tally today: Made 600 trades, traded 402,000 shares of stock. Profit/loss: A gain of \$16,460. It's been another good trading day.



For the full version of Louis Forte's trading day—including hour-by-hour details—visit www.pcwORLD.com/may00/brokers.



LOUIS FORTE and fellow day traders keep an eye on their investments.

mind, however, that day trading is risky business. While Forte might have a good day, the North American Securities Administrators Association in Washington, D.C., estimates that 70 percent of day traders lose money.

8:15 a.m. Arrive at the office. Over the next 45 minutes, 150 more day traders will filter into this room, all of them male and almost all under 30. Some of them will

traders also receive another important break: commission rebates that can bring the costs down from \$15 to as low as \$5 per trade. While you can trade in the after-hours market at E-Trade, it doesn't offer wireless trading.

Finally, the news is not so great on the customer service front. Gomez.com assigned E-Trade a fair-to-middling rating for customer confidence, and we found that the company wasn't particularly fast in responding to our online inquiry. Still, active investors will like E-Trade's low fees, expansive research, and vast message boards. And newbies who aren't afraid of getting lost in the crowd will benefit from the wealth of information.

Fidelity

NOT ALL THINGS TO ALL PEOPLE

Mutual fund giant Fidelity Investments is having an identity crisis of sorts. In 1999, the firm rebranded its online brokerage business as Powerstreet. A recent ad campaign extolled the virtues of

online trading, regardless of one's investing style. Unfortunately, this all-things-to-all people approach tends to make Fidelity's site seem like a confusing mess.

Fidelity offers so many programs and types of accounts (such as Powerstreet, PowerstreetPro, InstantBroker, and Fidelity Automated Service Telephone), it's hard to know what's available for your situation. Customer service might not be much help either—Gomez.com's ranking places Fidelity near the bottom among brokers on our list when it comes to customer confidence. In another unsettling sign, e-mail from a Fidelity customer support rep advised us that if the site crashed during trading, we'd have to talk with a supervisor if we wanted the broker to honor its lower online-commission rate.

That said, Fidelity does offer a lot of good features: A customizable My Fidelity

Name: Ann Dexheimer

Investor type: Buy-and-hold

Online brokers: DLJdirect, E-Trade, Morgan Stanley Dean Witter Online, Charles Schwab, TD Waterhouse

Occupation: Part-time office manager

Location: Pleasanton, California

"As a person with some loss of hearing, I say online brokerages are the only way to go."

ty page (served by Lycos), free check-writing from funds, after-hours trading, online bill payments, research from Leh-

man Brothers and S&P's Stock Reports, and wireless trading by pager or Palm VII.

Powerstreet may best serve owners of Fidelity's mutual funds who want to dabble in stocks, options, or bonds and still keep their accounts consolidated at one firm. Powerstreet customers can buy and sell all Fidelity funds without commission or transaction fees.

For traders who can't stand to be away from their portfolio, InstantBroker allows trading via two-way pagers or Palm VII organizers. The Fidelity Automated Service Telephone system lets you place trades by phone, using either the keypad or its speech recognition system.

Note: If you come across references to Fidelity Online Xpress, you can safely ignore them. It seems that Powerstreet is the new online brokerage arm of the firm, replacing its old online trading system.

Morgan Stanley Dean Witter Online

RESEARCH GALORE, HIGH FEES

Much of the online brokerage industry has made a selling point of low commissions, racing to see who can offer the cheapest trades. Morgan Stanley Dean Witter Online has bucked that trend—it's one of the few online firms (if not the only one) to increase its commissions.

In late 1999 the company changed its name from Discover Brokerage to Morgan Stanley Dean Witter Online, and in the process raised its commissions from \$20 to \$30. The transformation is an apparent effort to align itself more closely with its full-commission parent brokerage, Morgan Stanley Dean Witter.

Besides the name change and new commission schedule, little is different about MSDW Online since the rechristening. Customers can now visit branch offices to drop off checks or paperwork. While the site touts "expanded access to the unparalleled Morgan Stanley Dean Witter Analyst Research," that promise fails to ▶



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How does it work?

The engineers at Hughes figured out that the real bottleneck in the speed of the Internet wasn't the request **out** to the Web — telephone modems handle that just fine. Everything slows down when the Web tries to use the telephone system to send you **back** the media-rich information you requested. So, we use a much faster satellite connection for sending you the Web content you want. Check out the diagram — this is the system that makes DirecPC the fastest Internet access available nationwide.



Wait? a little

DirecPC gets pushy.

Sure, you love the idea of surfing the Web at up to 400 Kbps. But what if you could get your favorite Web sites and Usenet Newsgroups delivered straight into your PC by satellite — **automatically**, without even having to tie up your phone line to ask for them? That's just what DirecPC's Turbo WebCast™ and Turbo NewsCast™ services do — so you're never behind on the news and information that's important to you. The best thing about these two services? They're **free** with your paid subscription to any Turbo Internet™ service package.



The good news.

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AS LOW AS**

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We know what you're thinking: "If I'm going to put a dish on my roof, I might as well sign up for one of those satellite TV services, too."

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Just call 1-800-DIRECPC or stop by www.direcpc.com to find out more.



You already know how great the Internet is — you're just looking for a way to go faster. DirecPC is the fastest Internet access available nationwide. It's affordable, and it's available everywhere. So, if you're still plugging away with an old-fashioned telephone modem, you need to ask yourself:

What are you waiting for?

Service Plan Details		Residential		Business
Name of Service Plan		Executive Surfer	Family Surfer	Office Surfer
Price of Service Plan (Including ISP)		\$29.99/Month	\$49.99/Month	\$129.99/Month
Price of Service Plan (Without ISP)		\$19.99/Month	\$34.99/Month	\$109.99/Month
Hours of Service (Availability)		24 Hours a Day	24 Hours a Day	24 Hours a Day
On-Line Time (Hours of usage for Turbo Internet)		25 Hours/Month	100 Hours/Month	200 Hours/Month
Additional Hourly Rate (Including ISP)		\$1.99/Hour	\$1.99/Hour	\$1.99/Hour
Additional Hourly Rate (Without ISP)		\$0.99/Hour	\$0.99/Hour	\$0.99/Hour
DirecPC Services				
Turbo Webcast: Broadcast delivery of popular Websites to your PC's hard drive		Included	Included	Included
Turbo NewsCast: Broadcast delivery of up to 30,000 Usenet Newsgroups to your PC's hard drive		Included	Included	Included
Turbo Internet: Fully interactive access to the Internet at speeds up to 400Kbps		Included in Online Time	Included in Online Time	Included in Online Time
Free E-mail Accounts		1	1	4
Networking (Number of Seats)		N/A	N/A	4

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disclose that the said access isn't free unless customers hold accounts of \$100,000 or more—everyone else gets to pay hefty subscription charges.

One standout on the site is the free fascinating commentary provided by Market-History.com. The mutual funds area is full of resources, with search tools, profiles, and graphs. MSDW Online charges a straight \$50 fee to those who buy ten high-yielding Dow stocks at a time.

MSDW Online blends function and style in an intelligent, attractive way. The site is moderately easy to navigate, although trading screens are still frustratingly unorganized.

Experienced investors and those with large accounts will be drawn to MSDW Online's research and other services (such as online bond trading). And the ability to speak to a broker on the phone might just be the reassurance new investors need.

National Discount Brokers

NO MINIMUM FEE

National Discount Brokers has the most unusual logo of any online broker in our report—a mallard duck. Speaking of ducks, NDB's DuckBucks are a nice innovation: gift certificates you can purchase from the firm, redeemable for commission-free trades.

The regular commission, \$15 per trade, covers either all the purchases or all the sales of a single stock on the same day. So if you buy 100 shares of Boeing in the morning and 100 more Boeing shares 6 hours later, you pay just one commission of \$15. NDB also lets you trade after hours, and recently it began offering access to IPOs.

NDB features valuable commentary from the respected *Wall Street Transcript*. The company also offers free check-writing, a MasterCard debit and ATM card, and a Platinum Visa to account holders. With no minimum initial deposit requirement, NDB might be appropriate for people just getting their feet wet in the investment market.

Charles Schwab KING OF THE HILL



Charles Schwab is the largest online brokerage on our list. And late last year, Schwab grabbed the top spot on Gomez.com's scorecard as best overall broker. And there's more good news for active traders: Following its acquisition of day trading firm CyBer-Corp, Schwab dropped commissions for active traders by as much as 50 percent.

Schwab's online research is also excellent. The Equity Report Card is a terrific

example of how Schwab presents stock research in a context that can help investors make better decisions. Schwab also offers workshops in online investing (called Webshops) in branches across the United States. And Schwab plans to add to its educational Learning Center during the course of the year.

Schwab's site is fast and fairly intuitive, although the firm's array of features can be dizzying, particularly for newbies. Investors can create their own MySchwab page, with financial news, portfolio quotes and more—all provided by Excite. Schwab is also among the first online brokers to offer bill payment, but this service is free only for customers who have at least \$500,000 in their accounts or who make 24 or more trades in a year.

For new investors, Schwab provides comfortable navigation and easy access to information, while infrequent traders and buy-and-hold investors will appreciate the one-stop financial-shopping experience. Active investors will like the new commission rates, with trades as low as \$15.

Trading on Your Broker's Site: Quick Click or a Slow Crawl?

ACCORDING TO Service Metrics, which tracks Web site performance, users will wait 8 seconds for a page to download before they give up. Fortunately, all the brokerage sites we looked at downloaded pages in under 8 seconds. Still, some were faster than others. Kudos to Suretrade.



¹From December 29, 1999, to January 12, 2000, Service Metrics measured the performance of these Web sites by using a national and international network of data-collection agents. These agents downloaded Web pages three times per hour, 24 hours a day, using a T1 connection and more than a dozen Internet service providers.

²Average download speed of 100 popular Web sites.

Suretrade

MULTIPLE PERSONALITIES

In 1998, Suretrade burst onto the online brokerage scene in a blaze of light with a revolutionary approach. The business model? A single flat-rate commission no matter how many shares you traded or whether you traded online or over the phone, with no additional fees. With its focus on Web support, the firm chose not to offer toll-free service numbers.

It didn't take long for Suretrade's noble experiment to fail. The firm threw out its original plans and opted instead to adhere more closely to industry practices: It installed a toll-free support line, and introduced fees for various services.

Active investors will appreciate Suretrade's low commission for market orders. Suretrade is also the fastest brokerage site for page downloads, according to Service Metrics (see the chart at left).

New investors will like that the firm requires no minimum balance to open an account. But note that Suretrade doesn't rate high in customer confidence on Gomez.com's scorecard.



Wireless Trading: Should You Care?

ONLINE BROKERS' latest feature sounds great: Trade stocks anytime, anywhere, with just a few taps of your personal digital assistant, smart phone, or pager. Ameritrade, DLJdirect, Fidelity, Morgan Stanley Dean Witter Online, and Suretrade offer wireless trading access, and Schwab and TD Waterhouse should have the option up and running later in the year.

But wireless trading isn't for the casual investor. Brokers are aiming this service at their most active customers—people who make upwards of 20 trades a month. With monthly costs as high as \$90—on top of standard commission fees—it's easy to see why. Add to that the cost of buying a wire-

less device, and your stock-trading profits have just taken a significant hit.

Before you consider adding your stock portfolio to the long list of things that your handheld device manages, ask yourself the following questions to find out whether wireless trading is for you.

Is wireless your investment style? The type of investor you are should play a big part in your decision to go wireless, just as when you're choosing a broker. If you're a highly active trader who's always on the road, wireless may be the answer to your prayers. But if, like a lot of investors, you hold on to stocks for the long haul, wireless access may be like buying an SUV to drive around the suburbs. Sure, it looks cool, but it's not terribly practical.

"Even the most active online investor is trading about once a month on average," says Jaime Punishill, a senior analyst with Forrester Research. "[A wireless trading device] is a really expensive toy for making a trade once a month."

What will wireless cost to start? If you're new to the world of wireless, getting up and running can be pricey. Plan on spending between \$400 and \$800 for a wireless device you can trade on. You'll also

need to sign up for wireless data service (like Palm.net), a sort of ISP for your wireless device. Costs can vary wildly depending on the provider and the type of service. Plan on spending \$10 to \$40 per month.

What does your broker charge? Just as commissions can make or break a stock transaction, your broker's wireless-access fees can help you determine whether you should be trading wirelessly. While most firms make you pay a premium for wireless trading (usually around \$30 per month), brokers like Fidelity and DLJdirect are offering it to their customers for free. It's no reason to leave a broker you're happy with, but if your broker offers wireless for free, flexing your day-trading muscles is that much easier.

The bottom line: Unless you're already tuned in to the wireless world, signing up for wireless trading is going to cost you. For a very small group of high-powered traders, that's money well spent. Otherwise, if you're already paying for wireless data service, you might check with your broker about the cost of its wireless access. The rest of us have little reason to eat into our investment returns paying for wireless trading. —Eric Dahl

TD Waterhouse BROKER AND BANKER

Since our visit last year, TD Waterhouse has changed its name slightly and redesigned its Web site. The site's response time is respectably fast, and navigation is simpler than with the former clunky interface. The broker also seems to have reorganized its stock and fund research in a more accessible way.

While many online brokers are only now rushing to offer banking services (such as check writing) to their customers, TD Waterhouse was the first major online broker to build a bridge between banking and brokerage services. Traders can electronically transfer funds between bank and brokerage accounts at any time and at

no charge. They can also take advantage of a full range of banking services, including ATM cards, certificates of deposit, and home equity lines of credit.

If you don't sign up for a bank account, you can still take advantage of free check-writing and a Visa ATM/check card that's connected to your brokerage account. Either way, you can buy and sell stocks online at TD Waterhouse for a reasonable \$12 per trade. If you want to skip the Web site, though, TD Waterhouse charges you \$35 to place a trade by touch-tone phone, and the cost goes up to \$45 if you speak with a live broker. Waterhouse does honor the online rate if Web site problems prevent you from making a trade online. The firm doesn't offer wireless trading.

New investors might be comforted by TD Waterhouse's network of 165 branch offices across the United States. While the firm does not offer IPO access, it has formed an alliance with Charles Schwab and Ameritrade that could provide access to new deals for Waterhouse customers. TD Waterhouse won't fill the needs of highly active traders, but its services and online research will appeal to serious buy-and-hold investors.

Douglas Gerlach is the author of The Complete Idiot's Guide to Online Investing, Second Edition (Que, 2000) and the creator of Investorama.com, a financial Web site. Eric Dahl is a staff editor for PC World.



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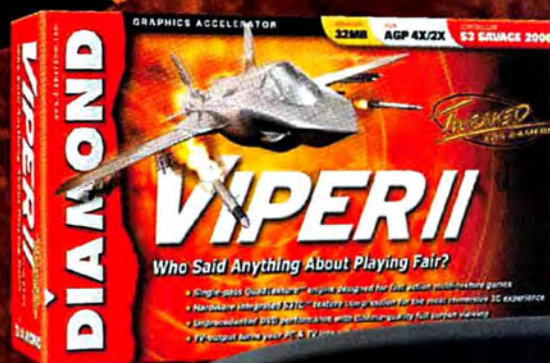


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Play!

Work stations. Remember that phrase? It described weak-kneed computers that lacked the power to do anything more than crunch boring numbers. Today, high-performance computers have a dual personality—they deliver a perfect mix of productivity tools and recreation opportunities.

A fully dressed multimedia computer is the Swiss Army knife of digital entertainment. One moment, it's a DVD player showing full-length, cinema-quality movies. The next, it's an MP3 jukebox playing the latest tunes hot from the Internet. And then it's a game machine whose mesmerizing 3D graphics and multidimensional audio transport you into another dimension. When deciding how to create the perfect personalized multimedia entertainment system, you face many choices.

BUILD, BUY OR UPGRADE

Not surprisingly, many computer enthusiasts buy or build their home computer systems with their game-playing goals in mind. And they tell of their love for gaming with the intensity some would reserve for describing a significant other.

"Many of my friends come over to play games, drink beer, and have fun. Kind of a respite from our hectic lives," says Ed Cimino. Cimino, a video-wall technician and therefore no stranger to technology's WOW! factor,



3dfx's Voodoo 5 5500 AGP accelerator





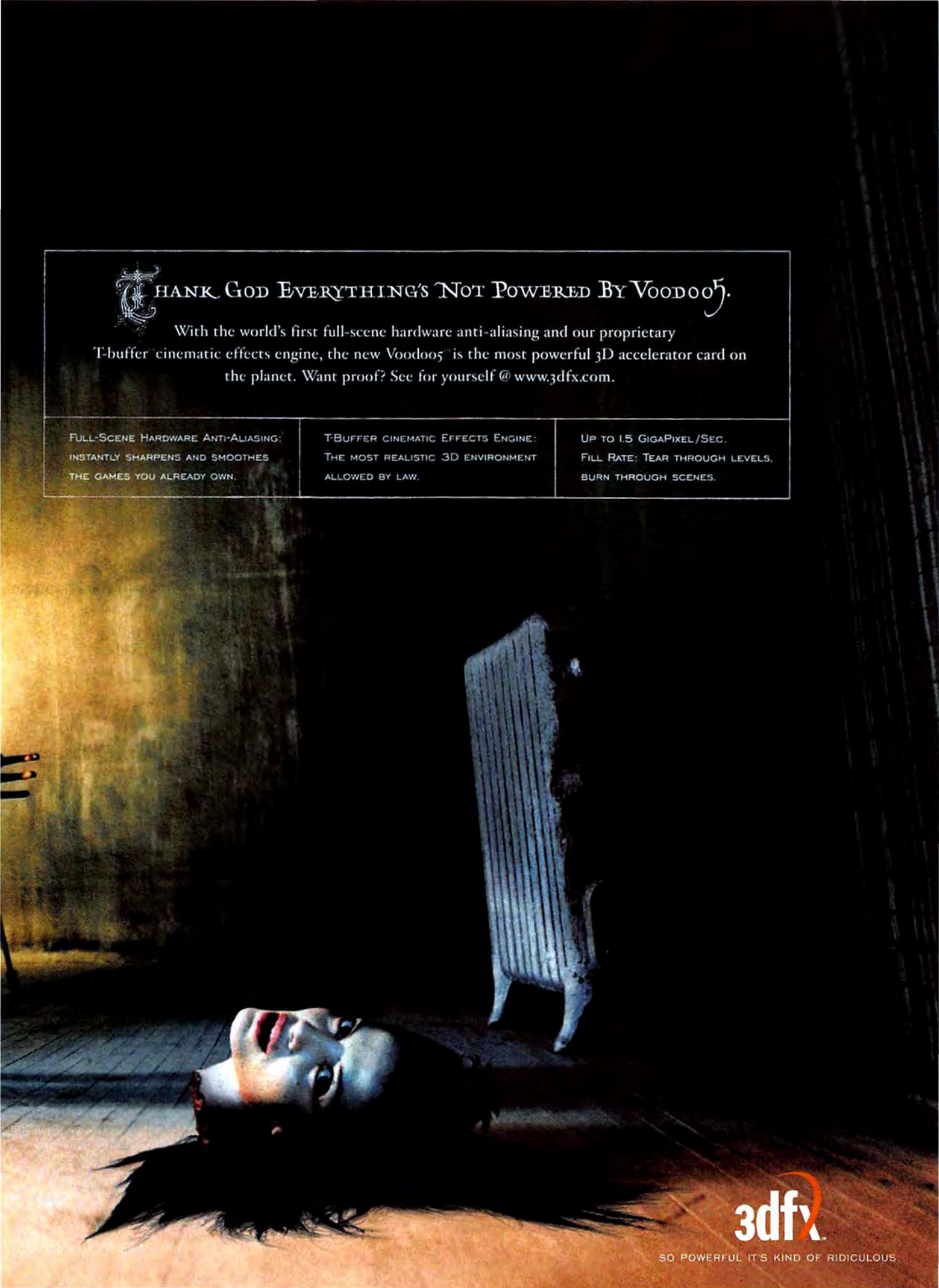
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SO POWERFUL IT'S KIND OF RIDICULOUS.



The Viper II graphics accelerator from S3



networks his two game machines to better exterminate close friends who visit him at his home in Warrington, Pa.

"My place has become game central," he continues. "I plan on having three computers networked soon to add to our gaming experience. When you race each other that way, you get an immediate reaction when you run [your friend] off the road."

Most factory-fresh computers meant for home or SOHO use come pre-configured as multi-media entertainment machines. If you want a PC that's more than six months old to deliver optimal multimedia performance, you have some tweaking to do.

Starting with the easiest steps for your software, make sure your hard drive is defragmented. You can see up to a 10-percent increase in disk I/O operations, and even more if you opt to rearrange your applications so that they load faster. In Windows 95 and 98, click on Start, Run, and type "defrag" (without the quotes). For other systems, defragmenters, plus other system-optimization tools and a virus checker, are included in most utility collections such as Norton's System Works.

Programs that run in the background, particularly virus checkers, are a double-edged sword. Since they can siphon off some performance, and occasionally interfere with some games, you might want to disable them during game play. Beware! Do that only if you can remember to turn the virus checker back on later, particularly before downloading patches, updates or MP3 tunes from independent sources.

Of all the software fixes you can install to keep your machine current with the most recent multimedia, video-card drivers are the most important. Take the time to visit your vendor's Web site and check for updated drivers. You could see a surprising gain in performance as a result of chip maven's seeking to tweak every ounce of horsepower from their hardware.

HOT ON HARDWARE

Now that you've got your machine's software tweaked to the max, investigate hardware upgrades. The three main areas that will boost your system's performance are adding RAM, upgrading your graphics board, and optimizing your audio system.

Upgrading your system RAM to 64 MB will improve your overall system performance in a heartbeat. With memory prices dropping back to their pre-earthquake lows, the best hardware upgrade investment you can make in your system is to shovel in as much RAM as the computer was designed to hold. Why? Because system memory reduces cycle-pinching read/writes to the hard drive.

Likewise, the graphic adapter's video RAM, because of its proximity to the graphics processing action, critically affects your system's gaming performance. More RAM is definitely better, says San Jose, Calif.-based 3dfx Interactive.

3dfx continues their tradition of producing leading-edge products with their new Voodoo 5 series of AGP accelerators. The Voodoo 5 series adapters contain 32 MB to 128 MB of video RAM and two to four on-board processors, making this product line the world's first 3D accelerators to break the gigapixel barrier. With this mass of memory and processing power available, you are treated to surrealistic 3D worlds at resolutions up to 1600 x 1200. 2D resolutions reach as high as 2048 x 1536.

One of the benefits common to all of the Voodoo 5 series adapters is full-scene hardware anti-aliasing to eliminate "jaggies." Anti-aliasing removes annoying jagged lines and flashing objects from the image to dramatically improve the visual quality of existing and new games.

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continued on page 7



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With a few software upgrades, an advanced graphics accelerator, and howling audio, you can transform your existing PC into a true entertainment center.

THE BETTER TO SEE YOU WITH

Most business applications live happily in a 2D world. Digital home entertainment, however, demands powerful 3D rendering and shading for video playback and action games, especially for many of the newer strategy games.

Santa Clara, Calif.-based S3 Inc.'s just-released Viper II graphics accelerator tears through high-intensity 3D game graphics and demanding 2D Windows applications while delivering unrivaled color-rich graphics and stunning realism. Its single pass QuadTexture engine, coupled with a high frame rate and texture compression, supports fast, non-stop action. Doing double-duty, its hardware-accelerated DVD performance combines with a TV out-port, permitting crystal-clear viewing of feature-length movies on the monitor or on the television.

Upgrading the graphics board frees the system's CPU to manage a myriad of other tasks, instead of servicing CPU-intensive rendering operations. This provides you with significant bang for the buck. The role of the graphics card is even more important if you're running an older PC. However, if you're running anything less than a P-233, you might want to consider a processor upgrade before upgrading to a new graphics board.

LEND ME YOUR EARS

High-end graphics cards do an incredible job of drawing you into the virtual reality of the PC's world. But nothing envelops you as completely as an immersive sound-track. Vendors achieve this through 3D audio or spatial sound to give the illusion of total immersion in the digitized environment.

If your audio entertainment interests are more along the lines of audio recording or creating a desktop digital studio, new audio adapters bring sound to life. They

give audio hobbyists all the tools they need for building a seminal home audio recording and playback studio within the confines of their PCs. From there, the sky's the limit. With added resources, you could eventually wind up with a fully-blown digital audio studio in the basement.

Fresh from the people who started the MP3 revolution comes the new 5x accelerated Sound Blaster Live MP3+ card. With this card, Milpitas, Calif.-based Creative Labs Inc. delivers the perfect synthesis of convenience and quality. The MP3+ card enables you to download MP3 music from the Internet with full digital sound quality, and to copy songs from CDs into compact MP3 files for easy storage or for play-back on Creative's NOMAD portable MP3 players.

While we're on the subject of audio, take a hard look at your speaker system. The most sophisticated audio processing will sound like a bad long-distance connection to Mars if played back through low-end speakers. With so many people using their PCs for MP3 and CD audio playback, it's not hard to find good-quality speakers designed for use with PCs. Don't let size fool you: some diminutive speakers, such as the compact SoundWorks cube units made by Creative Labs, produce a surprisingly big sound. SoundWorks speakers take advantage of a room's acoustics to deliver high-quality, wide-range, "big" sound. Just connect the speaker to a jack in the MP3+ card for beautiful high-fidelity sound, including great bass.

With a few software upgrades, an advanced graphics accelerator, and howling audio, you can transform your existing PC into a true entertainment center. So, after paying the bills and checking e-mail, why not take a high-speed run around the Grand Prix track, fly a Lear Jet under the Brooklyn Bridge, or annihilate a dear friend?

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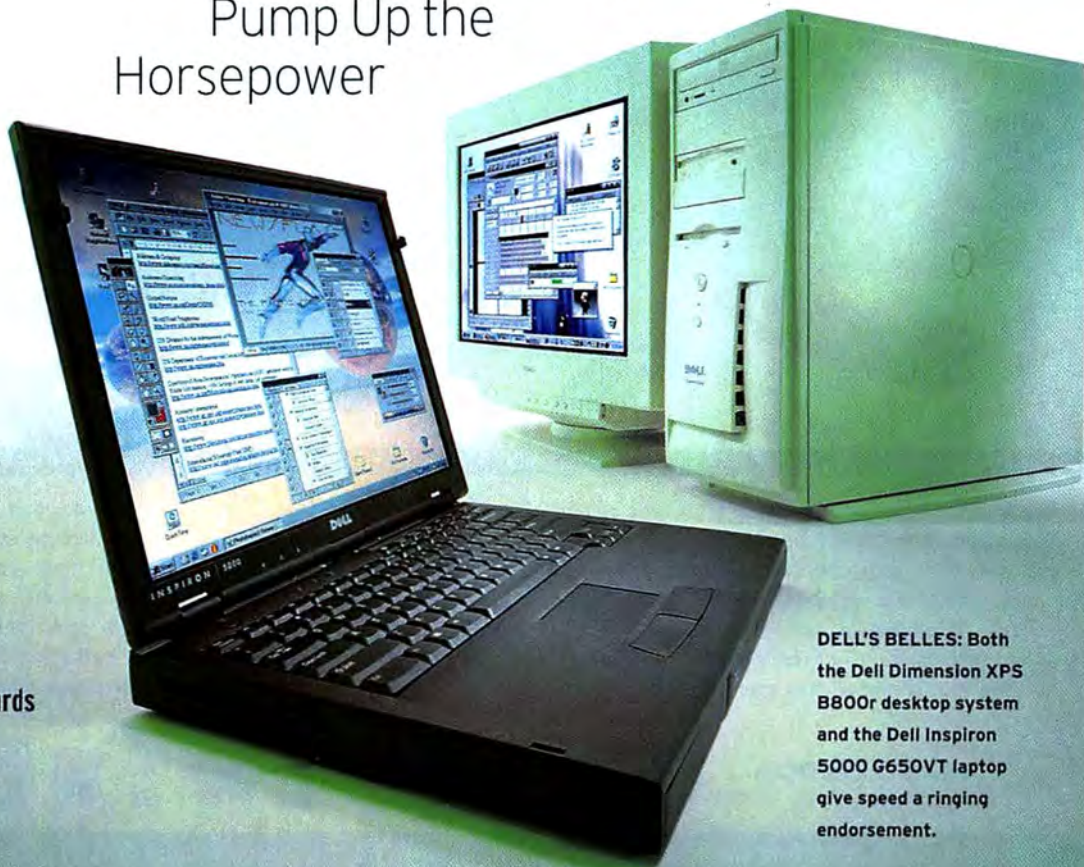
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231 Monitors



233 Graphics Boards



DELL'S BELLES: Both the Dell Dimension XPS B800r desktop system and the Dell Inspiron 5000 G650VT laptop give speed a ringing endorsement.

THE MUSCLE SYSTEMS on this month's charts, from notebooks aided by Intel's SpeedStep technology to desktop chart-makers hitting 800 MHz, pack a sizable herd of ponies under their hoods and stampede over more than their fair share of benchmarks. This month also sees the

first Top 30 machine to use the Windows 2000 operating system: The Dell OptiPlex GX300 captures the number five spot on our power chart. Though the Dell proved to be quite fast, we'll need to see more Windows 2000 systems before we can judge how the OS affects performance.

INTEL PUTS MORE SPEED IN YOUR NOTEBOOK'S STEP

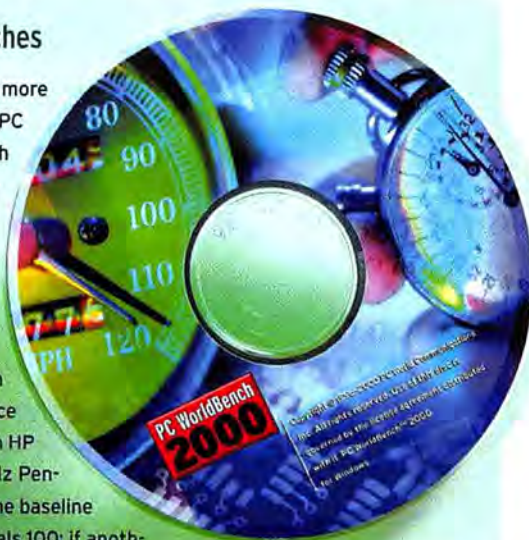
A FASTER PROCESSOR in your mobile computer seems like a good thing—until you take it on the road and those extra megahertz drain the battery faster than leaving your Yugo's lights on overnight. That's where Intel's new SpeedStep performance technology steps in: It reduces a notebook's clock speed while it's unplugged, conserving battery power. This month, we tested two SpeedStep notebooks: the Dell Inspiron 5000 G650VT and the Quantex W-1511.

The Dell uses a PIII-650/500 SpeedStep processor, and the Quantex uses a PIII-600/500. When tethered to a power outlet, they run at full speed (650 MHz and 600 MHz, respectively), but when relying on battery power, they automatically step down to a "battery optimized mode" of 500 MHz. Intel says the technique reduces a notebook's battery power consumption by 40 to 50 percent. However, our tests show that SpeedStep has a negligible effect on battery life, unless you're constantly pushing the processor to its limits (see *Top of the News*, March, www.pcworld.com/mar00/p3_notes). But SpeedStep should have greater benefits at faster speeds, Intel promises.

The Dell Inspiron earned an impressive PC WorldBench 2000 score of 127 and landed at number three on the notebooks power chart. The Quantex, with fewer megahertz under its hood, posted an even

PC WorldBench 2000 Launches

TO ASSESS THE performance of new, more powerful systems, we've updated our PC WorldBench test suite. PC WorldBench 2000 is based on 11 real-world applications: Microsoft Word, Excel, PowerPoint, and Access; Lotus WordPro and 1-2-3; Netscape Navigator; Intuit Quicken; Adobe Photoshop; Corel PhotoPaint; and Visio (by the company of the same name). The WorldBench 2000 score reflects a PC's performance compared with our baseline system, an HP Pavilion 8380 desktop with a 400-MHz Pentium II processor and 96MB of RAM. The baseline system's WorldBench 2000 score equals 100; if another system achieves a score of 110, for instance, then that system is 10 percent faster than the baseline HP machine in performing basic business tasks. (Visit www.pcworld.com/benchmark for details.) All systems in this month's Top 30 desktops, Top 15 notebooks, and Top 15 home PCs charts have been tested with WorldBench 2000. Don't compare their scores with those in previous issues—PC WorldBench 98 scores aren't convertible into WorldBench 2000 numbers.



higher score of 129 and grabbed fourth place on the chart. Those scores make them the fastest notebooks we've tested.

DESKTOPS ZOOM TO 800 MHZ

FOUR NEW SYSTEMS vying for our Top 10 Power PCs chart boast 800-MHz clock speeds. Dell and Micron submitted PIII-800 machines, and Polywell and Sys Technology sent units with Athlon-800 CPUs. The Dell Dimension XPS B800r won top honors in the speed category, posting a PC WorldBench 2000 score of 201 with Windows NT, the fastest performance we've ever seen. But the \$3469 price is also one of the highest we've noticed in quite a while, and is due partly to the system's expensive Rambus RAM.

Polywell's Poly 800K7 and Micron's Millennia Max 800, both Windows 98 SE machines, also performed well and secured spots on the power chart. The Sys Performance 800A, however, just missed grabbing a place, mostly because it had too few features for its \$2999 price.

In other news, a variety of monochrome lasers from six companies fill up this month's Top 10 Printers chart. Two new models debut on the small-business



side—the \$549 Samsung QL-6100 enters at number two, and the \$499 Brother HL-1270N lands at number five. On the corporate side, Xerox leaps onto the chart at number one, taking the Best Buy slot with its DocuPrint N2125.

Freelance writer Joel Strauch and PC World editors Grace Aquino, Michelle Campanale-Surkan, Lisa Cekan, Katharine Dvorak, Mick Lockey, Kalai Murugesan, Kalpana Narayanamurthi, Karen Silver, and Alan Stafford contributed to the Top 100 this month. Testing was performed by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeff Kuta, Sean Tieu, and John Tjon of the PC World Test Center. See page 14 for contact information. ▶



POINT YOUR browser to www.pcworld.com/top400 for late-breaking reviews on desktop computers. In the Top 400 section, you'll find comprehensive reviews and ratings. You'll also find details on the PC WorldBench 2000 test suite at www.pcworld.com/benchmark.

TOP 10 POWER PCs

	SYSTEM: \$2000 AND OVER	Month tested	★ Overall rating	Street price (02/11/00)	PC WorldBench 2000 performance score ¹	Base configuration
1	 Dell Dimension XPS B800r 800/388-8542 www.dell.com	NEW	94	Very expensive: \$3469	Outstanding 201	Outstanding: Pentium III-800EB, 128MB of RDRAM, 256KB L2 cache, 20GB hard drive, 19-inch monitor, Windows NT 4.0
2	 HP Vectra VL600 800/752-0900 www.hp.com/desktops	NEW	93	Average: \$2598	Very good 190	Good: Pentium III-733, 128MB of RDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows NT 4.0
3	Micron Millennia Max 800 800/642-7667 www.micronpc.com	NEW	92	Very expensive: \$3099	Very good 149	Outstanding: Pentium III-800, 128MB of SDRAM, 256KB L2 cache, 27GB hard drive, 19-inch monitor, Windows 98 SE
4	Axis Systems Orion CXV 800/378-9014 www.axisys.com	Retested this month	92	Very inexpensive: \$2057	Good 132	Very good: Pentium III-600, 128MB of SDRAM, 256KB L2 cache, 18GB hard drive, 19-inch monitor, Windows 98 SE
5	Dell OptiPlex GX300 800/388-8542 www.dell.com	NEW	91	Very expensive: \$3467	Outstanding 165	Outstanding: Pentium III-733, 128MB of RDRAM, 256KB L2 cache, 20GB hard drive, 19-inch monitor, Windows 2000 Pro
6	Polywell Poly 800K7 800/999-1278 www.polywell.com	NEW	91	Average: \$2395	Very good 151	Outstanding: AMD Athlon-800, 128MB of SDRAM, 512KB L2 cache, dual 13.6GB hard drives, 19-inch monitor, Windows 98 SE
7	ABS Performance 1 800/876-8088 www.buyabs.com	Retested this month	90	Average: \$2699	Very good 151	Outstanding: Pentium III-700, 256MB of SDRAM, 256KB L2 cache, 27.3GB hard drive, 19-inch monitor, Windows 98 SE
8	Premio Apollo T440B 800/677-6477 www.premiopc.com	NEW	90	Inexpensive: \$2199	Good 140	Very good: Pentium III-700, 128MB of SDRAM, 256KB L2 cache, 18.2GB hard drive, 19-inch monitor, Windows 98 SE
9	Systemax Venture PVO-700A 800/875-8430 www.systemaxpc.com	Retested this month	90	Very inexpensive: \$2049	Good 132	Good: AMD Athlon-700, 128MB of SDRAM, 512KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 98 SE
10	Kingdom Pinnacle Power 733 800/385-3436 www.kingdomcomputers.com	NEW	85	Average: \$2577	Good 142	Good: Pentium III-733, 128MB of SDRAM, 256KB L2 cache, 27GB hard drive, 17-inch monitor, Windows 98 SE
 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 201.

² We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

³ For more information about all of the products listed in this table, select number 910 on the product information card or visit www.pcworld.com/productinfo.



THE PRICE IS FRIGHT: If your stock options are kicking in and you're about ready to start living like Thurston Howell III, this month's chart offers fancy new systems

bristling with 800-MHz Athlon and Pentium III processors, Rambus RAM, and high-end graphics cards. They also carry high-end price tags.

1 DELL DIMENSION XPS B800r



WHAT'S HOT: Throw a PIII-800 into a Windows NT 4.0 machine, and you've got rip-snorting speed:

NEW This Dell's 201 on our PC WorldBench 2000 tests is the highest score of any NT system we've seen. Colors on the 19-inch Dell Ultrascan P991 monitor looked deep and rich; the sharp text started to blur only at the extreme resolution of 1920 by 1200. Top-drawer extras include an 8X/4X/32X CD-RW drive, an Iomega Zip 100 drive (a Zip 250 would have been nicer), a modem, a network card, and Office 2000 Small Business Edition.

WHAT'S NOT: Time to sell some stock—the Dimension XPS B800r costs \$3469. For that kind of money, you could pick up a couple of midrange systems. And while Dell provides ample documentation for the standard equipment, it lacked paperwork for some of the extra components.

WHAT ELSE: The system uses high-speed Rambus RAM, which is designed to rev up memory-intensive applications but is expensive. Despite the add-in goodies, this Dell still provides two open PCI slots and three open bays in its neat interior. You also get a quick-setup manual and a thick reference and troubleshooting guide.

BEST USE: For power users who must have everything—regardless of sticker price—this Dell looks like a million bucks.

2 HP VECTRA VL600



WHAT'S HOT: Armed with Windows NT 4.0 and a Pentium III-733 processor, the VL600 ripped

NEW through our PC WorldBench 2000 tests with an impressive score of 190. Pop off the solid side panel using a pull-out handle at the top (similar to Apple's G4), and you'll discover a fairly neat interior with five open PCI slots and three free drive bays. But you may never need to fill a bay with another hard drive: Our test system came with a 30GB model. And if you do add a drive, toolless quick-release tabs make the job easy.

WHAT'S NOT: The Vectra lacks documentation for individual components. The quick-release drive carriers seem less sturdy than the ones in some other systems.

Extra features	Design and expandability ²	Vendor's system reliability	Tech support quality/policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number ¹
Outstanding: Celestica NVIDIA GeForce 256 graphics card with 32MB of RAM, 8X/4X/32X CD-RW drive, network card, Zip 100 drive, Microsoft Office 2000 SBE	Good: includes top-notch monitor; midsize tower; 3 open drive bays, 2 open slots	Outstanding	Good/Good	24/7, toll-free	3/1	-
Good: Matrox Millennium G400 graphics card with 32MB of RAM, 4X/2X/24X CD-RW drive, network card, chassis intrusion detection, case lock	Good: toolless drive bay carriers; midsize tower; 3 open drive bays, 5 open slots	Good	Good/Fair	24/7, toll call	3/3	695
Good: VisionTek NV994 graphics card with 32MB of RAM, 8X DVD-ROM drive, V.90 modem, Microsoft Office 2000 Small Business Edition	Very good: roomy case; midsize tower; 5 open drive bays, 4 open slots	Good	Good/Outstanding	24/7, toll-free	Varies ¹ /3	696
Good: Visiontek NVIDIA TNT2 Pro graphics card with 32MB of RAM, 8X DVD-ROM drive, 4X/2X/24X CD-RW drive, V.90 modem	Very good: lots of storage; midsize tower; 2 open drive bays, 4 open slots	s	Good ¹/Outstanding	24/7, toll-free	3/3	697
Very good: NVIDIA GeForce 256 graphics card with 32MB of RAM, 8X/4X/32X CD-RW drive, network card, intrusion detection, case lock, Wake-on-LAN	Good: swing-out power supply; midsize tower; 3 open drive bays, 5 open slots	Outstanding	Good/Outstanding	24/7, toll-free	3/3	-
Very good: VisionTek NV994 graphics card with 32MB of SDRAM, 8X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive, Lotus SmartSuite Millennium, RAID card	Good: one-piece cover slides off easily; minitower; 2 open drive bays, 3 open slots	s	Fair ¹/Good	24/7, toll-free	3/5	698
Outstanding: ATI Rage Fury Maxx graphics card with 64MB of RAM, 8X DVD-ROM drive, 4X/4X/32X CD-RW drive, V.90 modem, Microsoft Office 2000 SBE	Good: front-mounted MIDI inputs; midsize tower; 2 open drive bays, 4 open slots	s	Fair ¹/Good	24/7, toll-free	3/Lifetime	699
Very good: Creative Labs Annihilator Pro graphics card with 32MB of RAM, 6X DVD-ROM drive, V.90 modem, Microsoft Office 2000 Small Business Edition	Good: MPEG decoder card; midsize tower; 5 open drive bays, 2 open slots	s	Fair ¹/Fair	10/5, toll-free	3/3	700
Outstanding: Creative Labs 3D Blaster RIVA TNT2 graphics card with 32MB of RAM, 8X DVD-ROM drive, 4X/4X/24X CD-RW drive, V.90 modem, network card	Good: display controls via USB; midsize tower; 2 open drive bays, 3 open slots	s	Fair ¹/Good	24/7, toll-free	Varies ¹ /1	701
Outstanding: Gainward Cardexpert NVIDIA RIVA TNT2 graphics card with 32MB of RAM, 8X DVD-ROM drive, V.90 modem, Zip 250 drive, Microsoft Office 2000 SBE	Good: RAM access partly blocked; minitower; 3 open drive bays, 4 open slots	s	Fair ¹/Fair	Varies, ¹ toll-free	Varies ¹ /1	702
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent			

¹ Five years on CPU and main RAM, three years on other parts.

² Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech-support quality, this rating may also depend on our anonymous support-quality calls.

³ 12.5 hours weekdays, 6 hours on Saturdays.



BLUED STEEL: Dell's Dimension XPS B800 uses expensive Rambus RAM (you can tell RDRAM by the blue plastic piece). RDRAM systems also use a placeholder card in the second slot.

WHAT ELSE: The VL600 ships business-ready, with a network card and a sturdy case lock (complete with its own keys). The keyboard features microphone and headphone jacks. HP's own 17-inch HP71

monitor provides sharp text up to its maximum resolution of 1280 by 1024, but the colors in our test images appeared a tad dark. Because the PC uses Rambus RAM, it leaves just one memory slot open (systems with this RAM can have only two slots on the motherboard). The case doesn't provide a separate system fan; instead, HP makes the power supply fan do double duty by cooling the interior via a duct mounted over the processor.

BEST USE: The VL600 is a powerful PC aimed at corporate workgroups.

3 MICRON MILLENNIA MAX 800

NEW **WHAT'S HOT:** This 800-MHz Millennium Max's unusual motherboard provides both Slot 1 and Socket 370 proces-

sor slots, so you can upgrade the system with either type of CPU. A well-designed interior offers four open slots, five open bays, and a power supply that swings out to provide even more work space. Text stayed sharp up to the unbelievably high resolution of 2048 by 1536 on the 19-inch Micron Trinitron CPD-4401 monitor. Colors appeared rich (albeit a tad dark) on test images. The PC comes with a year of free online training.

WHAT'S NOT: The system would better justify its \$3099 price tag if it included a removable storage option or a CD-RW drive. And this unit scored a 149 on our PC WorldBench 2000 tests, only six points better than its PIII-677 cousin, the Millennium Max 667.

WHAT ELSE: This Millennium earned a plus for documentation, thanks to its setup poster and thorough system manual, but it lacked some component manuals. The large midsize tower features twin fans ►

(plus one in the power supply), a case lock, and a side that pops off smoothly (though it requires some fiddling to replace). Playback looked sharp but slightly dark on the 8X DVD-ROM drive, and it paused when we opened other applications.

BEST USE: With its excellent monitor, the Millennia Max makes a pretty—but pretty expensive—presentation system.

4 AXIS SYSTEMS ORION CXV

WHAT'S HOT: The Orion CXV's PC WorldBench 2000 score of 132 marks it as one of the fastest PIII-600 machines we've tested with Windows 98. The system packs an 8X DVD-ROM drive (which played our test movies smoothly and clearly) and a 4X/2X/24X CD-RW drive.

WHAT'S NOT: You must remove four screws and take off the entire case to get inside; cables hinder access to the RAM slots and two open bays. The system lacks a printed system manual (an electronic version comes preloaded).

WHAT ELSE: The electronic manual contains lots of information on troubleshooting and setup. Audiophiles will love the Altec Lansing ACS33 set, which delivers crisp sound in concert with the Creative Labs Sound Blaster Live card.

BEST USE: This Orion fits as a stand-alone PC for general business use.

5 DELL OPTIPLEX GX300

NEW WHAT'S HOT: The first system we've looked at for the Top 100 that runs Windows 2000 Professional, this OptiPlex posted a PC WorldBench 2000 score of 165, which lags the Windows NT models on the chart but smokes all the Windows 98 ones. Martha Stewart would approve of the GX300's tidy interior: It offers chassis intrusion detection, a case lock, a swing-out power supply, five open PCI slots, and three open (and toolless) drive bays. Dell's 19-inch UltraScan P991 monitor shows vibrant colors and crisp text up to 1600 by 1200.

WHAT'S NOT: At \$3467, this model is no bargain-basement special. Dell puts most of its documentation online; the hard copy of the main system manual contains only the bare minimum, and you won't find any paper documentation for individual components (but you can order it for free).



TOOLLESS, BUT NOT TOOTHLESS: The drive bay carriers in the Hewlett-Packard Vectra VL600 don't require a screwdriver to remove, so you can fill them quickly and easily.

WHAT ELSE: Despite the easy-service chassis, the memory slots are buried, and the interior feels cramped until you swing the power supply out of the way. The 8X/4X/32X CD-RW drive makes small backups fast and easy.

BEST USE: For early adopters who want to get their hands on Windows 2000 as soon as possible, this OptiPlex offers a substantial bang for a lot of bucks.

6 POLYWELL POLY 800K7

NEW WHAT'S HOT: The 800-MHz Athlon CPU inside this Poly carries it to a 151 on our PC WorldBench 2000 tests—the highest of any Windows 98 machine we've looked at so far. The 19-inch Viewsonic E790 monitor displayed great-looking colors and easily readable text up to 1600 by 1200 resolution. And because the VisionTek NV994 graphics board includes a digital output, you can drive a digital flat-panel monitor.

WHAT'S NOT: The Poly's cramped interior doesn't give you much room to work in, and the rear ports are labeled with stickers that could easily come off.

WHAT ELSE: The PC uses two 13.6GB hard drives connected to an IDE RAID card to speed up disk-intensive functions. The thick system manual contains detailed information and some (but not enough) illustrations.

BEST USE: The Poly 800K7 makes a fast workhorse for any small office.

Transform and Lighting Enhance Graphics

TECH TREND TWO NEW POWER systems—Dell's Dimension XPS B800r and OptiPlex GX300—include graphics cards that use NVIDIA's highly hyped GeForce 256 graphics chip. The chip incorporates new technologies that, according to NVIDIA, enhance performance.

The GeForce chip offers hardware transform and lighting effects that relieve the CPU's graphics load. *Transform* alludes to altering 3D objects for display on a 2D screen; *lighting* refers to how the chips display stationary or moving lighting effects.

In our February graphics board roundup (www.pcworld.com/feb00/graphics), one board that used the GeForce 256 performed inconsistently, trouncing the competition in some games but trailing in others. In our experience, graphics card performance depends greatly on the software drivers used with them. More mature drivers—which should now be available for most cards that use the GeForce chip—should improve performance.

We'll probably also see the impact of the double data rate memory built into higher-echelon GeForce boards (such as the Creative Labs 3D Blaster Annihilator Pro). DDR memory doubles a card's memory bandwidth, allowing faster fill rates in high-resolution and high-color-depth 3D applications. That, in turn, speeds up 3D frame rates.



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7 ABS PERFORMANCE 1

WHAT'S HOT: With a PIII-700 processor and 256MB of RAM inside, the ABS earned a PC WorldBench 2000 score of 151, the highest we've seen for a similarly equipped Windows 98 machine. The 19-inch ADI MicroScan 6P monitor produced crisp text, even at 1600 by 1200 resolution, though colors looked slightly washed out. The Creative Labs Live Drive takes up an external drive bay and provides external ports for audio input and export, but that still leaves two bays and four slots open (three PCI, one ISA). You can access interior parts easily.

WHAT'S NOT: You'll have to trade in quite a few cows to get this magic bean machine: It's got a sticker price of \$2699. We also noticed slight pauses during playback on the 8X DVD-ROM drive when we opened other applications.

WHAT ELSE: Color-coordination freaks will like the ABS case design, which lets you snap any of five different colored panels onto the front of the midsize tower. A large binder holds all of the documentation; the system manual features large print and straightforward language.

BEST USE: The ABS is a good deal for a power user with a big budget and an interest in gaming or audio manipulation.

8 PREMIO APOLLO T440B

NEW **WHAT'S HOT:** The 6X DVD-ROM drive may be a bit slower than others, but it's assisted by a DXR3 MPEG decoder card, so it plays videos flawlessly. Images looked brilliant on the Premio's 19-inch TEg88E monitor.



A-OK FOR WIN2K: Dell's OptiPlex GX300 is the first Windows 2000 system we've tested for our Top 100.

WHAT'S NOT: This PIII-700 system scored a 140 on our PC WorldBench 2000 tests—lower than some PIII-600s that we've tested. Cables clutter the interior.

WHAT ELSE: To open the Apollo T440B, you must remove two screws; but the sturdy side panel slides on and off with ease. Inside, you'll find five open drive bays and two free slots, one of them ISA.

The machine has an 18.2GB SCSI hard drive connected to an expansion card that occupies one of the PCI slots. In addition, the system ships with a hefty manual containing loads of troubleshooting and general computing information.

BEST USE: With its good-size SCSI drive, this Apollo would work well for people in multimedia creation, especially video.

9 SYSTEMAX VENTURE PVO-700A

WHAT'S HOT: This small-business-oriented unit provides two connection options: a network card and a modem. The solidly constructed keyboard permits smooth, quiet typing and includes many programmable buttons. Its midsize tower case allows nearly effortless access to the interior through a sliding side panel.

WHAT'S NOT: The system's interior is cluttered, with the RAM slots completely hidden. But you'll find five free bays and two open slots, once you waded in. No software was installed with the 8X DVD-ROM drive on our test system, but playback looked smooth after we installed software ourselves.

WHAT ELSE: Text looks crisp on the 17-inch AOC Spectrum 7Glr monitor even at a resolution of 1600 by 1200. A PC WorldBench 2000 score of 132 lifts the Venture PVO-700A's performance just one point over that of its PVO-600A sibling.

BEST USE: Arrayed with a CD-RW drive, DVD-ROM drive, modem, and network card, this computer is ready for most small-business settings.



YOUR BIGGEST FAN: The Micron Millennia Max 800 comes with an interior door that can house two extra fans. But it already comes with three, so cooling won't be a problem.

10 KINGDOM PINNACLE POWER 733

NEW **WHAT'S HOT:** This Pentium III-733-equipped Kingdom earns a score of 142 on our PC WorldBench 2000 tests—making it one of the fastest such systems running Windows 98 that we've tested. The PC's 8X DVD-ROM drive displayed images attractively. Kingdom's thick system manual is loaded with diagrams and a large glossary.

WHAT'S NOT: Opening this minitower involves wielding a screwdriver and then yanking off the entire case. The Microsoft Multimedia Keyboard provides programmable buttons, but it feels much chintzier than Microsoft's Natural Keyboard.

WHAT ELSE: Colors on the 17-inch Optique Q71 monitor appeared vibrant. Text looked sharp at standard resolutions but blurred at extreme levels. An interior panel obstructs access to the system's RAM slots and to the back of the three open drive bays. However, the four PCI slots are easy to reach.

BEST USE: Small-office users looking for speed and hardware extras at a modest price should consider the Kingdom. ▶

ALSO NEW THIS MONTH



WE EVALUATED the following system along with the others, but it didn't score high enough to reach the Top 10 Power PCs chart. For a write-up, visit PCWorld.com (www.pcworld.com/t10pcs).

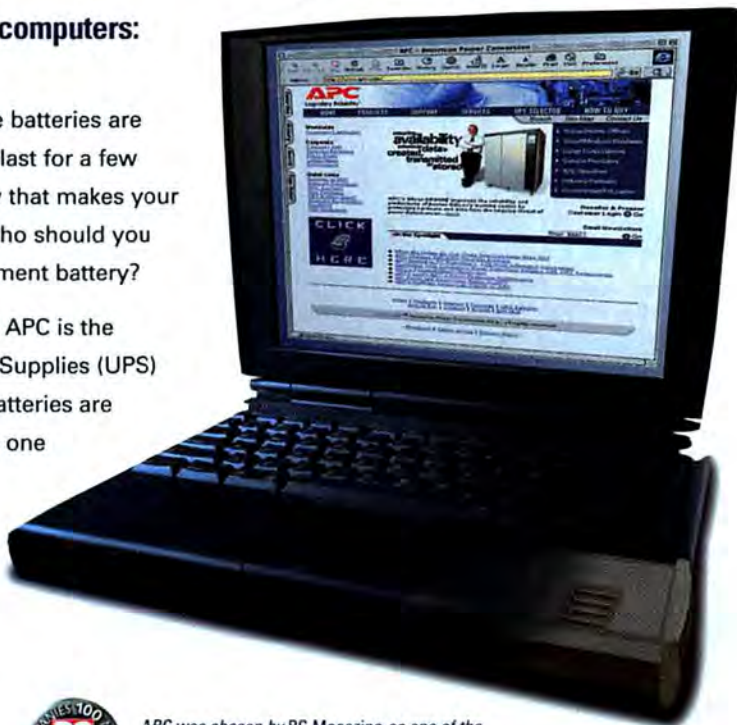
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TOP 10 MIDRANGE PCs

	SYSTEM: \$1200 TO \$1999	Month tested	★ Overall rating	Street price (2/1/00)	PC WorldBench 2000 performance score ¹	Base configuration
1	 Dell Dimension XPS T600r 800/388-8542 www.dell.com	NEW	92	Average: \$1559	Very good 136	Very good: Pentium III-600E, 128MB of SDRAM, 256KB L2 cache, 20.4GB hard drive, 17-inch monitor, Windows 98 SE
2	 Micron Millennia Max 667 800/642-7667 www.micronpc.com	NEW	88	Average: \$1799	Very good 143	Very good: Pentium III-667, 128MB of SDRAM, 256KB L2 cache, 27GB hard drive, 17-inch monitor, Windows 98 SE
3	Dell OptiPlex GX110 800/388-8542 www.dell.com	retested this month	86	Expensive: \$1877	Very good 173	Good: Pentium III-600, 128MB of SDRAM, 512KB L2 cache, 13.6GB hard drive, 17-inch monitor, Windows NT 4.0
4	Gateway GP7-700 800/428-3929 www.gateway.com	retested this month	86	Expensive: \$1937	Outstanding 147	Good: Pentium III-700, 128MB of SDRAM, 256KB L2 cache, 10GB hard drive, 17-inch monitor, Windows 98 SE
5	Micro Express MicroFlex-700B 800/989-9900 www.microexpress.net	retested this month	85	Inexpensive: \$1399	Good 134	Good: AMD Athlon-700, 128MB of SDRAM, 512KB L2 cache, 18GB hard drive, 17-inch monitor, Windows 98 SE
6	Systemax Venture PVO-600A 800/875-8430 www.systemaxpc.com	retested this month	83	Inexpensive: \$1499	Good 131	Very good: AMD Athlon-600, 128MB of SDRAM, 512KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 98 SE
7	CyberMax Enthusiast A650W 800/437-4596 www.cybermaxpc.com	retested this month	83	Average: \$1699	Very good 133	Very good: AMD Athlon-650, 128MB of SDRAM, 512KB L2 cache, 13GB hard drive, 19-inch monitor, Windows 98 SE
8	Quantex SM667 800/896-4898 www.quantex.com	retested this month	83	Average: \$1749	Satisfactory 138	Very good: Pentium III-667EB, 128MB of SDRAM, 256KB L2 cache, 20.4GB hard drive, 17-inch monitor, Windows 98 SE
9	AcerPower 4400 800/733-2237 www.acer.com	retested this month	80	Inexpensive: \$1385	Good 118	Satisfactory: Pentium III-600, 64MB of SDRAM, 512KB L2 cache, 10.2GB hard drive, 17-inch monitor, Windows 98 SE
10	NEC PowerMate ES 888/863-2669 www.nec-computers.com	NEW	80	Expensive: \$1873	Good 125	Good: Pentium III-600, 128MB of SDRAM, 512KB L2 cache, 13GB 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. See "PC WorldBench 2000 Launches" on page 201.

² We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

³ For more information about all the products listed in this table, select number 904 on the product information card or visit www.pcworld.com/productinfo.



THE TYPICAL MIDRANGE PC this month runs at a fleet 650 MHz and costs a modest \$1650. The Dell Dimension XPS T600r and the Micron Millennia Max 667—both new—take the number one and number two spots on the chart, respectively. The Micron posted a stellar PC WorldBench 2000 score of 143.

1 DELL DIMENSION XPS T600R



WHAT'S HOT: With a Pentium III-600E CPU, this Dimension earns a respectable PC WorldBench 2000 score of 136—on a par with some PIII-700s we've tested. Four open slots (three PCI and one ISA) and four open bays offer room for expansion components in this midsize tower's smallish interior. Colors appeared rich and crisp on the 17-inch Dell M780 monitor, and text stayed sharp up to the maximum resolution of 1280 by 1024. Dell keeps the system's price moderate, despite including Microsoft Office 2000 Professional.

WHAT'S NOT: You can type smoothly on the well-constructed Dell QuietKey keyboard, but not as quietly as its name suggests. The Dimension's labor warranty lasts for only a year; however, Dell's systems earn outstanding reliability scores. **WHAT ELSE:** The thorough system documentation includes a setup poster and guide, a thick reference, and a troubleshooting manual. The side of the case comes off easily after you loosen a thumb-screw and lift two levers.

BEST USE: With its high-end office suite, this Dimension would excel as a robust starter system for a small business.

2 MICRON MILLENNIA MAX 667



WHAT'S HOT: This Pentium III-667 system earned a score of 143 on PC WorldBench 2000, outperforming some PIII-700s we've tested under Windows 98 SE. It ships with Micron's extensive documentation and tutorials, including a quick-setup guide, a detailed system manual, and a year of free, unlimited access to Micron University—the company's online training classes. The bundled Microsoft Office 2000 Professional suite may take up quite a bit of disk space, but won't come close to filling the monstrous 27GB hard drive. Colors on the 17-inch Micron 700Dx monitor appeared deep and vibrant, and text looked crisp and clear at resolutions up to 1280 by 1024.

WHAT'S NOT: This large midsize tower lacks a reset button. Though you don't need tools to access the interior, replacing the side panel can be tricky.

Extra features	Design and expandability ¹	Vendor's system reliability	Tech support quality/policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number ²
Good: NVIDIA TNT2 M64 graphics card with 32MB of RAM, 17X-48X CD-ROM drive, V.90 modem, Microsoft Office 2000 Pro, Microsoft IntelliMouse	Good: easy-to-open case; midsize tower; 4 open drive bays, 4 open slots	Outstanding	Good/Good	24/7, toll-free	3/1	-
Good: Creative Labs CT6870 graphics card with 32MB of RAM, 8X DVD-ROM drive, V.90 modem, Microsoft Office 2000 Pro	Good: ample expansion room; midsize tower; 5 open drive bays, 4 open slots	Good	Good/Outstanding	24/7, toll-free	Varies */3	643
Good: integrated Intel 810 graphics with UMA and 4MB of 3D cache, 17X-40X CD-ROM drive, network card, chassis intrusion detection, case lock	Good: easy service; midsize tower; 3 open drive bays, 4 open slots	Outstanding	Good/Outstanding	24/7, toll-free	3/3	-
Outstanding: 3dfx Voodoo3 3000 graphics card with 16MB of RAM, 17X-40X CD-ROM drive, V.90 modem, network card, Zip 100 drive	Good: great monitor; midsize tower; 5 open drive bays, 2 open slots	Good	Fair/Outstanding	24/7, toll-free	3/3	644
Good: ATI Rage 128 Pro graphics card with 32MB of RAM, 8X DVD-ROM drive, V.90 modem, Microsoft Natural Keyboard	Very good: roomy, easy-access case; midsize tower; 4 open drive bays, 4 open slots	s	Fair */Outstanding	24/7, toll-free	4/4	645
Good: NVIDIA Vanta graphics card with 16MB of RAM, 4X/4X/24X CD-RW drive, V.90 modem, Microsoft Office 2000 SBE	Very good: easy access via handy lever; midsize tower; 4 open drive bays, 4 open slots	s	Fair */Good	24/7, toll-free	Varies */1	646
Good: Creative Labs NVIDIA GeForce 256 graphics card with 32MB of RAM, 8X DVD-ROM drive, V.90 modem, Corel WordPerfect Office 2000	Outstanding: roomy interior; midsize tower; 6 open drive bays, 4 open slots	Fair *	Good */Good	24/7, toll-free	3/1	647
Good: Creative Labs CT5823 graphics card with 32MB of RAM, 8X DVD-ROM drive, V.90 modem, Corel WordPerfect Office 2000	Very good: multimedia keyboard; minitower; 4 open drive bays, 4 open slots	Good *	Good */Good	24/7, toll-free	3/1	648
Good: Acer NVIDIA TNT2 graphics card with 16MB of RAM, 12X-40X CD-ROM drive, network card, chassis intrusion detection, case lock, Wake-on-LAN	Good: ample expansion room; desktop; 3 open drive bays, 2 open slots	Fair	Poor */Good	24/7, toll-free	3/3	649
Good: integrated ATI 3D Rage Pro AGP graphics with 8MB of RAM, 17X-40X CD-ROM drive, network card, chassis intrusion detection, case lock	Good: sleep and volume control on case; midsize tower; 3 open drive bays, 5 open slots	Good	Poor */Outstanding	24/7, toll-free	3/3	650
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent			

¹ Five years on CPU and main RAM, three years on other parts.

² 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.

WHAT ELSE: There's plenty of expansion room in the neat interior—four open PCI slots and five open bays. You'll have to wiggle through some wires to install additional RAM, however. The 8X DVD-ROM drive played our test movie smoothly, but it bogged down a bit when we opened other applications. Although the system is designed to accommodate additional fans, it already comes with three—one for intake, one for exhaust, and another inside the power supply.

BEST USE: With no network interface, this well-rounded machine is best suited for a small business or home office that needs a powerful application suite.

3 DELL OPTIPLEX GX110

WHAT'S HOT: With a Pentium III-600 CPU and Windows NT 4.0, the OptiPlex GX110 earned an impressive score of 173 on PC WorldBench 2000. The system's expansion cards connect to a riser card

that slides out for easy access. Upgrading will be a snap with four open slots and three open bays, and your IS department will appreciate the easy-service case on this midsize tower.

WHAT'S NOT: The integrated audio and speakers produce weak, tinny sound. If your IS department can be talked into it, upgrade to a set of external Harman/Kardon HK195 speakers for \$20 more.

WHAT ELSE: The system ships with a common two-button mouse (upgrading to an IntelliMouse costs \$29 extra). The GX110's distinctly corporate configuration includes an integrated network card, full remote management, integrated video, chassis intrusion detection, and a case lock.

BEST USE: This powerful managed PC is sure to rank high on any corporation's approved buy list.



BE A PRO: For just \$1559, our test Dell Dimension XPS T600r included Microsoft Office 2000 Professional.

4 GATEWAY GP7-700

WHAT'S HOT: With a Pentium III-700 processor and Windows 98 SE, the GP7-700 earned a blazing 147 score on PC WorldBench 2000. Gateway's 17-inch EV700 monitor produced sharp text and rich, saturated colors in our test images. This exceptionally well-equipped PC ►



RISE UP: Pull a green lever inside the Dell OptiPlex GX110 and a riser card, which carries the expansion cards, comes out for easy access.

includes an Iomega Zip 100 drive, a network interface card, a modem, and an APC surge suppressor that protects eight outlets and two phone lines. Getting inside the system is simple, thanks to a side panel that slides off smoothly after you loosen a couple of thumbscrews.

WHAT'S NOT: You get just two open expansion slots—one PCI, one ISA—and interior cabling obstructs access to memory upgrade slots. The system's 10GB hard drive is the smallest on the chart.

WHAT ELSE: Documentation includes a detailed setup guide and a system manual with many color illustrations. The two-speaker Cambridge SoundWorks SBS52 pumps out rich midrange sound, and the solid keyboard allows smooth typing.

BEST USE: Targeted at small- to medium-size businesses, the GP7-700 combines the right office features with raw power.

5 MICRO EXPRESS MICROFLEX-700B

WHAT'S HOT: This MicroFlex makes upgrades a snap. Turn one large thumbscrew at the top of the case, and either side pops off (and reattaches) smoothly. Though the interior is a bit cluttered, it has four open expansion slots and four open drive bays. The comfy Microsoft Natural ergonomic keyboard makes typing a pleasure—if you're accustomed to its design. Micro Express offers a generous four-year parts and labor warranty.

WHAT'S NOT: The thick system manual contains many photos and illustrations,

but it looks as if it were photocopied, and the pictures are tough to make out. Our test movie in the 8X DVD-ROM drive paused occasionally when we opened other applications.

WHAT ELSE: The PC's WorldBench 2000 score of 134 falls near the average for Athlon-700 systems we've tested. Its 17-inch Impression 7Plus DE-770 monitor displayed deep, rich colors; text remained sharp at 1024 by 768 resolution but blurred a bit at 1280 by 1024.

BEST USE: This system would be at home in any small office that needs athletic performance at a bargain price.

6 SYSTEMAX VENTURE PVO-600A

WHAT'S HOT: Solid multimedia hardware surrounds this reasonably priced (\$1499) system. The 17-inch AOC Spectrum 7Glr monitor produced impressively rich, saturated colors and crisp text, and the Cambridge SoundWorks SBS52 three-speaker set pumped out powerful sound. Unless you traffic in gargantuan files, the 20GB hard drive will take a long time to fill up,

and the 4X/4X/24X CD-RW drive lets you write and rewrite data to your heart's content. Interior access is outstanding: The midsize tower case pops off smoothly when you depress a lever on the side.

WHAT'S NOT: Though typing is quiet, the cheap-feeling keyboard flexes easily. Its keys—especially <Backspace>—are so small that they invite mistakes.

WHAT ELSE: The Venture PVO-600A earned a 131 on our PC WorldBench 2000 tests—average for an Athlon-600 system running Windows 98. Cables crisscross the interior, but you'll enjoy unimpeded access to the four open slots (three PCI and one ISA) and four open drive bays.

BEST USE: With its CD-RW drive and top-notch monitor and sound, the PVO-600A is an attractive multimedia PC.

7 CYBERMAX ENTHUSIAST A650W

WHAT'S HOT: The \$1699 Enthusiast A650W shows how a midrange system should handle multimedia. The 19-inch CyberMax AT1097F Trinitron monitor displayed rich colors in test images, and text remained crisp at resolutions up to the maximum 1600 by 1200. The ►

Hit the Reset Button (If You Have One)

TECH TREND PC MANUFACTURERS often try to streamline their systems, eliminating little-used features when they can. Some have even gone so far as to dispense with floppy drives. But should this housekeeping extend to the reset button?

Patrick Kimball, a spokesperson for Micron PCs, says that improvements in the operating system and in ease of use helped convince the company to eliminate the reset button from its consumer-oriented Millennia Max line. "Windows 98 and NT give you better software control in the event of a freeze, so you often don't need to reset," he says.

Philip Chang, engineering manager at Umax Computers, has a different opinion. "There are some hardware issues where the whole system will hang—beyond the operating system's control—so you still need a manual reset button," he says. Chang believes that users can damage their hard drive or power supply if they use the power button to hard-reboot their system.

But Steve Wilkins, strategic marketing manager for hard-drive manufacturer Quantum Corporation, says that newer hard drives are built to withstand a hard reboot. "The protection built into newer drives makes them okay to power off," he says. "They can stand up to the rigors of real life—either someone switching them off or a power failure." That said, Wilkins still considers it handy to have a reset button: "The software out of Redmond does tend to hang now and then."

Although pulling the plug isn't exactly treating your computer gently, choosing one system over another shouldn't come down to whether one of them includes a reset button.



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ROOM TO GROW: The Quantex SM667 offers four open slots and four open drive bays for expansion.

Altec Lansing ADA305 three-speaker set produced excellent sound, and it has USB connectivity so you can control it on screen. The 8X DVD-ROM drive played our test video smoothly, even when we opened other applications. Video playback benefits from the bundled Creative Labs NVidia GeForce 256 graphics card.

WHAT'S NOT: The Enthusiast A650W posted a score of 133 on PC WorldBench 2000—a tad low for the Athlon-650 units we've tested, but not far off.

WHAT ELSE: To get inside you must remove the entire case; but because it's fastened with thumbscrews, you don't need tools. You'll find lots of expandability—four open slots and six open bays in a mostly clear interior.

BEST USE: Built to handle everything from business applications to occasional gaming, this PC should attract experienced users who lack money to burn.

8 QUANTEX SM667

WHAT'S HOT: The SM667 posted a score of 138 on our PC WorldBench 2000 suite, which is about average for the Pentium III-667 systems we've tested. With four

open slots and four open bays, the minitower case has plenty of expansion room. The keyboard provides buttons for frequently used applications and Web sites. Color-coded ports aid setup.

WHAT'S NOT: You must remove two screws to free the flimsy side panel, and the plastic tabs that secure it are easy to bend; the interior is fairly cluttered. The 17-inch Quantex XP175N monitor displayed washed-out colors and blurry text at normal resolutions.

WHAT ELSE: The Altec Lansing ACS 33W system delivered crisp, strong audio from the Aureal Vortex2 sound

card. The slim system manual provides many screen shots, and the documentation includes a setup guide.

BEST USE: The Quantex SM667 should be suitable for small offices that need only modem connectivity.

9 ACERPOWER 4400

WHAT'S HOT: The system manual packs tons of illustrations and a truckload of excellent upgrading information. The well-designed desktop configuration features a case lock and a cover that easily slides off. The system comes with Wake-on-LAN and chassis intrusion detection features. Intel LANDesk Client Manager is included on disk (it's not preinstalled).

WHAT'S NOT: Some of the added features collide—literally. We had trouble reattaching the case cover because it didn't quite line up with the case lock. The unit earned a 118 on our PC WorldBench 2000 tests—one of the lowest scores we've seen for a PIII-600. A metal panel secured by a screw blocks access to an internal drive bay (but the panel isn't very hard to remove). Acer's system reliability rated only Fair in our most recent survey.

WHAT ELSE: Desktop cases can be a tight squeeze, but we found more expansion room than we'd expected—two open slots and three open bays. The 17-inch Acer 77C monitor produced adequate colors in our test images and mostly sharp text, though it began to get fuzzy at the maximum resolution of 1280 by 1024. Advent's

two-speaker AV120 set attaches to the sides of the monitor; it's easy to set up but delivers only mediocre sound.

BEST USE: A slim desktop with management features, the AcerPower 4400 should suit corporate buyers trying to save space and a few bucks.

10 NEC POWERMATE ES

NEW WHAT'S HOT: Atop the well-designed midsize tower, a silver strip holds buttons for sleep and volume control, as well as a headphone jack and a USB port. The interior has three open drive bays and four free PCI slots (plus one ISA), but expansion cards must be installed upside down. Documentation includes a quick-setup guide, and a thick manual with many helpful pictures and ample troubleshooting information.

WHAT'S NOT: A flimsy expansion bay cover awkwardly blocks all four bays. After opening the system, you have to shove the bundled cables to replace the tower's side panel. The NEC's score of 125 on our PC WorldBench 2000 tests is a bit low for Pentium III-600 machines.

WHAT ELSE: Colors appeared washed out on the 17-inch NCM 1720 monitor, but text stayed sharp up to the maximum resolution of 1280 by 1024. The system contains a built-in network interface, a case lock, and chassis intrusion detection.

BEST USE: This NEC might appeal to corporate users who want to keep an eye on their company assets. ▶



CAN YOU MANAGE? Acer's AcerPower 4400 includes Intel LANDesk Client Manager software.

ALSO NEW THIS MONTH



WE EVALUATED the following systems along with the others, but they didn't score high enough to make the *Top 10 Midrange PCs* chart. For write-ups, visit PC World Online (www.pcworld.com/t10pcs).

- ◆ Axis Systems Orion 100C DVD
- ◆ Compaq Prosignia Desktop 330
- ◆ Polywell Poly K7-650

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TOP 10 BUDGET PCs

	SYSTEM: UNDER \$1200	Month tested	★ Overall rating	Street price (2/11/00)	PC WorldBench 2000 performance score ¹	Base configuration
1	 Micro Express MicroFlex-55C 800/989-9900 www.microexpress.net	retested this month	87	Expensive: \$1199	 119	Good: Pentium III-550, 64MB of SDRAM, 512KB L2 cache, 18GB hard drive, 17-inch monitor, Windows 98 SE
2	 NuTrend Sierra LE 888/482-6678 www.nutrend.com	retested this month	86	Expensive: \$1139	 120	Good: Pentium III-500, 128MB of SDRAM, 512KB L2 cache, 13.5GB hard drive, 17-inch monitor, Windows 98 SE
3	Dell OptiPlex GX100 800/388-8542 www.dell.com	retested this month	84	Expensive: \$1152	 127	Good: Celeron-500, 64MB of SDRAM, 128KB L2 cache, 6.4GB hard drive, 17-inch monitor, Windows NT 4.0
4	Quantex SB500c 800/896-4898 www.quantex.com	retested this month	83	Average: \$979	 101	Good: Celeron-500, 64MB of SDRAM, 128KB L2 cache, 13.6GB hard drive, 17-inch monitor, Windows 98 SE
5	Racer PC500c 800/572-1922 www.racerpc.com	retested this month	82	Inexpensive: \$799	 102	Good: Celeron-500, 64MB of SDRAM, 128KB L2 cache, 8.4GB hard drive, 17-inch monitor, Windows 98 SE
6	HP Brio BA200 800/752-0900 www.hp.com/desktops/brio	NEW	80	Inexpensive: \$898	 99	Good: Celeron-500, 64MB of SDRAM, 128KB L2 cache, 4.3GB hard drive, 17-inch monitor, Windows 98 SE
7	PC Connection Epiq BPS 4000 888/467-1212 www.pconnection.com	retested this month	79	Very inexpensive: \$699	 95	Good: Celeron-466, 64MB of SDRAM, 128KB L2 cache, 6.4GB hard drive, 17-inch monitor, Windows 98 SE
8	AcerPower 8400 800/733-2237 www.acer.com	NEW	78	Expensive: \$1199	 104	Good: Pentium III-500, 64MB of SDRAM, 512KB L2 cache, 10.2GB hard drive, 17-inch monitor, Windows 98 SE
9	Toshiba V3100 800/867-4422 www.buy.toshiba.com	retested this month	74	Average: \$1101	 99	Good: Celeron-500, 64MB of SDRAM, 128KB L2 cache, 8.5GB hard drive, 17-inch monitor, Windows 95
10	Polywell Poly LPC 1000 800/999-1278 www.polywell.com	retested this month	73	Expensive: \$1199	 103	Very good: Celeron-500, 128MB of SDRAM, 128KB L2 cache, 27.3GB hard drive, 17-inch monitor, Windows 98 SE
 Best Buy		Percent of overall rating ▶		Price: 22 percent	Performance: 13 percent	Base configuration: 10 percent

¹ A system's performance word score is relative to the scores earned by other PCs running the same operating system. See "PC WorldBench 2000 Launches" on page 201.

² We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

³ For more information about all the products in this table, select number 903 on the product information card or visit www.pcworld.com/productinfo.



THIS MONTH'S BUDGET systems aren't quite so budget, with most prices in the \$1100 to \$1199 range. Racer and HP make the chart with systems under \$900 that also earned respectable PC WorldBench 2000 scores. Best Buys from Micro Express and NuTrend offer great performance, but cost over \$1100.

1 MICRO EXPRESS MICROFLEX-55C



WHAT'S HOT: With four open slots (three PCI and one ISA) and four open drive bays, the PC's large, well-organized interior allows for ample expansion. And it's easy to access, too: After loosening one large thumbscrew, you remove the top and pop off the side; the shell goes back on just as easily. The included Microsoft Natural Keyboard permits comfortable, quiet typing.

WHAT'S NOT: Our test PC came without any business suite or other software designed for the small or home office. In

our anonymous support calls to Micro Express, we received only Fair service.

WHAT ELSE: Among the Pentium III-550 systems we've tested, the MicroFlex-55C's PC WorldBench 2000 score of 119 is average. The 17-inch Impression 7VX monitor produces deep colors and sharp text at 1024 by 768 resolution. MidiLand's SW190 Super three-speaker set sports a funky rippled-plastic design; the audio itself is adequate for office environments.

BEST USE: This feature-rich system should meet the needs of most home offices or small businesses, but you must buy your productivity software separately.

2 NUTREND SIERRA LE



WHAT'S HOT: The Sierra LE costs \$1139 and boasts features and performance that put many midrange systems to shame. For example, it comes with an 8X DVD-ROM drive that auto-played our test movie and maintained smooth playback even while other applications were opening, and the keyboard offers several convenient application-launching buttons. The ATI Rage Fury graphics card provides a TV-out port so you can display your PC desktop on a television monitor.

WHAT'S NOT: Though you get a quick-setup guide, the skimpy manual provides little troubleshooting information. The interior wiring is messy, making access to components somewhat difficult.

WHAT ELSE: The 17-inch OptiQuest V71 monitor produced bright, crisp colors and sharp text at resolutions up to 1280 by 1024. With four open slots (two PCI, two

Extra features	Design and expandability ¹	Vendor's system reliability	Tech support quality/policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number ²
Very good: ATI Xpert 2000 graphics card with 32MB of RAM, 6X DVD-ROM drive, V.90 modem, Microsoft Natural Keyboard	Very good: easy access to roomy box; midsize tower; 4 open drive bays, 4 open slots	+	Fair +/Good	24/7, toll-free	4/4	634
Good: ATI Rage Fury graphics card with 32MB of RAM, 8X DVD-ROM drive, V.90 modem	Good: interior messy, but expandable; midsize tower; 4 open drive bays, 4 open slots	+	Fair +/Good	24/7, toll-free	3/lifetime	635
Satisfactory: integrated Intel 810 graphics with UMA and 4MB of display cache, 12X-24X CD-ROM drive, network card, intrusion detection, Wake-on-LAN	Satisfactory: Easy two-button case access; desktop; no open drive bays, 2 open slots	Outstanding	Good/Outstanding	24/7, toll-free	3/3	-
Good: integrated Intel 810 graphics with UMA, 24X-48X CD-ROM drive, V.90 modem, network card, Corel WordPerfect Office 2000	Good: removing side panel takes fiddling; midsize tower; 4 open drive bays, 1 open slot	Good +	Good +/Good	24/7, toll-free	3/1	636
Satisfactory: integrated Intel 810 graphics with UMA, 4.8X DVD-ROM drive, V.90 modem	Good: side handles on case; minitower; 1 open drive bay, 3 open slots	+	Fair +/Good	24/7, toll-free	Varies ³ /3	637
Satisfactory: integrated Intel 810 graphics with UMA, 17X-40X CD-ROM drive, V.90 modem	Satisfactory: small case has cluttered interior; minitower; 1 open drive bay, 2 open slots	Good	Good/Fair	24/7, toll call	1/1	638
Good: integrated Intel 810 graphics with UMA and 4MB of display cache, 12X-48X CD-ROM drive, V.90 modem	Satisfactory: roomy; need tools to open; midsize tower; 4 open drive bays, 2 open slots	+	Fair +/Good	24/7, toll-free	1/1	639
Good: ATI Xpert 98 AGP graphics card with 8MB of RAM, 24X-40X CD-ROM drive, network card, chassis intrusion detection, case lock, Wake-on-LAN	Good: slightly cramped interior; minitower; 3 open drive bays, 2 open slots	Fair	Fair +/Good	24/7, toll-free	3/3	640
Good: integrated Intel 810 graphics with UMA, 17X-40X CD-ROM drive, network card	Good: well-organized interior; minitower; 2 open drive bays, 2 open slots	+	Fair +/Good	24/7, toll-free	1/1	641
Good: integrated Intel 810 graphics with UMA and 4MB of display cache, 24X-52X CD-ROM drive, network card, Corel WordPerfect Suite 8	Satisfactory: case is size of big notebook; compact; no open drive bays or slots	+	Fair +/Good	24/7, toll-free	3/5	642
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.

² One-year warranty on screen, mouse, and keyboard; three years on other parts.

³ 24/7 tech support ends after the first year.

ISA) and four open bays, the Sierra LE offers lots of expansion room. This Pentium III-500 system earned a World-Bench 2000 score of 120, about average for systems we've tested in its class.

BEST USE: Frequent presenters can use the fast Sierra LE for day-to-day work.

3 DELL OPTIPLEX GX100

WHAT'S HOT: Dell's \$1152 OptiPlex GX100—one of the few Celeron-based Windows NT systems that we've tested—exceeded our expectations. Equipped with a 500-MHz processor, the OptiPlex GX100 turned in a respectable PC World-Bench 2000 score of 127, surpassing most Pentium III-450 systems we've tested with NT. The solid Dell QuietKey keyboard permits smooth, soft-touch typing, but is a little noisy. This machine ships corporate-ready with an integrated network interface, a case lock, and built-in Wake-on-LAN management features.

WHAT'S NOT: The desktop case provides no free drive bays, only one open RAM slot, and just two available PCI slots. The system manual covers Windows NT only scantily and includes no information on the OptiPlex's hardware or on any component other than the monitor. (Dell does provide online documentation for all of the parts.) There's also no way to upgrade the system's integrated Intel 810 AGP graphics and its 4MB of 3D cache, unless you resort to a PCI graphics card—the motherboard doesn't provide an AGP slot.

WHAT ELSE: To access the GX100's interior, you simply press two buttons (one on either side of the rather flimsy plastic case) and lift off the top. Dell's 17-inch M770 monitor displays crisp text and bright colors at the standard 1024 by 768 resolution. Fortunately, Dell has replaced



IN A SEA OF CELERON systems, the MicroExpress MicroFlex-55C's Pentium III-550 processor stands out.

the original notebook-style CD-ROM drive with a faster, sturdier model.

BEST USE: With its compact size, integrated network interface, and built-in management features, the speedy OptiPlex GX100 is destined to grace many a stall in corporate cubicle farms. ▶

4 QUANTECH SB500C

WHAT'S HOT: Packing both a modem and a network interface card, the SB500c is ready for any kind of connectivity, and at only \$979, this system delivers a pretty good bang for your buck. Quantex's 17-inch MON-XP170DP monitor displayed our test images with deep, rich colors, and text stayed sharp up to the maximum resolution of 1280 by 1024. If you need higher resolution, the SB500c lets you upgrade by installing an AGP graphics card, unlike with most systems that have integrated Intel 810 graphics.

WHAT'S NOT: To remove the flimsy side of the midsize tower, you have to remove two screws and jimmy the side back and forth. The fairly cluttered interior lacks some expandability: There are four open bays but only one open PCI slot.

WHAT ELSE: With a 101 on our PC World-Bench 2000 tests, this Quantex scored about average for the Celeron-500 systems that we've tested. The keyboard is large and solid, with extra multimedia keys, but it clacks a bit as you type. Documentation includes a slim system manual with lots of screen shots, and a Windows 98 setup guide.

BEST USE: A strong performer for the price, the Quantex SB500c would fit into almost any small business that is trying to tighten its budgetary belt.

5 RACER PC500C

WHAT'S HOT: A \$150 price drop brings this already cheap system down to \$799—the second-lowest price on our budget chart. A unique minitower design (with side handles for portability) makes access to the system's innards easy. Service from the company's tech support rated Good in our anonymous calls.

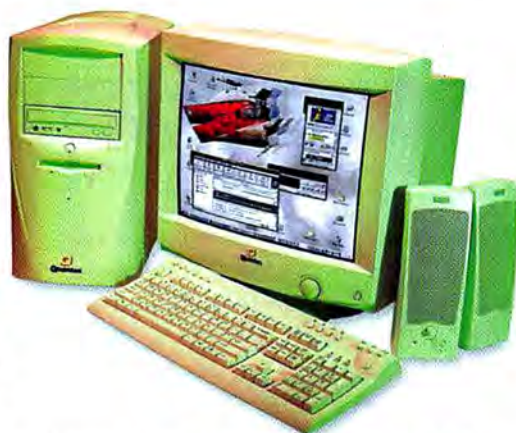
WHAT'S NOT: Colors appeared washed out on the 17-inch ADI VD-697 monitor. Playback on the 4.8X DVD-ROM drive looked poor, mostly due to the substandard monitor.

WHAT ELSE: This Racer's PC WorldBench 2000 score of 102 ranks as average for Celeron-500 systems running Windows 98. It comes with documentation for all components, but not an overall system manual. The neat interior offers limited expansion room—three open PCI slots but only one open drive bay.

BEST USE: Providing solid power at a rock-bottom price, the Racer makes a nice choice for a second home-office PC.

6 HP BRIO BA200

NEW **WHAT'S HOT:** At \$898, the Brio BA200 will leave a lot of change in your pocket. Despite its low price, this Celeron-500 system managed a respectable PC WorldBench 2000 score of 99. The sys-



QUANTIFIED AND QUALIFIED: Quantex's SB500c costs just \$979, and it comes with both network card and modem.

tem manual features lots of troubleshooting information and many helpful illustrations, and the HP Brio Assist CD-ROM provides even more support. If those don't suffice, try HP's tech support—we've found it helpful and easy to reach.

WHAT'S NOT: The good tech support comes at a price: HP doesn't offer toll-free lines, and after a year, you'll have to pull out a credit card for reps to talk to you. Should you need to get inside for maintenance, you must remove the entire case by loosening three thumbscrews, then carefully jimmy the case free.

WHAT ELSE: The diminutive minitower case has a cluttered interior but only two open expansion (PCI) slots and one open drive bay. Colors on the 17-inch HP 71 monitor appeared deep and rich, with text clear at most resolutions, though it blurred somewhat at the maximum resolution of 1280 by 1024. If you want to go higher, you'll need a PCI graphics card, because you can't upgrade the Brio's integrated Intel 810 AGP graphics.

BEST USE: Any small- to medium-size business with modest computing needs and budgets should consider the Brio.

ISA Fades Away as PCI Bus Takes Over

TECH TREND ONE OF THE OLDEST stalwarts of the personal computer world, the 16-bit Industry Standard Architecture bus has been around since 1984. When the 32-bit Peripheral Component Interconnect bus debuted in 1993, ISA still found a home on motherboards—mostly to support modems, network cards, and specialized adapters. But ISA slots (at left in photo) are rare in new PCs, indicating that the technology's days are numbered.

Dell spokesperson Andy Prince says that many companies, including Dell, are moving away from ISA—"It's so much slower a bus than PCI." Of the four Dells placing on our Top 30 charts, only the GX110—number three on our midrange lineup—offers an ISA slot.

Micron's Patrick Kimball agrees with Prince. "While some places in the corporate or government world still need ISA," he says, "going forward, most of our customers [will use PCI]." Neither Micron unit on our charts offers ISA slots. However, systems in Micron's ClientPro line, geared toward computing environments where stability and backward compatibility are important, still include an ISA slot or two.



7 PC CONNECTION EPIQ BPS 4000

WHAT'S HOT: Its dirt-cheap price of \$699—the lowest on our chart. The Epiq BPS 4000 ships with a quick-setup guide, a thick technical-support and warranty booklet, and a thorough system manual with many detailed diagrams and illustrations. Its midsize chassis provides

expandability to spare, with four open drive bays and two open PCI slots.

WHAT'S NOT: The flimsy keyboard's keys rest too close together for comfortable typing. Worse, the 17-inch Pionex P708 monitor yielded dull colors of our test images, headache-inducing fuzzy text at 1024 by 768 resolution, and almost illegible text at the maximum resolution of 1280 by 1024.

WHAT ELSE: You reach the Epiq's interior by removing three screws. The system earned a score of 95 on PC WorldBench 2000—average for the Celeron-466 systems we've tested under Windows 98.

BEST USE: Spending a little bit more on a better monitor might make the Epiq tolerable for offices on very tight budgets.

8 ACERPOWER 8400

NEW **WHAT'S HOT:** Acer's AcerPower 8400 packs many desirable corporate features for a bargain price. The minitower carries chassis intrusion detection, a network interface card, and a case lock. The system manual includes thorough upgrading information and a warranty guide. The CD-ROM drive even comes with a lens cleaner. The drive also boasts extra buttons for fast-forward, play, and other audio CD options.

WHAT'S NOT: Colors on the 17-inch Acer 77C appeared washed out. Text blurred at the standard 1024 by 768 resolution and was almost unreadable at the maximum resolution of 1280 by 1024.

WHAT ELSE: This machine earned a PC WorldBench 2000 score of 104, about average compared with similarly configured PIII-500 systems that we've tested.



WAKE UP AND SMELL THE LAN: Acer's AcerPower 8400 offers Wake-on-LAN so you can revive it remotely.

To get inside, you must remove two screws; the side panel then slides out smoothly. However, the small motherboard makes accessing the two open slots and three open bays a bit difficult.

BEST USE: The AcerPower is suitable for any business with moderate computing needs; its intrusion-alert and networking features make it ideal for corporate desks.

9 TOSHIBA V3100

WHAT'S HOT: Toshiba's system documentation includes a handy

quick-setup guide and a thick manual with many illustrations covering ergonomics and troubleshooting, though it lacks documentation for individual hardware components. The side of the minitower slides on and off easily after you remove two thumbscrews.

WHAT'S NOT: The V3100 earned a score of 99 on our PC WorldBench 2000 tests—about average for Celeron-500 systems. Typing on the flimsy keyboard was quiet, but the keys seem too close together. At the maximum resolution of 1280 by 1024, the 17-inch Toshiba Tekbright 710V monitor produced somewhat blotchy colors and shadowy text.

WHAT ELSE: Designed for corporate computing, this diminutive system uses integrated video, while speakers and a modem are optional. Standard features include a PCI network interface card and full remote management. The cramped interior is well organized but offers just two open PCI slots and two open bays for expansion.

BEST USE: This solid corporate workhorse should appeal to IT managers looking for moderate power at a bargain price.

10 POLYWELL POLY LPC 1000

WHAT'S HOT: Talk about space-saving desktop systems—this tiny PC may well get lost under your desk clutter. The LPC's case is



PICK A PRETTY COLOR: HP's Brio BA200 offers a foolproof combo of colored ports and matching connectors, so you don't mix when you should be matching.

about the size of a large book, and it provides some novel features. Besides a built-in network interface and a modem, the Poly supplies S-video and AV-out ports for multimedia presentations. The excellent documentation includes a quick-setup guide, a thick system manual, and a user guide with general troubleshooting information. Loaded with a generous 128MB of RAM and a monster 27GB hard drive, this Poly still costs only \$1199.

WHAT'S NOT: The system's design virtually prohibits upgrading. First off, the interior's tough to reveal: After removing three screws, you slide the internal chassis out of the cover—like opening a box of matches. Second, the minuscule interior makes no room for expansion: You get no open slots or bays, though you could swap the huge hard drive for an even bigger one later. Judging from our anonymous calls, Polywell's tech support rated only Fair.

WHAT ELSE: Diminutive size doesn't hurt the Poly's performance. With a score of 103 on our PC WorldBench 2000 tests, its speed is on par with similarly configured Celeron-500 systems. The 17-inch ADI CM700 monitor delivers deep, rich colors and sharp text, but it blurs a bit at the maximum resolution of 1280 by 1024. Clear sound with thunderous bass emanates from the three-speaker Cambridge PC Works set.

BEST USE: This minuscule Poly would make a great system for a (very) small office with severe space constraints. ►

TOP 15 NOTEBOOK PCs

POWER NOTEBOOK: \$2700 AND OVER		Month tested	★ Overall rating	Street price (2/11/00)	PC WorldBench 2000 performance score <small>Faster</small>	Base configuration
1	Gateway Solo 9300LS 800/428-3929 www.gateway.com	Retested this month	89	Very inexpensive: \$2748	Good 112	Very good: Pentium III-450, 15-inch active screen, touchpad, 64MB of RAM, 6GB hard drive
2	Acer TravelMate 732 TLV 800/733-2237 www.acer.com/aac	Retested this month	86	Very inexpensive: \$2799	Very good 120	Outstanding: Pentium III-500, 15-inch active screen, touchpad, 128MB of RAM, 9GB hard drive
3	Dell Inspiron 5000 G650VT 800/388-8542 www.dell.com	NEW	85	Very expensive: \$3727	Outstanding 127	Good: Pentium III-650/500, 15-inch active screen, touchpad, 128MB of RAM, 18GB hard drive
4	Quantex W-1511 800/896-4898 www.quantex.com	NEW	84	Inexpensive: \$2899	Outstanding 129	Very good: Pentium III-600/500, 15-inch active screen, touchpad, 128MB of RAM, 11.5GB hard drive
5	NEC Versa LXi 888/632-8701 www.nec-computers.com	NEW	81	Average: \$3299	Good 109	Very good: Pentium III-450, 15.1-inch active screen, touchpad, 128MB of RAM, 6.1GB hard drive
MIDRANGE NOTEBOOK: \$2000 TO \$2699		Percent of overall rating ▶		Price: 14 percent	Performance: 20 percent	Base configuration: 5 percent
1	HP Pavilion N3290 800/322-4772 www.hp.com	NEW	78	Average: \$2399	Very good 109	Good: Pentium III-500, 14.1-inch active screen, touchpad, 64MB of RAM, 6GB hard drive
2	NEC Versa VX PIII-500 888/632-8701 www.nec-computers.com	NEW	77	Average: \$2499	Good 104	Very good: Pentium III-500, 14.1-inch active screen, touchpad, 64MB of RAM, 12GB hard drive
3	Chem USA ChemBook 3015 800/866-2436 www.chemusa.com	NEW	77	Average: \$2399	Outstanding 114	Good: Pentium III-500, 14.1-inch active screen, touchpad, 128MB of RAM, 6.5GB hard drive
4	Quantex W-1410 800/896-4898 www.quantex.com	Retested this month	75	Inexpensive: \$2099	Very good 109	Very good: Pentium III-500, 14.1-inch active screen, touchpad, 64MB of RAM, 6.4GB hard drive
5	Axis Systems Fusion 7700G 800/378-9014 www.axisys.com	Retested this month	70	Average: \$2418	Satisfactory 89	Very good: Pentium III-400, 14.1-inch active screen, touchpad, 96MB of RAM, 6.4GB hard drive
BUDGET NOTEBOOK: UNDER \$1999		Percent of overall rating ▶		Price: 17 percent	Performance: 17 percent	Base configuration: 5 percent
1	HP Pavilion Notebook PC 800/322-4772 www.hp.com	Retested this month	84	Average: \$1573	Very good 90	Satisfactory: Celeron-433, 12.1-inch active screen, touchpad, 64MB of RAM, 4.8GB hard drive
2	Dell Latitude Cpt V466GT 800/388-8542 www.dell.com	Retested this month	83	Expensive: \$1978	Very good 90	Very good: Celeron-466, 14.1-inch active screen, touchpad, eraserhead, 64MB of RAM, 6.4GB hard drive
3	Acer TravelMate 514 TXV 800/733-2237 www.acer.com/aac	NEW	79	Expensive: \$1899	Good 83	Good: Celeron-466, 14.1-inch active screen, touchpad, 64MB of RAM, 6.4GB hard drive
4	FOSA-USA 995H Celeron 400 800/216-3672 www.fosa.com	NEW	78	Very inexpensive: \$1335	Good 88	Satisfactory: Celeron-400, 12.1-inch dual-scan screen, touchpad, 64MB of RAM, 6GB hard drive
5	Twinhead PowerSlim 600 800/995-8946 www.twinhead.com	NEW	76	Expensive: \$1910	Good 89	Good: Pentium II-366, 12.1-inch active screen, touchpad, 64MB of RAM, 6.4GB hard drive
Best Buy		Percent of overall rating ▶		Price: 20 percent	Performance: 14 percent	Base configuration: 5 percent

¹ Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.

² For more information about all the products listed in this table, select number 902 on the product information card or visit www.pcworld.com/productinfo.

³ Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.



SPEEDSTEP. Isn't that the latest aerobic exercise craze?

Close: It's Intel's nifty new dual-speed mobile processor,

which runs a plugged-in notebook at a heart-pounding 600

or 650 MHz and reduces its speed to 500 MHz when the notebook is

unplugged to conserve battery power. This month, the first SpeedStep

business notebooks—the big-screened Quantex W-1511 and Dell Inspi-

ron 5000 G650VT—step onto our charts.

POWER NOTEBOOKS

1 GATEWAY SOLO 9300LS



WHAT'S HOT: Unlike many big laptop screens, the Solo's 15-inch display feels sturdy enough to withstand the occasional bump or accidental twist. And it sports a featherweight price of \$2748—down \$118 from last month. The unit's 12-cell lithium ion bat-

Extra features	Design and ease of use	Battery life (hours:min)	Travel weight (pounds) ¹	Vendor's system reliability	Tech support quality/policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number ²
Very good: 10X-24X CD-ROM drive, V.90 modem, multipurpose bay takes second lithium ion battery	Excellent: smoothly designed presenter's dream	Outstanding: 5:13	Average: 8.6	Good	Good/Good	24/7, toll-free	3/3	625
Excellent: 6X DVD-ROM drive, V.90 modem, multipurpose bay takes second lithium ion battery	Average: comes network ready	Very good: 4:31	Average: 7.9	Fair	Good */ Fair	24/7, toll-free	1/1	626
Excellent: 6X DVD-ROM drive, V.90 modem, multipurpose bay takes second lithium ion battery	Very good: decked out and carries fastest mobile chip	Good: 3:07	Heavy: 8.9	Good	Good/Outstanding	24/7, toll-free	3/3	-
Very good: 6X DVD-ROM drive, V.90 modem, multipurpose bay takes second lithium ion battery	Average: video-out port biggest frill on this large-screen portable	Good: 3:10	Average: 8.5	*	Fair */ Fair	24/7, toll-free	Varies */1	627
Very good: 12X-24X CD-ROM drive, V.90 modem, ethernet adapter, multipurpose bay takes second lithium ion battery	Excellent: clunky but configurable, external battery gauge	Good: 3:14	Heavy: 9.5	Fair	Fair/Outstanding	24/7, toll-free	3/3	628
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: 6X DVD-ROM, V.90 modem, lithium ion battery	Average: listen to music CDs without turning this unit on	Satisfactory: 2:52	Average: 7.8	Good	Good */ Poor	24/7, toll call	1/1	629
Satisfactory: 12X-24X CD-ROM, V.90 modem, lithium ion battery	Average: poor CD controls and application launch buttons	Satisfactory: 2:55	Average: 7.3	Fair	Fair/Outstanding	24/7, toll-free	3/3	630
Satisfactory: 12X-24X CD-ROM drive, V.90 modem, multipurpose bay takes second lithium ion battery	Very good: all-black portable holds two batteries at once	Good: 3:20	Average: 7.6	*	Good */ Fair	24/7, toll-free *	1/3	631
Very good: 6X DVD-ROM drive, V.90 modem, multipurpose bay takes second lithium ion battery	Very good: plain looking, so-so sound, but holds two batteries	Good: 3:00	Average: 7.7	*	Fair */ Fair	24/7, toll-free	Varies */1	632
Very good: 12X-24X CD-ROM drive, V.90 modem, multipurpose bay takes second lithium ion battery	Average: modular bay, easy-to-remove hard drive	Satisfactory: 2:21	Average: 7.3	*	Fair */ Fair	24/7, toll-free	3/3	633
Extra features: 5 percent	Design and ease of use: 10 percent	Battery life: 8 percent	Weight: 8 percent	Reliability: 20 percent	Support and warranty: 10 percent			
Satisfactory: 10X-24X CD-ROM drive, V.90 modem, lithium ion battery	Average: all-in-one with external CD controls	Satisfactory: 2:42	Average: 7.4	Good	Good */ Poor	24/7, toll call	1/1	634
Good: 10X-24X CD-ROM drive, multipurpose bay takes second lithium ion battery	Excellent: highly configurable	Good: 3:05	Average: 8.3	Good	Good/Good	24/7, toll-free	1/1	-
Good: 6X DVD-ROM drive, V.90 modem, lithium ion battery	Good: all-in-one portable can stand alone as CD player	Good: 3:46	Average: 7.9	Fair	Good */ Fair	24/7, toll-free	1/1	635
Satisfactory: 10X-24X CD-ROM drive, V.90 modem, lithium ion battery	Average: basic unit with above-average dual-scan screen	Satisfactory: 2:05	Average: 6.9	*	Fair */ Poor	9/5, toll-free	1/1	636
Good: 10X-24X CD-ROM drive, V.90 modem, multipurpose bay takes second lithium ion battery	Average: light subnotebook without docking station	Satisfactory: 2:05	Very light: 5.3	*	Fair */ Poor	12/5, toll-free	1/1	637
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			

¹ Insufficient data to give a rating.

² Three years on CPU and main memory, one year on other parts.

³ Toll-free support is available 8:30 a.m. to 5:30 p.m.; thereafter it's a toll call.

tery easily outlasted other laptop power packs in our tests, running for a record-breaking 5 hours and 13 minutes.

WHAT'S NOT: Our test system came with a relatively stingy (for this price range) 64MB of RAM and 6GB hard drive. The Solo 9300LS's speakers produce fairly loud audio but have a weak bass response and sound fuzzy at higher volumes.

WHAT ELSE: This beefy desktop replace-

ment bulges with multimedia connections. It carries TV-in and -out ports and a Dolby jack for connecting a Surround Sound stereo system. The polished, black 9300LS also boasts external buttons for launching applications. Two modular bays make configuration changes a snap. You can swap out the floppy drive or the CD-ROM drive ►



SILVER SCREEN:

Quantex's W-1511 pairs a TV-out port with a DVD-ROM drive.

in favor of a second hard drive of up to 10GB (for an extra \$499), a SuperDisk drive (\$75), or a second battery (\$100).

BEST USE: Presenters and digital editors will appreciate this beautifully designed, reasonably priced notebook.

MIDRANGE NOTEBOOKS

1 HP PAVILION N3290



WHAT'S HOT: This \$2399 Pentium III-500 version of HP's consumer model (the Pavilion Notebook PC) combines above-average

sound with external buttons for convenient DVD and CD playing. You can program the touchpad buttons to launch applications, and the keyboard is quiet and comfortable. Parts are easy to access; the hard drive is locked in by one screw.

WHAT'S NOT: Calls to HP's technical support staff are on your nickel, and the company charges you for this support after three years. The headphone port sits inconveniently at the back of the unit, and the translucent-blue CD controls are hard to read and too shallow to press easily.

WHAT ELSE: With a PC WorldBench 2000 score of 109, the Pavilion's performance is average for a PIII-500 notebook. Likewise, its 2:52 battery life is mediocre.

BEST USE: The Pavilion N3290 would make a nice personal machine for a music-loving desk jockey or for someone with money to spend on a fast processor, a big screen, and a DVD-ROM drive.

BUDGET NOTEBOOKS

1 HP PAVILION NOTEBOOK PC



WHAT'S HOT: Like its higher-priced Pentium III-500 sibling (which occupies first place on our midrange chart), this well-rounded budget notebook can function as a stand-alone CD player. At 6.6 pounds (not including the AC adapter), the Pavilion is trim for a notebook with built-in floppy and CD-ROM drives. Parts on this system are easy to access, including the hard drive, which is locked in by a single screw.

WHAT'S NOT: Though fast for a budget notebook, this Celeron-433 performs 15 percent slower than a typical Celeron-400.



GET WITH THE PROGRAM: You can set the Hewlett-Packard Pavilion N3290's touchpad buttons to launch your favorite applications.

Free telephone support (to a toll number) ends after three years, and we have the same design quibbles about it as with the Pavilion N3290: The headphone port is inconveniently located on the back of the unit, and the shallow, dark-blue CD controls are difficult to read and press.

WHAT ELSE: You can program the mouse buttons to launch your favorite applications. You get the same attractive consumer software bundle as with the Pavilion N3290: Microsoft Works 2000, Money 2000, and Quicken Basic 2000.

BEST USE: Only HP's parsimonious support policies prevent the \$1573 Pavilion from being the perfect starter notebook.

What's New

THE ARRIVAL OF notebooks based on Intel's new Pentium III-650/500 and PIII-600/500 SpeedStep processors is forcing Pentium III-500 laptop prices down to more affordable levels. Single-speed PIII-550 notebooks grabbed four of the five spots on our midrange lineup.

Meanwhile, SpeedStep notebooks command the highest prices. Dell's \$3727 Inspiron 5000 G650VT, in third place among power notebooks, costs a pretty penny. But others are relatively good deals: The new Quan-

tex W-1511, number four on this month's power chart, lists for a reasonable \$2899.

In March's *Top of the News* story "Double Time: New PIII Notebooks Run at 650 or 500 MHz" (www.pcworld.com/mar00/p3_notes), however, we reported that a SpeedStep processor only affects performance if you use heavy-duty applications. If you're in the habit of watching a couple of DVD movies every time you make a cross-country flight, for instance, a SpeedStep processor can squeeze up to 14 percent more time out of one battery charge. But Intel's SpeedStep has little effect with more typical business applications.

This month we looked at three notebooks that have similar case designs. Dell's Inspiron 5000 G650VT looks like a heavier, thicker, more decked-out version of the Quantex W-1511. For a lower-cost version of essentially the same case, check out Chem USA's \$2399 ChemBook 3015, in third place on our midrange list. Despite being the most modestly equipped of the three, the ChemBook 3015 still sports a Pentium III-500 processor and a 14.1-inch screen. All three units offer a modular bay that can hold a second battery, among other extra-cost add-ins.

Contributing Editor Carla Thornton regularly covers notebooks for PC World. ►



TRACK STAR: Acer's TravelMate 514 TXV, the third-place finisher among budget notebooks on this month's chart, plays CDs even when the system is off.

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Printers That Mean Business

TOP 15 HOME PCs

	POWER SYSTEM: \$2000 AND OVER	Month tested	★ Overall rating	Street price (2/17/00)	PC WorldBench 2000 performance score ¹	Base configuration ²
1	 Gateway Select 800 800/315-2536 www.gateway.com	NEW	89	Average: \$2399	Outstanding 147	Very good: AMD Athlon-800, 128MB of RAM, 512KB L2 cache, 27.3GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
2	Dell Dimension XPS T650r 800/388-8542 www.dell.com	retested this month	88	Inexpensive: \$2189	Very good 138	Very good: Pentium III-650, 128MB of RAM, 256KB L2 cache, 20.4GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
3	Sony VAIO PCV-R549DS 888/315-7669 www.sony.com/pc	NEW	87	Expensive: \$2800	Outstanding 147	Good: Pentium III-750, 128MB of RAM, 256KB L2 cache, 41GB hard drive, minitower, 17-inch monitor, Windows 98 SE
4	HP Pavilion 9690c PC 800/724-6631 www.hp-at-home.com	NEW	86	Expensive: \$2798	Outstanding 147	Good: Pentium III-800, 128MB of RAM, 256KB L2 cache, 40GB hard drive, midsize tower, 17-inch monitor, Windows 98 SE
5	Compaq Presario 5900Z-800 800/345-1518 www.compaq.com	NEW	86	Very expensive: \$2956	Very good 138	Very good: AMD Athlon-800, 128MB of RAM, 512KB L2 cache, 34.2GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
MIDRANGE SYSTEM: \$1200 TO \$1999		Percent of overall rating ▶		Price: 10 percent	Performance: 20 percent	
1	 Dell Dimension L600r 800/388-8542 www.dell.com	retested this month	95	Average: \$1649	Very good 130	Good: Pentium III-600, 128MB of RAM, 256KB L2 cache, 10.2GB hard drive, minitower, 17-inch monitor, Windows 98 SE
2	Quantex GX700 800/896-4898 www.quantex.com	retested this month	93	Expensive: \$1879	Outstanding 143	Outstanding: Pentium III-700, 128MB of RAM, 256KB L2 cache, 28.5GB hard drive, midsize tower, 19-inch monitor, Windows 98 SE
3	Micron Millennia Max 600 800/642-7667 www.micronpc.com	retested this month	89	Expensive: \$1873	Very good 129	Good: Pentium III-600, 128MB of RAM, 512KB L2 cache, 20GB hard drive, midsize tower, 17-inch monitor, Windows 98 SE
4	Quantex M650 800/896-4898 www.quantex.com	NEW	85	Inexpensive: \$1399	Very good 132	Good: Pentium III-650, 128MB of RAM, 256KB L2 cache, 20.5GB hard drive, minitower, 17-inch monitor, Windows 98 SE
5	HP Pavilion 8660c PC 800/724-6631 www.hp-at-home.com	NEW	81	Average: \$1648	Good 117	Good: Pentium III-533, 128MB of RAM, 256KB L2 cache, 20.4GB hard drive, minitower, 17-inch monitor, Windows 98 SE
BUDGET SYSTEM: UNDER \$1200		Percent of overall rating ▶		Price: 20 percent	Performance: 15 percent	
1	 Dell WebPC 800/388-8542 www.dell.com	NEW	92	Average: \$928	Satisfactory 86	Satisfactory: Celeron-466, 64MB of RAM, 128KB L2 cache, 6.4GB hard drive, minitower, 15-inch monitor, Windows 98 SE
2	Gateway Astro 800/315-2536 www.gateway.com	retested this month	85	Very inexpensive: \$799	Good 96	Satisfactory: Celeron-400, 64MB of RAM, 128KB L2 cache, 4.3GB hard drive, all-in-one, 15-inch monitor, Windows 98 SE
3	CyberMax Enthusiast 500 CBG 800/437-4596 www.cybermaxpc.com	retested this month	78	Average: \$1079	Very good 107	Very good: Celeron-500, 128MB of RAM, 128KB L2 cache, 13GB hard drive, midsize tower, 17-inch monitor, Windows 98 SE
4	Quantex M466c 800/896-4898 www.quantex.com	retested this month	78	Average: \$969	Good 98	Good: Celeron-466, 64MB of RAM, 128KB L2 cache, 13.6GB hard drive, midsize tower, 17-inch monitor, Windows 98 SE
5	Micron Millennia C466 800/642-7667 www.micronpc.com	retested this month	75	Expensive: \$1171	Very good 105	Good: Celeron-466, 64MB of RAM, 128KB L2 cache, 13GB hard drive, minitower, 15-inch monitor, Windows 98 SE
 Best Buy		Percent of overall rating ▶		Price: 25 percent	Performance: 15 percent	

¹ A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "PC WorldBench 2000 Launches" on page 221.

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).



YOU'LL FIND LOTS of fresh faces on our charts this month, all tested under our new PC WorldBench 2000 test suite. Four systems debut on the power list, including the Best Buy Gateway Select 800, the first AMD Athlon-800-powered home PC we've tested. Meanwhile, Dell's compact and affordable WebPC nabs the budget Best Buy, thanks to easy setup and an LS-120 SuperDisk drive.

POWER HOME PCs

1 GATEWAY SELECT 800



NEW

WHAT'S HOT: Speed-hungry users will like the moderately priced Select 800. An Athlon-800 processor powered it to a PC WorldBench 2000 score of 147—one of the highest marks we've recorded for a home

Extra features	Setup/ ease of use	Graphics	Reliability/ support	Comments	Product info number ¹
Good: Creative Labs 3D Blaster Annihilator graphics board with 32MB of SDRAM, 8X DVD-ROM drive, V.90 modem	Very good/ Good	Good	Fair/ Good	PRO: One of the fastest on the chart, reasonably priced. CON: No reset button on the front of the case, scanty documentation.	651
Very good: Celestica graphics board with 32MB of SDRAM, 8X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	Outstanding/ Very good	Good	Outstanding/ Outstanding	PRO: Lowest-priced power PC here, top-notch reliability and support. CON: Tinny audio; toggling between DVD and other tasks is clunky.	-
Good: Asus AGP-V3800 graphics board with 16MB of SDRAM, 8X DVD-ROM drive, V.90 modem, Sony CD-RW drive	Good/ Good	Good	Good/ Fair	PRO: Colossal hard drive, terrific speed, easy to use. CON: High price; cluttered interior makes upgrades laborious.	652
Outstanding: Asus AGP-V3800 graphics board with 16MB of SDRAM, 8X DVD-ROM drive, V.90/DSL modem, ethernet card, CD-RW drive	Outstanding/ Very good	Good	Fair/ Fair	PRO: Excellent performance, huge hard drive, high-speed Internet connectivity. CON: Pricey, limited expansion slots.	653
Very good: 3D Blaster Annihilator graphics board with 32MB of RAM, 10X DVD-ROM drive, V.90/DSL modem, ethernet card, CD-RW drive	Outstanding/ Good	Very good	Fair/ Fair	PRO: Fast with games, high-speed Web connectivity, first-rate Klipsch Pro Media v.4 THX sound system. CON: Most expensive PC on chart.	654
Extra features: 15 percent	Setup/ease of use: 5 percent	Graphics: 15 percent	R & S: 35 percent		
Good: integrated Intel 810 graphics with UMA and 4MB of 3D cache, 22X-48X CD-ROM drive, V.90 modem, ethernet card	Outstanding/ Very good	Satisfactory	Outstanding/ Outstanding	PRO: Zippy performance, monitor displays lush colors. CON: Limited expandability, graphics in 3D games look blocky.	-
Good: Creative Labs 3D Blaster Annihilator graphics board with 32MB of RAM, 8X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	Good/ Satisfactory	Good	Good/ Good	PRO: Fastest midrange system, swift 3D-gaming performance. CON: Expensive, poorly illustrated setup sheet, inadequately marked ports.	655
Good: Creative Labs 3D Blaster Annihilator graphics board with 32MB of SDRAM, 8X DVD-ROM drive, V.90 modem	Outstanding/ Good	Very good	Good/ Good	PRO: Speedy gaming performance, easy-open case. CON: Pricey, monitor displays fuzzy small text, documentation too basic.	656
Good: integrated Intel 810 graphics with UMA and 4MB of 3D cache, 8X DVD-ROM drive, V.90 modem	Good/ Good	Satisfactory	Good/ Good	PRO: Lowest-priced midrange PC, terrific expandability. CON: Slow and some banded images in games, subpar documentation.	657
Very good: integrated Intel 810 graphics with UMA and 4MB of 3D cache, 8X DVD-ROM drive, V.90 modem, ethernet card, CD-RW drive	Outstanding/ Very good	Satisfactory	Fair/ Fair	PRO: Ample storage, simple to set up. CON: A bit sluggish, cramped interior, some objects in games look slightly pixelated.	658
Extra features: 10 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 35 percent		
Very good: integrated Intel 810 graphics with UMA and 4MB of 3D cache, 10X-24X CD-ROM drive, V.90 modem, LS-120 SuperDisk drive	Outstanding/ Very good	Good	Outstanding/ Outstanding	PRO: Reasonable price, small footprint, removable media drive. CON: Slowest home PC, tiny hard drive.	-
Satisfactory: integrated Intel 810 graphics with UMA and 4MB of 3D cache, 17X-40X CD-ROM drive, V.90 modem	Outstanding/ Very good	Satisfactory	Fair/ Good	PRO: Lowest-priced system on the chart, incredibly easy to set up. CON: A tad slow, lowest-capacity hard drive here.	659
Good: integrated Intel 810 graphics with UMA and 4MB of 3D cache, 6X DVD-ROM drive, V.90 modem	Good/ Satisfactory	Satisfactory	Fair/ Good	PRO: Speediest budget PC, twice the memory of other budget systems here. CON: Slow in 3D games, middling sound system.	660
Very good: integrated Intel 810 graphics with UMA and 4MB of 3D cache, 6X DVD-ROM drive, V.90 modem	Good/ Satisfactory	Satisfactory	Good/ Good	PRO: Terrific value, roomy interior with easy access. CON: Small fonts blurry, scant software bundle, rudimentary manual.	661
Good: integrated NVIDIA RIVA 128zx graphics with 8MB of SGRAM, 17X-40X CD-ROM drive, V.90 modem	Satisfactory/ Good	Satisfactory	Good/ Good	PRO: Quick performance, multimedia keyboard. CON: Price increase over \$200 this month due to larger hard drive; limited expansion.	662
Extra features: 5 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 35 percent		

¹ For more information about the products listed in this table, select number 905 on the product information card or visit www.pcworld.com/productinfo.

PC. The system's graphics also impressed us: Its Creative Labs 3D Blaster Annihilator graphics board with 32MB of memory posted superior 3D-gaming test speeds in Expendable (75 frames per second) and Flight Simulator 2000 (34 fps). The system offers ample room for expansion, with two internal and three external drive bays open, plus three open PCI slots. The

Boston Acoustics Digital BA735 sound system—two satellite speakers and a sub-woofer—sounded rich and clear.

WHAT'S NOT: Unlike most home PCs we see, the Select 800 lacks a reset button on the front of the case. Inside the machine, a fan blocks access to the memory slots and drive bays, complicating the upgrading process. The sparse documenta-



PERFORMANCE KING: Gateway's Select 800 tops the power list due to great all-around speed.

tion can complicate setup for nontechnies.

WHAT ELSE: The 19-inch Gateway VX 900 monitor displayed rich, realistic colors and clear small text with no flicker, even at 1600 by 1200 resolution. The sturdy keyboard has four programmable buttons for launching applications. Bundled software includes Microsoft Works Suite 2000 and Norton AntiVirus 2000 (a PC World Best Buy). At \$2399, the Select 800 is reasonably priced for a power system.

BEST USE: The Select 800 is a speedy machine suitable for demanding database chores and 3D gaming.

MIDRANGE HOME PCs

1 DELL DIMENSION L600R



WHAT'S HOT: Colors on the Dell Dimension L600r's 17-inch Trinitron monitor look lush. Text was easy to read at 1024 by 768 resolution, though at higher resolutions we had to adjust the refresh rate to eliminate some distracting flicker. The Altec Lansing ACS304 speakers and subwoofer produce rich sound. Want to create a home network? The L600r's 3Com networking card uses your phone lines to connect PCs. (You'll need a similar card in each of your other PCs to make a connection.)

WHAT'S NOT: This system ran sluggishly in our 3D-gaming tests and displayed slightly pixelated scenes in *Expendable* and *Quake 3 Arena*. Both results are consistent with those we've recorded for other PCs that use Intel's integrated 810 chip set. One free PCI slot and one free drive bay offer limited expansion opportunities.



SMALL-FOOTPRINT PC: Dell's reasonably priced WebPC has a slender chassis and is simple to use.

WHAT ELSE: The L600r, which has a Pentium III-600 CPU, earned a PC WorldBench 2000 score of 130—about average for its processor class. System setup is a snap thanks to a helpful, well-illustrated instruction sheet and clearly marked cables and connectors. A reference-and-troubleshooting manual provides lots of basic maintenance advice. A comprehensive help system resides in the PC's hard drive. Microsoft's Works Suite 99 is bundled.

BEST USE: The L600r can handle most home or home-office tasks, as long as you avoid fast-moving games and other demanding graphics.

BUDGET HOME PCs

1 DELL WEBPC



WHAT'S HOT: This affordable PC's small footprint is about the size of a place mat. Its slight, hourglass-shaped, black plastic case measures about 10 inches in both depth and height—ideal for anyone with limited desk space. Setup is simple, too: You connect the mouse and the keyboard to separate USB ports, attach a phone line to the modem port, and plug in the power cord.

WHAT'S NOT: The WebPC did poorly in our tests, earning a PC WorldBench 2000 score of 86—the slowest in this bunch—and producing occasionally choppy 3D-gaming performance. Since the WebPC has no expansion slots or drive bays, you can never upgrade it. And because it relies exclusively on USB ports, you'll need an adapter if you want to connect such devices as parallel-port printers. The machine forgoes a floppy drive, but our test unit came with a 120MB external SuperDisk drive, along with two disks. (Without the removable storage drive, the PC would cost \$779.)

WHAT ELSE: Graphics and text looked good at 800 by 600 resolution. The keyboard has three handy programmable buttons and two USB ports. You also get Microsoft Works Suite 2000 and McAfee VirusScan.

BEST USE: Great for budget-minded shoppers but not for future upgraders.



OVERSIZE TOASTER? No, it's Compaq's Presario EZ2200, with an easy-off panel for future upgrades.

What's New

ONE NEW MIDRANGE home system that missed the chart is Compaq's \$1398 Presario EZ2200. This easy-to-use PC has a side panel you can pull off for quick (albeit constricted) access to memory sockets and two open PCI slots. A 17GB hard drive and a CD-RW drive offer storage options.

With a PC WorldBench 2000 score of 97, the EZ2200 recorded below-average performance for a Celeron-500-based PC. It also ran slowly in 3D games and generated some banded images in *Quake 3 Arena* and *Expendable*. And because the CD-ROM and CD-RW drives are mounted vertically on the front of the case, placing a CD in either drive is cumbersome.

Kirk Steers is a contributing editor for PC World.

ALSO NEW THIS MONTH



We evaluated the following systems along with the others, but they didn't score high enough to reach the Top 15 Home PCs chart. For write-ups, visit PCWorld.com (www.pcworld.com/top400/newhomepcs).

- ◆ ABS Multimedia System 1
- ◆ ABS Performance PC System 2
- ◆ Acer Aspire 6422
- ◆ Compaq Presario EZ2200
- ◆ CompUSA PC Home Series HS500K
- ◆ CompUSA PC Pro Series PS733K
- ◆ Gateway Profile 2 500cx
- ◆ HP Pavilion 6640c PC
- ◆ Nutrend Maestro GE
- ◆ Nutrend Sierra LE

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TOP 10 PRINTERS

	SMALL-BUSINESS/HOME LASER	Street price (2/14/00)	Overall rating	Speed for plain text/full-page graphics (ppm)	Print quality for text/gray-scale graphics	Comments	Product info number
1	 Brother HL-1240 800/276-7746 www.brother.com	\$299	86	8.2/3	Very good/ Good	 FEATURES: Rated 12 ppm. Standard 2MB of RAM, 600-by-600-dpi maximum resolution, 250 sheets input, 150 output. SUMMARY: The inexpensive HL-1240 produces terrific text quality and has respectable speed. It's also small and quiet, a bonus in packed office spaces. Unfortunately, it lacks an ethernet option.	685
2	Samsung QL-6100 (NEW) 888/987-4357 www.samsungtelecom.com	\$549	83	10.1/3.4	Very good/ Good	FEATURES: Rated 12 ppm. Standard 4MB of RAM, 1200-by-1200-dpi maximum resolution, 350 sheets input, 250 output. SUMMARY: The most expensive SOHO laser on our chart, the QL-6100 seems pricey, considering that it lacks an ethernet. But its speed rivals corporate units; and it produces both clear text and good, if somewhat dark, gray-scale images.	686
3	Oki Data Okipage 10ex 800/654-3282 www.okidata.com	\$399	83	8.5/2.8	Good/ Good	 FEATURES: Rated 10 ppm. Standard 2MB of RAM, 1200-by-600-dpi maximum resolution, 250 sheets input, 100 output. SUMMARY: This quick personal LED printer produces good output overall, though text can look slightly jagged, and you must buy extra RAM to support the highest resolution. Good documentation helps balance sloppy design.	687
4	Xerox DocuPrint P8 800/832-6979 www.xerox.com	\$199	81	6.8/4.2	Good/ Adequate	 FEATURES: Rated 8 ppm. Standard 512KB of RAM, 1200-by-600-dpi maximum resolution, 250 sheets input, 100 output. SUMMARY: Our chart's least expensive model drops \$50. Text speed is good for the price, and it's the fastest model on our SOHO chart for printing graphics. Print quality is better on text; graphics look detailed but blocky.	688
5	Brother HL-1270N (NEW) 800/276-7746 www.brother.com	\$499	81	6.9/2.6	Very good/ Good	 FEATURES: Rated 12 ppm. Standard 4MB of RAM, 1200-by-1200-dpi maximum resolution, 250 sheets input, 150 output. SUMMARY: This expensive, networked version of the HL-1240 produces clean text, sharp lines, and smooth grays. Its network capabilities are suitable for small workgroups, but it's a bit flimsy for larger offices.	689
CORPORATE LASER							
1	 Xerox DocuPrint N2125 (NEW) 800/832-6979 www.xerox.com	\$1299	87	11.7/3.7	Very good/ Very good	 FEATURES: Rated 21 ppm. Standard 32MB of RAM, 1200-by-1200-dpi maximum resolution, 650 sheets input, 500 sheets output. SUMMARY: Offers admirable performance and sharp print quality for its somewhat high price. Expansion capabilities, including paper trays for up to 1750 sheets, make it a nice choice for larger offices.	690
2	NEC SuperScript 1800N 800/632-4636 www.nectech.com	\$999	86	11.3/3.7	Excellent/ Good	FEATURES: Rated 17 ppm. Standard 20MB of RAM, 1200-by-1200-dpi maximum resolution, 1100 sheets input, 250 output. SUMMARY: This networked model produces perfectly clean, sharp text and detailed, if slightly dark, gray-scale images. Best of all, it comes with an ethernet and a built-in duplexer for under a thousand bucks.	691
3	Ricoh Laser API400 800/637-4264 www.ricoh-usa.com	\$799	85	10/3.3	Very good/ Good	 FEATURES: Rated 14 ppm. Standard 8MB of RAM, 1200-by-1200-dpi maximum resolution, 350 sheets input, 250 output. SUMMARY: Text-printing speed isn't bad for the price, and it delivers clean output on both text and graphics. Negatives include disorganized manuals, awkward installation, and a hard-to-insert toner cartridge.	692
4	Samsung QL-7050 (NEW) 888/987-4357 www.samsungtelecom.com	\$899	84	12.6/3.9	Very good/ Good	FEATURES: Rated 17 ppm. Standard 12MB of RAM, 1200-by-1200-dpi maximum resolution, 600 sheets input, 200 output. SUMMARY: The QL-7050 produces the fastest text output on our chart and offers solid print quality for a reasonable price. A standard built-in duplexer makes it an even better bargain at this price.	693
5	Lexmark Optra T612n 800/539-6275 www.lexmark.com	\$1499	84	12.5/4.7	Very good/ Very good	 FEATURES: Rated 20 ppm. Standard 16MB of RAM, 1200-by-1200-dpi maximum resolution, 600 sheets input, 250 output. SUMMARY: The quickest model on our chart in graphics, this pricey unit boasts outstanding paper-handling options and strong all-around print quality. Includes ethernet connection.	694
 Best Buy		 Windows 95-certified Plug and Play		All products:		908	



HOW WE TEST The overall rating for both small-business/home and corporate printers is based on print quality (25 percent), price (25 percent), features (15 percent), speed (10 percent), service and support (10 percent), and ease of use (15 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.



WE'VE SEEN A NUMBER of new monochrome laser printers since we last looked at models in January, and several newcomers gain slots on our Top 10 list. The Xerox DocuPrint N2125

debuts on the corporate chart in first place with quick text-printing speeds and top-notch letter quality. Two new models from Samsung—the QL-7050 and the QL-6100—enter the corporate and small-business/home charts, respectively. Finally, the Broth-

er HL-1270N, a networked version of our SOHO Best Buy, lands at number five.

IN THE OFFICE

WE TESTED SEVEN lasers this month—five designed for larger offices and two best suited to small or home-based businesses. On the corporate side, the well-equipped Xerox DocuPrint N2125 earns a Best Buy slot. We were impressed by its speeds (11.7 pages per minute on text and 3.7 ppm on graphics); crisp, bright text; flawless line art; and respectable, if somewhat dark, gray-scale images. Its control panel is carefully designed and easy to use. Xerox includes feature-rich printer management software with the DocuPrint N2125—it can e-mail you a warning when running low on supplies or store password-protected documents on its optional hard drive (\$409). Xerox also sells a raft of paper-handling options for this model, including two 550-sheet paper trays for \$229 each (bringing the total input capacity to 1750 sheets), an envelope feeder for \$229, and a duplexer for \$249.

The DocuPrint N2125 is no bargain, however. At \$1299, it costs \$300 more than NEC's SuperScript 1800N, which prints about as fast and has a built-in duplexer. But the Xerox shines with clear print quality, myriad optional paper trays, and a simple design. (A nonnetworked version, the N2125b, costs \$999.)

Also new to the corporate chart is the

Samsung QL-7050. Its zippy 12.6-ppm text printing and 3.9-ppm graphics speeds help it land at number four. And the \$899 price tag looks even better when you consider its built-in duplexer. Text and lines look crisp, but graphics are dark and a bit rough.

The three other corporate laser printers we tested missed the chart. Kyocera's \$1099 FS-3750 and Mita's \$1025 DP-1800 are nearly identical, and both are painfully slow for big-office printers: The DP-1800 turns out text at 9 ppm and the FS-3750 at 9.5 ppm, compared to our corporate chart's current average of 11.6 ppm. Kyocera recently bought Mita's printer group, and these two models share Kyocera's muddled control panel, flimsy auxiliary tray, and rough text (though the FS-3750 creates sharper lines and the DP-1800's gray-scale graphics are smoother).

Kyocera's \$899 FS-1750 has the same engine as the FS-3750 and prints text even slower, at a very poky 7.7 ppm. It creates surprisingly better output, with solid, even text, but its slow speeds and dotted gray-scales keep it off the chart.

AT HOME

IF YOU HAVE a small office or a home-based business, Brother's HL-1270N or Samsung's QL-6100 may be right for you. Debuting in fifth place, the HL-1270N prints crisp text and accurate graphics that



XEROX'S \$1299 DOCUPRINT N2125 tops the corporate chart with speedy performance, sharp print quality, and an intuitive design.

closely resemble output from Brother's HL-1240, which retains the top spot on our SOHO chart this month. The primary differences are price and speed: The HL-1240 costs \$299 while the HL-1270N sells for \$499 (the extra \$200 buys a standard ethernet card). The HL-1270N's 6.9 ppm text speed is about 15 percent slower than the HL-1240, but it's adequate for home use.

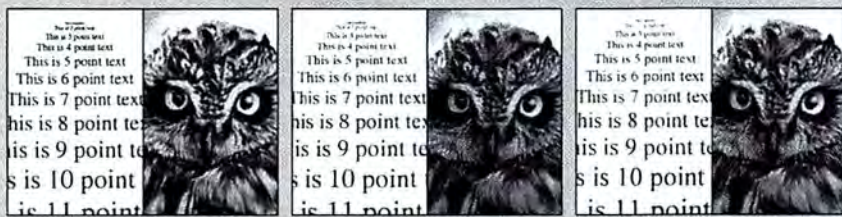
Both the HL-1240 and the HL-1270N sport a few annoying quirks. Neither has a tray for the auxiliary paper feed, so you have to hold your envelope or sheet of paper at the printer. And a prompt before every print job asks whether you want to use the N-up or poster formats. (N-up fits multiple pages onto a single sheet, while poster format prints a single page across multiple sheets.)

Samsung's QL-6100 takes second place on the SOHO chart. It's pricey (\$549 without an optional \$180 ethernet card) but fast. The text-printing speed of 10.1 ppm is comparable to the lasers on our corporate chart. It prints clean, if slightly pale, text and clear lines. Graphics look good, but a bit dark and rough at the edges. It's also easy to use, with a clearly written manual and well-marked control panel. Still, the QL-6100 probably doesn't belong in a big office. It's a bit flimsy for heavy use, and its main paper tray holds 250 sheets, versus 350 to 1100 sheets for the corporate models on our chart (a second 250-sheet tray costs \$180).

—Dan Littman ▶

PRINT QUALITY SAMPLES

Xerox Is Tops With Sharp Text



XEROX DOCUPRINT N2125

Our new corporate Best Buy prints solid text, even in small type; clear lines with minimal banding; and detailed, if somewhat dark, gray-scale images.

SAMSUNG QL-6100

The QL-6100 produces sharp, clear text and prints small type well. Gray-scale images are generally good, but they appear dark and have a few rough edges.

BROTHER HL-1270N

Brother's new network laser produces light, sharp text; surprisingly crisp lines with very little banding; and smooth, attractive gray-scale graphics.



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TOP 10 SCANNERS

	SOHO SCANNER	Street price (2/23/00)	Overall rating	Scan quality	Scan speed—B&W at 300 dpi/color at 600 dpi (seconds per page)	Comments	Product info number
1	 Epson Perfection 1200U 800/463-7766 www.epson.com	\$249	99	Very good	9/67	FEATURES: USB, 1200 by 2400 dpi, 11.3-by-16.8-by-3.5-inch case, 9.9 pounds, 8.5-by-11.7-inch scanning area, optional transparency adapter. SUMMARY: Outstanding resolution, fast performance, and superb scans make the Perfection 1200U our top pick. For \$50 more, you can buy the slightly faster SCSI version.	—
2	Epson Perfection 636U 800/463-7766 www.epson.com	\$199	99	Very good	12/74	FEATURES: USB, 600 by 2400 dpi, 11.3-by-16.8-by-3.5-inch case, 9.9 pounds, 8.5-by-11.7-inch scanning area, optional transparency adapter. SUMMARY: Fine-quality scans, first-rate features, and good overall performance make this model a close runner-up to its sibling, the Epson Perfection 1200U.	—
3	Microtek ScanMaker V6UPL 800/654-4160 www.microtekusa.com	\$149	96	Very good	19/80	FEATURES: Parallel and USB, 600 by 1200 dpi, 11.8-by-21.5-by-3.2-inch case, 8.8 pounds, 8.5-by-14-inch scanning area, includes 35mm transparency adapter. SUMMARY: This versatile scanner is the only legal-size unit on the SOHO chart. It serves up high-quality scans and handles 35mm slides as well as reflective art.	677
4	Umax Astra 2200 800/562-0311 www.umax.com	\$199	89	Good	26/99	FEATURES: SCSI and USB, 600 by 1200 dpi, 12.2-by-18.4-by-3.9-inch case, 8.5 pounds, 8.5-by-11.7-inch scanning area, includes transparency adapter. SUMMARY: This well-rounded performer handles both reflective and transparent documents and comes with a great software bundle for building Web sites.	678
5	Canon CanoScan FB 630P NEW 800/652-2666 www.ccsi.canon.com	\$99	88	Good	23/118	FEATURES: Parallel, 600 by 1200 dpi, 10.1-by-14.7-by-1.5-inch case, 3.3 pounds, 8.5-by-11.7-inch scanning area, no optional transparency adapter. SUMMARY: The only Contact Image Sensor unit here weighs just 3.3 pounds and provides sharp images, but it slows when scanning color. A USB version costs \$30 more.	679
6	AcerScan Prisa 620UT 800/379-2237 www.acerperipherals.com	\$149	87	Good	27/112	FEATURES: USB, 600 by 1200 dpi, 12-by-18-by-4-inch case, 9.5 pounds, 8.5-by-11.7-inch scanning area, includes transparency adapter. SUMMARY: Though a bit slow when scanning color images, this all-purpose device works nicely with transparent and reflective documents and comes with 24-hour tech support.	680
7	HP ScanJet 5300Cse NEW 800/722-6538 www.scanjet.com	\$299	87	Very good	38/84	FEATURES: Parallel and USB, 1200 by 2400 dpi, 11.9-by-19.9-by-4.1-inch case, 8.1 pounds, 8.5-by-11.7-inch scanning area, optional transparency adapter and automatic document feeder. SUMMARY: Offers higher resolution and more quick-start buttons than its predecessor, but free tech support lasts a scant 90 days.	681
CORPORATE SCANNER							
1	 Canon CanoScan FB 1200S 800/652-2666 www.ccsi.canon.com	\$299	93	Very good	20/74	FEATURES: SCSI, 1200 by 1200 dpi, 11.5-by-18.1-by-3.7-inch case, 8.8 pounds, 8.5-by-11.7-inch scanning area, optional transparency adapter and ADF. SUMMARY: Competitively priced corporate model boasts great color and detail and comes packaged with its SCSI card. Long tech-support hours add to its overall value.	682
2	HP ScanJet 6350C 800/722-6538 www.scanjet.com	\$499	92	Very good	13/76	FEATURES: SCSI and USB, 1200 by 2400 dpi, 12.3-by-19.6-by-7.6-inch case, 15.8 pounds, 8.5-by-11.7-inch scanning area, includes transparency adapter and automatic document feeder. SUMMARY: A great choice for OCR, this durable veteran scans 35mm slides and produces top-quality scans.	683
3	Umax Astra 4000U NEW 800/562-0311 www.umax.com	\$399	88	Very good	37/116	FEATURES: USB, 1200 by 2400 dpi, 11.3-by-16.8-by-3.5-inch case, 9.9 pounds, 8.5-by-14-inch scanning area, optional transparency adapter. SUMMARY: Though no speed demon, this unit can scan legal documents and lands a spot on the chart with generous support policies and splendid scan quality.	684



Best Buy

For expanded reviews of this month's scanners, visit www.pcworld.com/may00/t10scanners.

All products: 907

HOW WE TEST All scanners are tested with default settings under Windows 98 on a Dell Dimension V333 (Pentium II-333) PC with 64MB of RAM, using each scanner's bundled software. Overall score is based on scanned image quality (28 percent), scanning speed (25 percent), ease of use (17 percent), features (15 percent), support (10 percent), and price (5 percent). Speed tests are timed from the start of scanning until cursor control is regained. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

¹ Dimensions are listed in the following order: width, depth, and height.

² Scanner was tested with USB interface.



THREE NEW SCANNERS make the cut this month. Canon's bargain-priced CanoScan FB 630P joins the chart with surprisingly sharp images for a Contact Image Sensor model. The

other SOHO newbie, HP's ScanJet 5300Cse, replaces the ScanJet 5200Cse, and on the corporate side, the Astra 4000U supplants the Astra 2400S; both of these newcomers have better resolution than their predecessors but somewhat less speed. ►

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TOP 10 MONITORS

	19-INCH MONITOR	Month tested	Street price (2/18/00)	Overall rating	Quality of text/graphics	Comments	Product info number
1	 Samsung SyncMaster 950p 800/726-7864 www.samsungmonitor.com	Mar 00	\$374	86	Very good/ Very good	FEATURES: 17.9-inch viewable area, .26mm dot pitch tube, up to 119-Hz refresh rate, Plug and Play ready, TCO'99 compliant, three-year warranty, 24-hour toll-free support. SUMMARY: Superb image quality and reasonable price keep model at the top. BNC connectors are handy; bulky size may not suit cramped spaces.	703
2	 Cornerstone Technology C901 800/562-2552 www.monitorsdirect.com	(NEW)	\$349	83	Very good/ Good	FEATURES: 18-inch viewable area, .26mm dot pitch tube, up to 116-Hz refresh rate, Plug and Play ready, TCO'99 compliant, three-year warranty, 24-hour weekday toll-free support. SUMMARY: Low price pushes model onto the chart. Sharp text on spreadsheets, but Web-page colors not as lively as on other monitors.	704
3	Dell UltraScan P991 800/388-8542 www.dell.com	Mar 00	\$559	83	Excellent/ Very good	FEATURES: 17.8-inch viewable area, .24-.25mm stripe pitch FD Trinitron tube, up to 134-Hz refresh rate, Plug and Play ready, TCO'99 compliant, three-year warranty, 24-hour toll-free support. SUMMARY: Pricey, but ultracrisp lettering in word processing documents suits those who work with text. Renders rich graphics.	-
4	Philips 109B 877/835-1838 www.philips.com	Mar 00	\$429	82	Good/ Very good	FEATURES: 17.9-inch viewable area, .25mm dot pitch tube, up to 120-Hz refresh rate, Plug and Play ready, TCO'99 compliant, three-year warranty, 16-hour daily toll-free support. SUMMARY: \$50 price drop helps model stay competitive. Bold graphics and short case depth; somewhat blurry text on spreadsheets.	705
5	LG Studioworks 995E 800/243-0000 www.lgeus.com	Mar 00	\$420	82	Very good/ Very good	FEATURES: 18-inch viewable area, .26mm dot pitch tube, up to 120-Hz refresh rate, Plug and Play ready, TCO'99 compliant, three-year warranty, 12-hour daily toll-free support. SUMMARY: Despite notable image quality, falls two spots as other models offer more generous support hours. Lacks some advanced controls.	706
6	Sampo AlphaScan 812SR 770/449-6220 www.sampotech.com	Mar 00	\$369	81	Very good/ Very good	FEATURES: 17.5-inch viewable area, .25mm dot pitch tube, up to 130-Hz refresh rate, Plug and Play ready, TCO'95 compliant, three-year warranty, 10-hour weekday support (toll charges apply). SUMMARY: Competitive price and impressive image quality offset by lack of toll-free support. Crude icons mar on-screen control menu.	707
7	Cornerstone Technology p1401 800/562-2552 www.monitorsdirect.com	Mar 00	\$539	79	Very good/ Very good	FEATURES: 18.1-inch viewable area, .26mm dot pitch tube, up to 134-Hz refresh rate, Plug and Play ready, TCO'99 compliant, five-year warranty, 24-hour weekday toll-free support. SUMMARY: \$106 price drop helps higher-priced model hold its place. Crisp text and vivid colors. No weekend tech support.	708
8	KDS AV-19ST 800/237-9988 www.kdsusa.com	Mar 00	\$359	78	Very good/ Good	FEATURES: 18.1-inch viewable area, .25mm stripe pitch Trinitron tube, up to 120-Hz refresh rate, Plug and Play ready, TCO'95 compliant, three-year warranty, 9-hour weekday toll-free support. SUMMARY: Huge \$140 price drop hoists model onto the chart. Clear text, but meager support hours could deter some.	709
9	Mitsubishi Diamond Plus 91 800/843-2515 www.mitsubishi-display.com	(NEW)	\$559	76	Very good/ Good	FEATURES: 18.3-inch viewable area, .25-.27mm stripe pitch Diamondtron NF tube, up to 115-Hz refresh rate, Plug and Play ready, TCO'99 compliant, three-year warranty, 12-hour daily toll-free support. SUMMARY: Crisp, dense text on word processing documents, but cheaper models with comparable image quality available.	710
10	ViewSonic PF790 800/888-8583 www.viewsonic.com	Mar 00	\$479	76	Good/ Good	FEATURES: 17.7-inch viewable area, .25-.27mm stripe pitch SonicTron tube, up to 118-Hz refresh rate, Plug and Play ready, TCO'99 compliant, three-year warranty, 24-hour toll-free support. SUMMARY: Not the best choice for high-end graphics, but generous support hours make this a good choice for home office tasks.	711



Best Buy

For reviews of products that didn't make the chart, visit www.pcworld.com/t10monitors.

All products: 911



TEST 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. ¹Highest refresh rate at 1024 by 768 resolution. ²Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play. ³Uses an aperture grille whose parallel wires near the sides of the screen are strung farther apart than those near the middle.



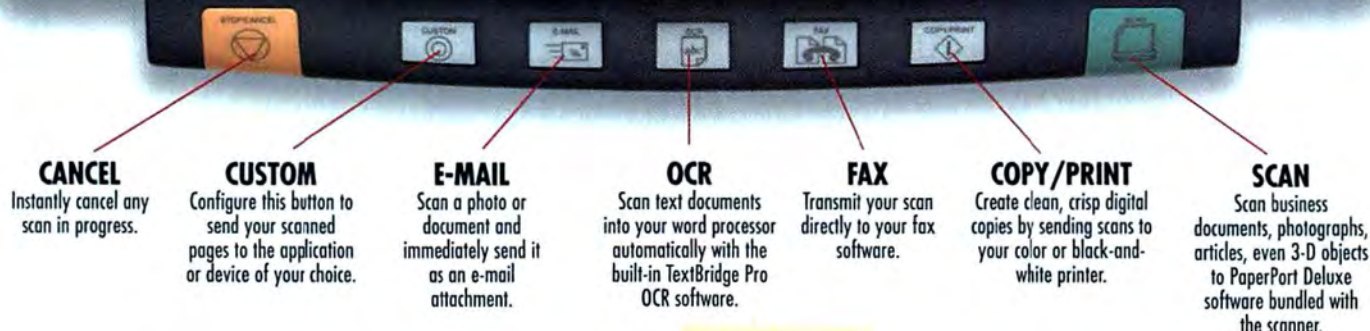
THE PRICE OF 19-INCH monitors creeps down—\$20 here, \$50 there. Four models on the chart under \$400 means great prices for big-screen real estate. The C901 from Cornerstone

Technology lands in Best Buy territory, courtesy of its rock-bottom price and clear text. Mitsubishi's Diamond Plus 91 also finds a place thanks to crisp text. Models from CTX, HP, Iiyama, and Princeton fell short. Next month we review 21-inches. ►

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TOP 10 GRAPHICS BOARDS

	AGP BOARD	Month tested	Street price (2/5/00)	Overall rating	Mixed-media business rating	3D games rating	Features rating	Comments	Product info number
1	 Guillemot Maxi Gamer Xentor 32 877/484-5536 www.guillemot.com	Feb 00	\$189	91	Very good	Excellent	Good	FEATURES: 2X AGP, NVIDIA RIVA TNT2 Ultra chip, 32MB of SDRAM, 300-MHz RAMDAC, video-out, bundled 3D games—Interplay's Kingpin: Life of Crime and Ubisoft's Speed Busters. SUMMARY: Great 3D speed makes this an excellent buy for gamers.	667
2	 Matrox Millennium G400 Max 800/361-1408 www.matrox.com/mga	Apr 00	\$209	90	Excellent	Very good	Very good	FEATURES: 4X AGP, Matrox G400 Max chip, 32MB of SGRAM, 360-MHz RAMDAC, video-out, two VGA ports, bundled Micrografix Picture Publisher and Simply 3D, plus 3D game. SUMMARY: Performance and dual-display support keep it near the top.	668
3	Diamond Viper II 800/468-5846 www.s3.com	Mar 00	\$199	89	Very good	Excellent	Fair	FEATURES: 4X AGP, S3 Savage 2000 chip, 32MB of SDRAM, 350-MHz RAMDAC, video-out, bundled 3D game—Acclaim's TrickStyle. SUMMARY: Affordably priced card renders crisp detail in Viper Racing and excellent performance in Quake 3 Arena.	669
4	ELSA Erazor X2 800/272-3572 www.elsa.com/america	(NEW)	\$289	88	Excellent	Excellent	Good	FEATURES: 4X AGP, NVIDIA GeForce 256 chip, 32MB of DDR SGRAM, 350-MHz RAMDAC, video-out, bundled ELSA MainActor video-editing tool. SUMMARY: The fastest in Quake 3 Arena, with 91 frames per second in 16-bit mode.	670
5	Diamond Stealth III S540 Xtreme 800/468-5846 www.s3.com	Feb 00	\$129	87	Good	Good	Fair	FEATURES: 4X AGP, S3 Savage4 Xtreme chip, 32MB of SDRAM, 300-MHz RAMDAC, bundled PowerPoint plug-in from CrystalGraphics. SUMMARY: This board offers a viable choice for any budget-conscious graphics board shopper.	671
6	Leadtek WinFast GeForce 256 DDR 888/532-3835 www.leadtek.com	(NEW)	\$249	87	Excellent	Excellent	Good	FEATURES: 4X AGP, NVIDIA GeForce 256 chip, 32MB of DDR SGRAM, 350-MHz RAMDAC, video-out, bundled color calibration tools. SUMMARY: This board costs less than others with DDR memory and renders excellent lighting effects in Quake 3.	672
7	3dfx Voodoo3 3000 800/234-4334 www.3dfx.com	Feb 00	\$150	86	Very good	Good	Fair	FEATURES: 4X AGP, 3dfx Voodoo3 chip, 16MB of SDRAM, 350-MHz RAMDAC, no bundled 3D games. SUMMARY: This card's speed and video-out should suit gamers best, though it lacks 32-bit rendering support in 3D graphics.	673
8	Creative Labs 3D Blaster Annihilator Pro 800/998-1000 www.creative.com	Apr 00	\$300	85	Excellent	Excellent	Very good	FEATURES: 4X AGP, NVIDIA GeForce 256 chip, 32MB of DDR SGRAM, 350-MHz RAMDAC, bundled color calibration tools and 3D games. SUMMARY: This pricey board tied for the second fastest in Quake 3, pumping out 89 frames per second in 16-bit mode.	674
9	Hercules 3D Prophet DDR-DVI 877/484-5536 www.hercules.com	(NEW)	\$299	85	Excellent	Excellent	Very good	FEATURES: 4X AGP, NVIDIA GeForce 256 chip, 32MB of DDR SGRAM, 350-MHz RAMDAC, video-out, no bundled applications. SUMMARY: A swift performer, this expensive board renders lovely images but lags in software extras.	675
10	Asus AGP-V6600 Deluxe 510/739-3777 www.asus.com	Apr 00	\$269	84	Excellent	Very good	Excellent	FEATURES: 4X AGP, NVIDIA GeForce 256 chip, 32MB of SGRAM, 350-MHz RAMDAC, video capture, video-out, 3D glasses, bundled video editor and 3D games. SUMMARY: Pleasing performer has lots of extras but generated dark scenes in some games.	676



Best Buy

For reviews of other new graphics boards that we tested this month, visit www.pcworld.com/t10graphics.

All products: 906



TEST HOW WE TEST We test boards under Windows 98. Business tests include PC WorldBench 98. Our 3D-gaming score is based on four games, each evaluated on frame rate and image quality. We test AGP boards in a Dell Dimension XPS T600 with a PIII-600 and 128MB of RAM. Overall AGP rating is based on performance (42.5 percent), features (27.5 percent), price (20 percent), and support policies (10 percent). For all scores, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.



NEW BOARDS FEATURING FAST DDR (double data rate) memory duke it out this month. ELSA's Erazor X2 and Leadtek's WinFast GeForce 256 DDR make strong showings, thanks to win-

ning combinations of performance, price, and features. Both produce smokin' graphics performance on business apps and 3D gaming. The Hercules 3D Prophet DDR-DVI showed impressive speed, but its lack of bundled applications held it back a bit. ■

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"Experienced 'Net buyers have become frustrated by their suppliers' inability to give them quick answers to simple questions about products and orders," explains Crucial's Rafe VanDenBerg. "That's why we've expanded both our Web-based and telephone customer service resources."

Thanks to that expansion, Crucial.com customers never have to worry about the problems that plague other e-commerce sites: poor or non-existent technical support, arcane merchandise return procedures, e-mails that seem to disappear into a vacuum. All of Crucial's warranty, support, and return policies are clearly posted on the site — along with a dynamically managed FAQ area that's constantly updated with answers to memory buyers' most frequently asked questions. Crucial.com is loaded with all the technical information that buyers need to quickly select the right memory products for 8,500 different desktops, notebooks, servers, printers, and routers. The site also provides invaluable assistance for properly installing memory upgrades and troubleshooting problems.

And, if you can't find what you need on the site, there's always the phone. "Sometimes, you just want to talk to a knowledgeable, helpful human being," notes VanDenBerg. "We don't think that's an unreasonable expectation — especially when you're dealing with something as important as memory. So we've built the phone staff we need to meet our customers' service requirements."

Lee Regnier, IS Coordinator at Nexus Onarga Academy, can vouch for Crucial's strong service orientation. "Crucial deserves kudos for its excellent prices, pleasant staff, and efficient business practices," he marvels. "I've never seen a company process a credit application and deliver a product so rapidly."



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Memory is becoming a hot topic as buyers prepare to migrate to Windows 2000. "It's hard to pin down the memory requirements for a new OS until you get your hands on it," says VanDenBerg. "But now that Windows 2000 is here, it's clear that any successful deployment will involve significant memory upgrades."

Crucial's site addresses that need with a new Windows 2000 Upgrade Guide — which features benchmarks and RAM recommendations, along with an online sweepstakes that gives you the opportunity to win a free copy of Microsoft's next-generation OS.

Of course, Crucial's main appeal remains unchanged. It's still the only site where consumers can buy memory upgrades directly from Micron, the country's largest DRAM manufacturer and one of the top three in the world.

In addition to providing memory modules for its own respected brand, Micron also offers the other leading computer brands. Crucial is thus a far more reliable source for quality memory than resellers who simply slap new labels on someone else's chips. "Today's chipsets have critical timing and circuit requirements that mandate precision design and manufacturing," observes VanDenBerg. "Since we work directly with the top PC manufacturers, we can assure our customers that our upgrades match these exacting specifications."

All of these features combine to make Crucial.com a very bookmark-able URL. "We've created the most informative memory-related site on the Web," boasts VanDenBerg. "Even if you're not buying from us, it's a very educational place to browse."

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Chuck Rine wears many hats at environmental consulting firm Groundwater Sciences Corp., where he works as a hydrogeologist. The hard hat is the one his coworkers recognize. But he is also the company's webmaster and "all-around computer guy," he says.

The firm, based in Harrisburg, Pa., cleans up hazardous waste and contaminated groundwater, while striving to maintain low rates for its commercial clients. With only 25 employees and an eye on the bottom line, "It just wasn't cost-effective to have a dedicated IT person on staff," Rine says. "The responsibility of supporting our PCs came down to me and one other person, because we showed the most interest in computers."

For five years, Rine has bought most of Groundwater Sciences' computer equipment from online vendors. But too many of them, he says, fail to deliver on their promises of low prices and product availability. "What really annoys me is when a site lists a lot of things as being available, when they are actually on backorder or not available at all," he says.

There is only one vendor Rine really trusts—CDW.com, a Web site run by Vernon Hills, Ill.-based CDW Computer Centers, Inc. CDW is the number-one authorized direct seller of Compaq, Computer Associates, Toshiba, and other top brand names. CDW is also the number-one direct marketing reseller for Microsoft products.

CDW.com's highly automated, state-of-the-art sales systems ensure that "CDW.com will have what we want, when we want it," Rine says. And Groundwater Sciences' designated CDW.com account manager makes sure the firm does not miss good deals on the equipment it needs. "I like the fact that we have

been working with the same person for over four years," Rine says. "He knows our business, and his suggestions are often right on target."

Rine receives personalized Buyers' Alerts from CDW.com "almost every other day," he says. The Buyers' Alert feature notifies customers via email when the products they choose become available or fall below a certain price. "We're a very mobile group here, and Buyers' Alert lets us know when the site has good deals on IBM ThinkPads and accessories."

CDW.com also alerts shoppers to product specials through its CDW Buyers' Edge electronic newsletters. Email subscribers to CDW Buyers' Edge—which comes in plain text and HTML editions—get the inside track on CDW news, and learn about deals and unadvertised specials for leading products.

CDW.com's Purchase History feature helps Rine to make better buying decisions, too. "CDW.com lets me check my purchase history online, which sure beats having to go through my files at work," he says. Purchase History lets Rine view the details of purchases he made up to five years ago. "The information helps me plan for new equipment purchases, and to upgrade memory and software on older systems."

Rine makes quick decisions on important purchases with CDW.com's CDW Compare feature. "The online shopping experience with CDW.com is great, and I especially like the ease with which I can compare products in the same category as those I am interested in buying," he says.



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Everyone knows what it's like to try and get to the bank to make a deposit to cover the check to pay the bill that was due yesterday. Or what it's like to wait in a drive-through line and end up behind someone who seems to be doing some complex estate planning with the teller... while your take-out order is getting cold.

Well, NetBank is out to eliminate such phenomena. The Alpharetta, Ga.-based company opened its virtual doors in October 1996, and has rapidly become the country's largest federal savings bank to operate exclusively through the Internet. For obvious reasons, the bank enjoys substantial overhead savings over its bricks-and-mortar competitors — which it can translate into better interest rates and lower fees for its customers. Those financial incentives, combined with the convenience of 24-hour-a-day, seven-days-a-week point-and-click service, make NetBank an attractive resource for the growing population of time-stingy Netizens.

"I looked around for the best money market I could find in May of 1998, and NetBank had it," recalls NetBank customer Alicia Hanson, who works at an Atlanta-based high-tech consultancy. "Then I opened a checking account with them. By October, I had closed out my other bank account, and now I use NetBank for everything."

Hanson is a big fan of the convenience that online banking offers. Her paycheck is directly deposited into her account, and she can pay her bills even if she is away from home. "I can access my bank account from any browser any time I want to," she says. "And I don't have to go out and buy stamps anymore."

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She is also using NetBank's other services, which include online brokerage. "When you use their brokerage services, you can pull your money right out of your money market or checking, so you don't have to do any separate transfers," she explains. "That makes it really simple."

In addition to high-interest checking accounts, money market accounts, and brokerage services, NetBank — which is an

FDIC member and now has assets of over half a billion dollars — also provides mortgage loans, debit and credit cards, equipment leasing, and other banking services. The bank recently joined the Armed Forces Financial Network, which means that U.S. military personnel around the world can now enjoy the benefits of having an account they can access anywhere, anytime.

NetBank's appeal is reflected in its rapid growth, with the number of accounts doubling to over 35,000 in the first six months of 1999. The bank has also consistently turned a profit over the last five quarters.

According to International Data Corp., there were about 6.6 million households banking online in 1998 — a number that they project will increase five-fold by 2003. With its big head start, NetBank is well positioned to capture a good share of that lucrative market. "NetBank has set the standard for Internet banking by providing customers with a complete line of Web-based products and services," declares NetBank CEO D.R. Grimes. "It's the ultimate one-stop banking and financial services site." ▶

THE DIFFERENCE BETWEEN OTHER BANKS AND US?



THE DREADED ASTERISK.

How can such a small notation hide such vital information as "\$10,000 minimum balance required" and "balances below \$999 result in .50% interest"? Beats us. Ours just says you have to open an account with a minimum deposit of \$50 to earn up to 4 times the average interest of other checking accounts. And we almost didn't even need a lawyer to write that.

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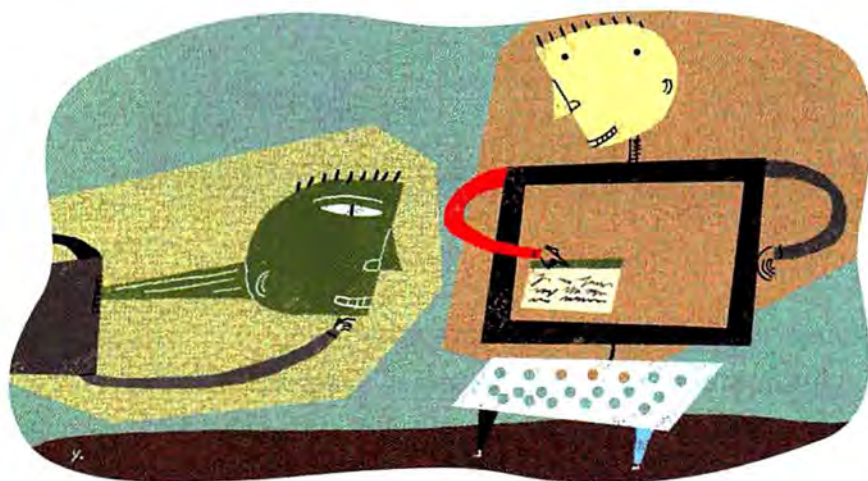
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HERE'S HOW



WINDOWS TIPS

SCOTT DUNN

Give Us This Day Our Daily Tip



REMEMBER WHEN YOU first installed Windows 95 and that annoying "Welcome to Windows 95" message appeared in the middle of the screen every time you rebooted? Remem-

ber how quickly you unchecked *Show this Welcome Screen next time you start Windows*? (Windows 95 users can relive the moment: Choose *Start•Run*, type *welcome*, and press *<Enter>*.) Fortunately, Microsoft has

found a less obtrusive way to give you an occasional message. All you need is Windows 98 SE, Windows 2000, or Internet Explorer 5. (If you're a Windows 95 user who installed IE 5 without first installing IE 4's Desktop Update, the following will work only when browsing Web pages.) In any folder, browser, or Explorer window,

choose *View•Explorer Bar•Tip of the Day*. A small pane opens at the bottom of the window containing a tip. Click the *Next Tip* link if you want to see more. Or drag the bar separating the tip from the rest of the window to adjust its size. The tip will stay visible until you close the window. If you display the tip pane in a browser win-

dow, it should reappear the next time you launch Internet Explorer (with Windows Explorer or folder windows, you have to manually display the tip pane each time).

Unfortunately, many of the tips apply only to IE 5. But the possibilities for that space are endless. If you'd like to see a tip about some other aspect of Windows, or view a periodic reminder to back up your files, or even use the tip pane to send messages to other family members who use the computer, you can replace or add to the list of tips that cycle through. The trick lies in editing the HTML file.

CUSTOM TIP LISTS

HERE'S WHAT to do. First, use Explorer to locate the *Tip.htm* file in the *Web* folder in your Windows folder (FIGURE 1). If extensions are hidden, the name appears simply as "Tip." Copy this file to another folder as a backup, so you can restore it to the original folder if anything goes wrong. Next, choose *Start•Run*, type *notepad c:\windows\web\tip.htm* (your path may differ), and press *<Enter>*. To add a tip or message, scroll almost to the bottom of the file until you see lines that begin *<div ID="Tip73"*, *<div ID="Tip74"*, and so forth. Click at the end of the last of these paragraphs (following the text *</div>*) and press *<Enter>* a couple of times to separate your addition from the existing text. To introduce your tip, type *<div ID="Tip75" Style="display: none;">* (or simply copy this header line from any of the tips in the file and paste it where you added the carriage returns). Just remember to adjust the tip number so that it sequentially follows the last tip's ("Tip75" if your last tip was "Tip74" and so on). Type your message, or copy and paste a short tip from another source, such as PC World Online. It's best to limit text to one paragraph so it fits in the tip pane. (But if you want to enlarge the window, type *<p>* at the end of each para-

graph, or <p><p> to double-space between paragraphs.) Complete the tip by typing </div> at the end of the last paragraph. Add as many tips as you like; just remember to number them consecutively, following the example of the original tips in the file. Finally, look for the line that begins 'var nTips=' near the bottom of the file (about 20 lines from the end). Edit the number to the right of the equal sign so that it represents the total number of tips, including Tip*o*. So, if you have tips numbered from 0 to 75, this line should read **var nTips=76;** When you're done, save the file.

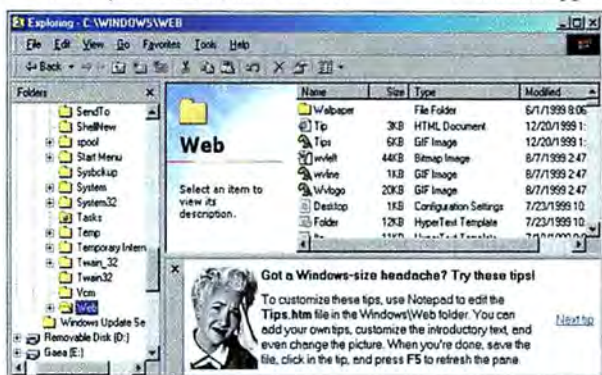



FIGURE 1: ADD CUSTOM TIPS to Windows Explorer or Internet Explorer by editing the Tip.html file in the Windows\Web folder.

Now click in the tips pane at the bottom of your browser or folder window and press **<F5>** to refresh the content. You should see your additions, or at least be able to get to them by clicking *Next tip*.

Not satisfied? You can also change the "Did you know..." text at the top of each tip—just reopen `Tips.htm` in Notepad and search for that phrase. Edit as you please, but be sure you don't change any of the surrounding code. To apply bold type, add `` at the beginning and end of the phrase you want to emphasize. To customize the graphic that appears next to the tips, replace the `Tips.gif` in the `Windows\Web` folder with any (preferably small) GIF image; just rename the original (to something like `Tips.bak.gif`), then name the new file `Tips.gif` (or just plain `Tips` if extensions are hidden). Windows will resize your picture to fit the allotted space. To change the display size of the picture, look for the phrases `width="27"` and `height="36"` in the `Tip.htm` file, and replace the values of the width and height in pixels.

OPEN ONE FILE TYPE IN MANY APPLICATIONS

 WINDOWS recognizes a file's type by its three-digit file extension (which Windows 2000 hides by default) and will associate each type with one application. This makes it easy to open a file in a preferred application—simply double-click the file icon. But what if you open a file in multiple apps? At different times, for example, you may open a GIF file in an image-editing application like Adobe Photoshop, a Web-based animation application, or a quick-and-simple

file viewer. In Windows 9x, this was doable but not very easy. See *Windows Tips, July* (www.pcworld.com/jul99/hh_windows), as well as this month's "Windows Toolbox" for a software solution. Fortunately, in Windows 2000, the capability has improved.

Make your menu: In Windows 2000, right-click any file icon and choose *Open With*. The first time you do this for an unassociated file type, you'll be presented with an *Open With* dialog box listing several installed applications. Select one from the list or click *Other*. Select the application file from your hard disk, and click *Open*. Then click *OK*. The next time you go through this routine, you may still have to display the *Open With* dialog box and select another application. But once you've opened a file type in two or more applications, you'll get an *Open With* submenu that lists all the apps you've used to open this particular type of file so far. If the application you want is not on the *Open With* submenu, click *Choose Program* and go through the above routine again to add it to the list (see **FIGURE 2**). The *Open With* submenu always shows the default program at the top; then items are sorted by date of use, with the most recent application first.

Change default associations: If you want to change the default application for a file type—the one that launches when you double-click a file icon—you can use the

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hereshow](http://www.pcworld.com/hereshow)

same technique. Right-click a file and choose *Open With•Choose Program* (even if you see the application you want on the submenu). Select an application from the list, and this time check the box labeled *Always use this program to open these files*. Then click *OK*. Alternatively, you can right-click any file type and choose 

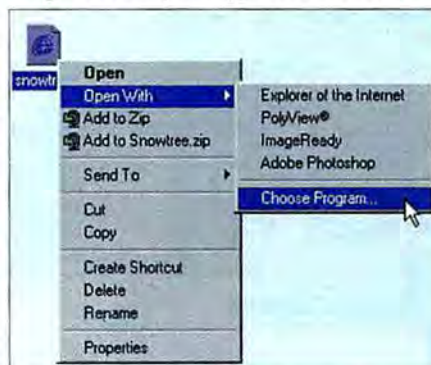


FIGURE 2: WINDOWS 2000 makes it easy to assign multiple apps to open a single file type.

Properties (or select it and press **<Alt>-<Enter>**, or even **<Alt>**-double-click). In the Properties sheet, click the *Change* button next to the *Open With* line. Select the application, and click *OK* two times.

Now, the hard part: If you want to rename or remove an item from the *Open With* menu or *Open With* dialog box, you'll have to edit the Windows Registry. Since this is risky, you should take the following steps to back up the Registry first: Choose *Start>Programs>Accessories>System Tools>Backup*. In the Backup window, choose *Tools>Create an Emergency Repair Disk*. When prompted, insert a floppy disk and check *Also backup the registry to the*

repair directory. Click *OK*. If you run into trouble, these tools may or may not help. If they don't, you might have to reinstall Windows—so proceed at your own risk.

Remove a menu item: If you add an item to your *Open With* menu and later decide to remove it, try this: Choose *Start>Run*, type **regedit** and press **<Enter>** to start the Registry Editor. Navigate down the tree on the left until you come to the branch **HKEY_CUR-**

RENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\FileExts. If necessary, double-click the *FileExts* folder (called a *key*) to expand the branches beneath. Find the file extension for the menu that you want to edit, and double-click it. Then select the *OpenWithList* key under the extension key. In the pane on the right, select the icon corresponding to the menu item that you want to remove. (You won't see the menu item by name, but rather the name of the file that the menu item launches.) Press **<Delete>** and click *Yes* to confirm.

Undo an accidental dialog box addition: If you accidentally added a nonexecutable file (such as a data file, which can't open any other files) to your *Open With* menu, the previous tip will remove it from your *Open With* menu. To remove it from the *Open With* dialog box as well, go to the Registry Editor, and navigate to the key **HKEY_LOCAL_MACHINE\SOFTWARE\Classes\Applications**. Double-

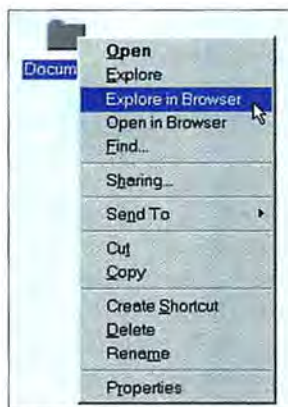


FIGURE 3: CUSTOMIZE your right-click menu to add commands you wish were there.

Rename menu and dialog box items: If you navigate through the menu using keyboard shortcuts, renaming the items in your *Open With* menu and *Open With* dialog box can ease the process. For example, **<Shift>-<F10>** displays the context (right-click) menu for selected icons; pressing **H** afterward displays the *Open With* menu. From there, just press the first letter of the menu item you want. But if more than one item

starts with that letter, you may have to press it multiple times, followed by **<Enter>**. By renaming the menu items that begin with the same letter, you'll be able to access them faster.

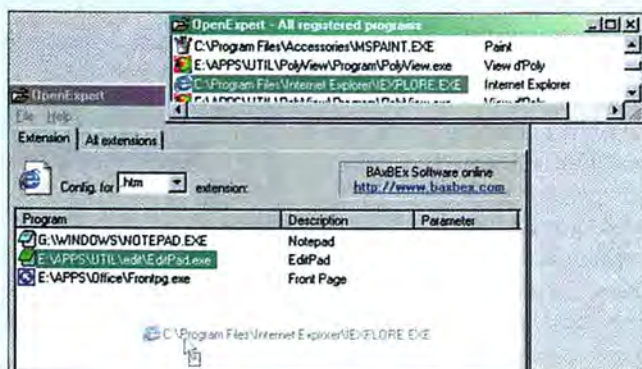
Here's what to do: In the Registry Editor, navigate to the **HKEY_LOCAL_MACHINE\SOFTWARE\Classes\Applications** key. Double-click *Applications*, and then double-click the application name whose menu you want to modify. Under that key, select the *Shell* key. In the right pane, double-click the *Friendly Cache* icon. In the Edit String dialog box, edit the text in the Value data box—this is the text that will appear on the *Open With* menu and *Open With* dialog box. If you want to give the menu name a unique keyboard shortcut, put an ampersand (**&**) in front of one of the letters in the name. Be sure that no other menu items begin with the letter you pick. Click *OK* and exit the Registry. The next time you open this menu using the keyboard method, you'll see an underscore marking the letter you designated; press it to launch that application. This underscore doesn't appear if you use the mouse to display the menu.

BROWSE YOUR FOLDERS

95 IF YOU RUN Windows 95 and installed Internet Explorer 4.x without the Desktop Update feature, you're missing out on some of the embellishments IE 4.x gives to Windows 98 users. But you can still get an enhanced file-management tool by using

Open One File Type in Many Apps with OpenExpert

WANT TO OPEN GIFs, JPEGs, or HTML files from your browser one day and from an editing program the next? Opening a file and its application from Explorer is usually a one-file-type, one-application kind of procedure. It's possible to dig through the myriad Explorer dialog boxes to change your options, but who wants to do that for several file types? OpenExpert can help. This handy little utility (free to home users, \$20 for businesses) adds an "Open With" submenu to your right-click menu and makes it a breeze to configure applications. Once you've set up a few apps, adding them to the menu for other file types is a simple drag-and-drop procedure. You can also customize the names of applications and the order that they appear on the menu. Why didn't Microsoft think of this? Thank the people at BaxBex Software for such a great idea. You can download OpenExpert from the vendor's site (baxbex.com) or from FileWorld.



IE to browse your hard disk; it includes a Favorites menu or panel, forward and back navigation button, and a Links toolbar. To make IE search your hard disk the way Explorer does, see "A Better Way to Explore Your Hard Drives" (www.pcworld.com/jun99/windowstips).

But if you want to open individual folders in a browser on the fly, you need another approach. You can customize Windows so that when you right-click a folder, you have the option of opening it in an Internet Explorer window. Here's what to do: First, double-click *My Computer*. In the *My Computer* window, choose *View>Options*. Click the *File Types* tab, and in the list, select *Folder* (not *File Folder*). Click the *Edit* button. At the bottom of the *Edit File Type* dialog box, click *New* to create a new action for the right-click menu. In the *New Action* dialog box, type **Explore in Browser** (or whatever you'd like to name your menu command) in the top box. In the bottom box, type "**C:\Program Files\Internet Explorer\iexplore.exe**" -e (adjust the path as needed to reflect the location of your browser). Then click *OK*.

Now, your right-click menu has a command to open a selected folder in a two-pane Internet Explorer window with the



FIGURE 4: USE IE 5's PRINT range to print only the Web information you want.

folder tree on the left. To add a command that opens a folder in a single-pane browser window, do this: Click *New* once again to create another action. In the *New Action* dialog box, type something like **Open in Browser** in the top box and "**C:\Program Files\Internet Explorer\iexplore.exe**" in the bottom box (again, your path may

vary). Then click *Close* twice to close the remaining dialog boxes. The next time you right-click a folder, you'll have two new menu commands that let you open that folder in your Internet Explorer browser (as shown in **FIGURE 3**).

PRINT SELECTIVELY WITH INTERNET EXPLORER 5



IN JANUARY'S issue I explained how you could use Microsoft FrontPage or FrontPage Express to simulate a print preview for Web pages when surfing with IE 5 ("Save Paper When Printing From IE 5," www.pcworld.com/jan00/hh_windows). But reader Eli Winkler has pointed out a better way to save paper when printing a Web page. In IE 5, select the portion of the Web page you want to print (that is, drag the cursor over the area to highlight it). Then choose *File>Print*. In the 'Print range' section, choose *Selection* to print only the selected material (see **FIGURE 4**). Then click *OK*. You'll get only the portion you selected.

MAKE ICONS DISAPPEAR



IN THE APRIL issue, I told you how to use a desktop toolbar to take the place of all the icons cluttering your screen. But I was wrong when I said that Windows 2000 didn't let you do this all on its own ("The Clean and Efficient Desktop," www.pcworld.com/apr00/hh_windows). It does, but like many things in Windows 2000, the controls have moved around a bit. In Windows 2000, right-click on the desktop and choose *Active Desktop*. Then, if there is a check mark by *Show Web Content*, choose *Show Desktop Icons* from the *Active Desktop* menu to uncheck *Show Web Content* (see **FIGURE 5**). If *Show Web Content* isn't checked, add the checkmark. Then right-click on the desktop again and choose *Active Desktop>Show Desktop Icons*.

GET THERE FASTER WITH DOCUMENT SHORTCUTS



WINDOWS FILE and folder shortcuts make it easy to open a document or folder fast. But they don't make it easier to get to, say, page 31, paragraph C of a long document or a spe-



FIGURE 5: HIDE THOSE ICONS in a flash in Windows 2000 by right-clicking the desktop.

cific cell of that monster spreadsheet you've been nursing all year. Fortunately, there is another kind of shortcut to solve this problem—the document shortcut. The only catch is that the application you use to open these documents must support object linking and embedding (OLE). For the majority of people, this means using Microsoft Word or Excel.

To create a document shortcut, open the document or spreadsheet you want a shortcut for. Navigate to the particular page, paragraph, sentence, or cell that you frequently consult, and select it. Then use your right-mouse button to drag the selection to a folder or the desktop. Release the button and choose *Create Document Shortcut Here*. Depending on the application, you may need to copy the selection, navigate to your folder or desktop, right-click, and choose *Paste Shortcut*.

With many applications, you'll need to return to the original app (the one that the shortcut points to) and choose *File>Save*. If you're creating a great number of these document shortcuts, you'll find them easier to manage if you keep them in their own folder. To create this folder, right-click the *Start* button and choose *Open*. In the *Start Menu* folder, right-click an empty area and choose *New>Folder*. Type a name and press **<Enter>**.



Find files in this article at www.fileworld.com/magazine. Send your questions and tips to scott_dunn@pcworld.com. We pay \$50 for published tips and questions. Scott Dunn is a contributing editor for PC World and a principal author of *The PC Bible*, 2nd Edition (Peachpit Press, 1995). ■

YOUR QUESTIONS ON: Securely deleting files ♦ Emptying the trash automatically

Protect Yourself Against Catastrophic Installs

INSTALLING SOFTWARE is dangerous. Every time you put another program onto your system, you run the risk of breaking something that's already there. And uninstalling a new app doesn't always fix a troublesome installation, because uninstall routines seldom do their job completely. So how do you install new software without risking disaster?

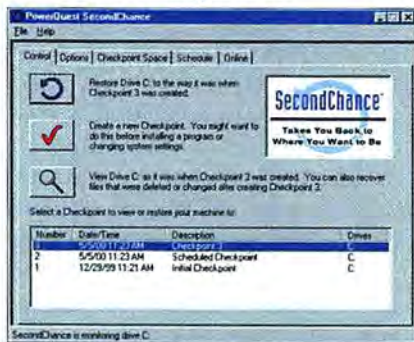


FIGURE 1: AVOID SOFTWARE installation trouble with SecondChance (top) and GoBack (bottom).

One way is to use PowerQuest's SecondChance (see FIGURE 1, top) or Wild File's GoBack (Figure 1, bottom). These programs track all of the changes made to your hard drive. If an installation messes things up, either program can roll your hard drive back to an earlier condition.

A word of caution: Before you use one of these programs to restore your setup, back up your data. You might want to get Windows back to where you had it last Tuesday, but you don't want to lose a

week's work in the process.

If you would rather not spend money or risk installing these programs, you can simply back up the Windows Registry before installing a new piece of software. This won't protect you as well as GoBack or SecondChance, but it will let you restore the part of Windows that sustains the most damage after a bad installation.

You can back up the Registry in Windows Explorer. Select **View>Folder Options** (or **View>Options**). Click the **View** tab, select **Show all files**, and click **OK**. Now create a folder called **C:\Regback**. Go to the Windows folder, find the files **system.dat** and **user.dat**, then hold down **<Ctrl>** as you drag those two files to **C:\Regback**.

If you need to restore the Registry, you must first exit to DOS. Do this by selecting **Start>Shut Down>Restart in MS-DOS mode**. At the DOS prompt, type the following commands, pressing **<Enter>** at the end of each line:

```
attrib -r -s -h c:\regback\*. *
attrib -r -s -h c:\windows\user.dat
attrib -r -s -h c:\windows\system.dat
copy c:\regback\*. * c:\windows /y
attrib +r +s +h c:\windows\user.dat
attrib +r +s +h c:\windows\system.dat
```

EMPTY THE TEMP FOLDER AUTOMATICALLY



CAN I SET something up to automatically empty the temp folder on a regular basis?

Francis Pham, West Chester, Ohio
YOU CAN SAFELY remove anything in **C:\Windows\Temp** that was created before the current Windows session. So the best time to have it automatically emptied is



Close Multiple Programs

WANT TO CLOSE several programs at once? Aaron Wille of Denver showed me an easy way to do it. Start by clicking one of the programs on the taskbar. Then hold down **<Ctrl>** while you select other programs you want to terminate. When they are all highlighted, right-click one, select **Close**, and watch them all go in one fell swoop. Unfortunately, the taskbar doesn't offer a 'select all' option. So if you have many programs running, this trick doesn't provide you with a really easy way to close every one.

during boot-up. Here's how to do that:

Select **Start>Run**, type the command **sysedit** and press **<Enter>** to launch the System Configuration Editor. Once there, go to the **autoexec.bat** window. That batch file may contain text, or it may be blank. Either way, add these two lines:

```
deltree /y c:\windows\temp
md c:\windows\temp
```

Save the file and exit the program.

From now on, you'll get an empty temp folder every time you boot.

RUN PROGRAMS AT SHUTDOWN



IS THERE A WAY to run certain applications automatically when I close Windows?

Mark Leugner, Regina, Saskatchewan
WHAT BETTER time to scan, defrag, and back up your hard drive than when you're shutting down at the end of the day? Unfortunately, Windows doesn't provide a way to do this, so you'll have to go with third-party software.

I recommend Kill Win, a little program by BK Soft that lets you set up an icon to run one or more programs, then shut down Windows. There are two current versions of the program—one free and one shareware—and both are available at www.borgking.de/bk-soft or on FileWorld. (Both also require the Visual Basic 6.0 runtime, also on FileWorld. See "Must Have That DLL," *Answer Line*, April, www.pcworld.com/aproo/al.)

You can use either version to automatically run other programs before closing

Windows, but to do so with the free Kill Win 2.1.6, you'll have to create a batch file. Select **Start•Programs•Accessories•Notepad**. Assuming you've installed Kill Win in the C:\KillWin folder, enter the text **c:\killwin\killwin /w**. Press **<Enter>**.

On the next line, type **start /w**, followed by the command to run a program. For instance, if you want to scan your hard drive, type **start /w scandisk c: /n**. The 'start /w' will make the batch file wait before it goes on to the next command. Press **<Enter>** to go to the next line. If you want to run more than one program, type each command on its own line, prefaced with **start /w**. Finally, type **c:\killwin\killwin /s** on the last line to exit Windows.

Save the file with the extension .bat, as in **Close Windows.bat**, and place it somewhere convenient, such as on your Start menu. When you want to shut down Windows, select **Start•Close Windows** rather than the usual **Start•Shut Down**. When you run this batch file, you'll get an error message telling you that it can't close the DOS window while it's running the batch file; don't worry about it.

The \$15 Kill Win Pro makes running other programs before shutdown much easier. Once you have installed and launched Kill Win Pro, select the **Settings** tab. On the **Various things** tab, check **Execute another program before the execution of an action**. Directly below, select **until this app has closed, then execution**.

For 'Location of the app', enter the command to launch the app you want to run

before shutting down Windows. For the default action, select **Shut down Windows**. Finally, click **OK**.

Now, to run your program and exit Windows, launch Kill Win Pro from the Start menu, then double-click its system tray icon. Or you can simply double-click the **Kill Win Pro** icon on your desktop. This shortcut, unlike the one in the Start menu, automatically runs Kill Win Pro's default action.

SECURELY DELETE SENSITIVE FILES



I HAVE SOME sensitive data on a PC I'm donating to a local charity. I can delete the files, but I know there are utilities that can recover such deleted material. Can I destroy the files so they can't be recovered?

C. M. White, Newport News, Virginia
WHEN YOU DELETE a file in Windows and empty the Recycle Bin, the physical space that the file occupied becomes available for other files. But until the space is overwritten, it still contains the old data.

You may already have a program that can overwrite data so it can't be recovered. For instance, Norton Utilities comes with a program called WipeInfo, which will securely delete a file, folder, or the free space on your drive. Or with Mijenix PowerDesk Utilities 98, you can render a file irretrievable by highlighting it and selecting **File•Destroy**.

If you don't have either program, download Jetico's BCWipe from www.jetico.com/download.htm or from FileWorld (it's free for noncommercial users). BCWipe integrates with Windows Explorer (see FIGURE 2). To wipe a file off of your hard drive, simply right-click it in Explorer and select **Delete with wiping**. To wipe off deleted files, right-click the drive and select **Wipe free space**. Wipe options include a level of cleaning that meets a Department of Defense security standard.

A quick-and-dirty way to overwrite deleted files is to run Windows' Defrag, which moves files around on your hard disk, thereby overwriting many sectors occupied by "ghost files." The success of this method, however, is not guaranteed, as it does not write over every sector.

OVERCOME HALTED DEFRAGS, PART II

A FEW MONTHS AGO, I offered some tips on helping Windows' disk scanner and defragger complete their jobs without freezing or starting over (see "Overcome Halted Defrags," *Answer Line*, January, www.pcworld.com/janoo/al_defrags). Several readers responded with these additional tips:

Go away and let it run: These programs can't finish their jobs if you keep using your computer. So take a break after you start a scan or defrag. Also, if you have a screen saver or any program that's set to kick in while your system is idle, disable it temporarily.

Defrag in Safe Mode: If you boot into Windows' Safe Mode, you are much less like-



FIGURE 2: WINDOWS DOESN'T completely erase files when it deletes them, but BCWipe does.

ly to run into some program that causes a conflict with the disk scanner or defragger. To get into Safe Mode, reboot your computer. If you are using Windows 95, wait until the words 'Starting Windows 95' appear, then press **<F8>**. With Windows 98, as soon as the boot process starts, press and hold down **<Ctrl>**. In either case, you'll eventually get to the Startup menu, where Safe Mode will be one of the options.



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GoBack

Street price: \$50; Wild File; 888/945-3345; www.goback.com

PRODUCT INFO NO. 601

Norton Utilities 2000

List price: \$50; Symantec; 800/497-6180; www.symantec.com

PRODUCT INFO NO. 602

PowerDesk Utilities 98

List price: \$40; Ontrack/Mijenix; 800/645-3649; www.mijenix.com

PRODUCT INFO NO. 603

SecondChance

List price: \$70; PowerQuest; 800/379-2566; www.powerquest.com

PRODUCT INFO NO. 604

Take command of your modem ♦ Free digital ID certificates ♦ Net sharing tools

Free Net Access— Too Good to Be True?



WHAT'S THE CATCH? There has to be a reason why free Internet services are taking off. I'm currently using Freeworld.com and find that—unlike other services—it has minimal advertising and offers virtually unlimited usage.

I also pay for an account with a large ISP that features slower log-ins and e-mail delivery, and never connects at a speed faster than about 45 kbps. Should I keep this account, or dump it in favor of the free one? It's true that Freeworld.com lacks toll-free support, but what do you expect for free?

Tom Gundlach
Phoenix



THERE IS no catch, though (as you note) you don't always get what you don't pay for. Free Internet access is like commercial TV—obviously, someone is paying for it, just not you. In the case of most free ISPs, advertisers subsidize your access. If they bother you, tune out their banner ads. The service you chose may be one of the best, though. Rather than forcing you to download and run proprietary software that displays incessant banner ads, Freeworld.com simply requires that you make the company's site your browser's home page. (See **FIGURE 1** for a list of other free dial-up ISPs and DSL services and their requirements.)

Still, even if you don't mind the more intrusive requirements imposed by the other sites, a free ISP may not be right for you. For one, not all offer POP3 e-mail accounts—a serious problem if you rely on a mail client (like Eudora) that doesn't

work with Internet-based e-mail. And though the majority of free ISP services offer local phone numbers nation-

wide, the closest access number to your home may be a toll call. If you spend much time online, those local long-distance connections could end up costing you more than you pay for a standard ISP account.

A free ISP may not come through for you in other ways as well. When you sign on with a regular ISP, you get more than just a phone number and an e-mail address. Even budget plans often include Web hosting, multiple e-mail accounts, and 24-hour or toll-free tech support. More important, most free accounts don't support the faster types of access now available, such as ISDN, DSL, and modem bonding.

That doesn't mean the situation won't change, though. You can choose to move your Web site to any number of free hosting services, such as GeoCities, as long as you don't mind the ads they insert into your pages. As free ISPs continue to fiercely compete for customers, access numbers will undoubtedly increase, as will the types and quality of free services provided. Already, the first free DSL

ISPs—albeit with numer-



Maximize New IE Windows

NAVIGATOR DOES IT, why can't Internet Explorer? When you right-click a link in either browser, one choice on the menu that pops up is to open the link in a new window. Navigator dutifully opens a window the same size as the current one. But IE stubbornly uses a smaller size by default, which means that you have to maximize the window yourself. Here's a work-around. Instead of right-clicking the link, press <Ctrl>-N to open a duplicate of the current window; thereafter, simply click the link.

ous attached strings—have cropped up. Competition from free ISPs may also force pay services to lower their rates or switch to the free mode. And finally, there may be some shakeout as a few services become dominant.

For now, a free ISP account can nicely complement your existing service, especially if the latter lacks nationwide numbers. If you don't mind the disruption of changing your e-mail and Web site addresses, you could certainly dump your monthly ISP subscription and save the

FREE DIAL-UP ISP	Web address
1stUp.com	1stup.com
Address.com	www.address.com
AltaVista Free Access	www.altavista.com
BlueLight.com	www.bluelight.com/isp.html
Free ISP	freeworld.excite.com/freeworld/
FreeL.Net	freel.com
Freeworld	www.freeworld.com
IFreedom.com	www.ifreedom.com
Juno	dl.www.juno.com/get/web
Lycos	free.lycos.com
NetZero	www.netzero.com
SurfFree.com	www.surfFree.com
WorldSpy.com	www.worldspy.com/freeisp/isp.html
Xoom.com FreeISP	freeisp.xoom.com
FREE DSL SERVICE	
FreeDSL	www.freedsl.com
INyc	www.inyc.com

All services require an advertising banner on screen at all times except Freeworld and WorldSpy.com.

FIGURE 1: CHOOSE FROM more than a dozen free ISPs, but it's best to compare them to see the "price" you really pay.

ILLUSTRATIONS: JAMES YANG (LEFT); JEFFREY PELO (RIGHT)

Delete those old backups ♦ Insert dates fast ♦ Change column settings at midpage

Build Automatic Return Addresses in Word

THE ENVELOPE AND LABELS dialog box in Word 97 and 2000 (Tools•Envelopes and Labels) automatically fills in a return address for you. But where does that address come from? And what if it isn't the one you want to use? You can select it and type in a new address each time you use that dialog box, but if you want to change the default address for some reason (say you move or you've inherited the PC from another employee), you'll have to take a different route:

Select **Tools•Options** and click the **User Information** tab in the Options dialog box. Type the new return address information in the 'Mailing address' field, deleting the old address if necessary (see **FIGURE 1**). Then click **OK**.

Hint: You can also change the return address in the Envelope and Labels dialog box itself, especially for a temporary change. Just be sure to click the appropriate button when asked whether to save the new address as the default after you click that dialog box's **Print** button.

INSERT DATES POSTHASTE

NEED A DATE in your document? You can insert one with a menu command (select **Insert•Date and Time**, then choose further options from a dialog box). But if you're fond of keyboard shortcuts, there are alternatives.

Word 97 & 2000: Put the cursor where you want the date and press **<Alt>-<Shift>-D**. There's a twist to this approach: The date you get is a dynamic date field that will update each time you load the document. To make the current date permanent, click the field once, then press **<Ctrl>-**

<Shift>-<F9>. To change the default appearance of dates you have entered in this manner, select **Insert•Date and Time**, choose the desired format, click **Default**, and confirm the change.

WordPerfect 8 & 9: Place the cursor at the desired position and press **<Ctrl>-D** to permanently insert the current date. To insert a date code that will automatically update itself, press **<Ctrl>-<Shift>-D**. (Hey Microsoft, see how easy it can be?)

SWITCH COLUMN FORMATS MIDPAGE

YOU MAY OFTEN need a two-column format for one part of a page and a one-column format for the rest—especially in newsletters or other graphical documents. But Word doesn't clearly indicate how to do this. Here's the quick, foolproof way to handle such formatting in Word 97 and 2000.

Position the pointer at the end of the text that will precede your new format or on a blank line that will begin the new for-



FIGURE 1: CHANGING WORD'S default return address is simple—just go to Tools•Options.



Delete Unneeded Word Backups

WORD 97 AND 2000 can automatically create backup copies of your open documents (select **Tools•Options•Save•Save Autorecover info every:**). It's a great idea that can save your bacon should you need to revert to a previously saved version. However, once the document is in its final form, these automatic backups just take up precious disk space. To delete them, select **Start•Find**. Type *.wbk in the Find dialog's Named field, and select **My Computer** from the 'Look in' list. Now delete the ones you no longer need.

matting area. Select **Insert•Break**. In the Break dialog box (see **FIGURE 2**), select **Continuous** under 'Section breaks' and click **OK**. A gray section-break line will appear. Select **Format•Columns**, then choose the desired number of columns and click **OK**. Other column options will be correctly set automatically. Repeat these steps each time you need a different column layout.

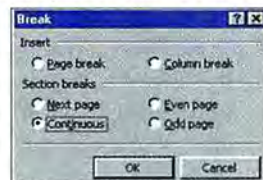


FIGURE 2: GIMME A BREAK. Select a break option.

While editing, keep an eye on the gray section-break lines so you don't backspace over one. If you do, press **<Ctrl>-Z** or click the **Undo** icon to correct the error.

Note for WordPerfect 8 and 9 users: No section breaks are needed to insert multiple column layouts anywhere on a page. Just select **Format•Columns** whenever you want to create a multicolumn layout, and use the Columns dialog box to set the number of columns and other measurements. To return to a single column layout, just select **Format•Columns** and then click **Discontinue**.



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Surprise, Surprise! Excel Can Handle Fractions

SOME TYPES OF data, such as stock market quotes, normally display as fractions, not decimals. To enter a fraction in Excel, type the whole number (or integer) followed by a space, and then type the fraction, using a slash (for example, 5/8). If you type only a fraction, Excel may interpret it as a date (so it might read 5/8 as May 8). To avoid this mistranslation, enter 0, a space, and then the fraction.

When you enter a fractional value, Excel automatically applies a fraction number format that reduces it to the smallest possible denominator. For example, if you enter 16 2/8, Excel displays the number as 16 1/4. In some cases, however, you'll want the fractions to use a common denominator. For example, you might want the value 16 2/8 to be shown as 16 4/16. To obtain this result, select your cells and choose *Format>Cells*. Then select the *Number* tab and choose *Fraction* from

	A	B	C	D
1				
2		Closing Price Per Share		
3	January	14 1/8	14 2/16	
4	February	15 3/8	15 6/16	
5	March	16 1/4	16 4/16	
6	April	14 3/16	14 3/16	
7	May	11 1/4	11 4/16	
8	June	9 7/8	9 14/16	
9	July	12 1/8	12 2/16	
10	August	13 3/8	13 6/16	
11	September	15 5/16	15 5/16	
12	October	15 3/8	15 6/16	
13	November	18 7/8	18 14/16	
14	December	20 3/4	20 12/16	
15				

FIGURE 1: EXCEL USES the smallest denominators (column B) unless you format for others (column C).

the Category list. Finally, select the desired number format from the Type list.

FIGURE 1 shows some examples of numbers expressed as fractions. Column B shows the numbers produced using Excel's default formatting. Column C has the same values formatted as 16ths.

You can also express fractional data using a decimal point. For instance, the number 9 4/16 could appear as

9.04. Here, the digits to the right of the decimal represent 16ths. To display values in this format, use Excel's DOLLARFR() function. It's available only when the Analysis ToolPak is installed (select *Tools>Add-ins* to install it). The DOLLARFR() function takes two arguments: the number and an integer for the denominator. The formula =DOLLARFR(9.25,16), for example, returns 9.04.

This function is also useful for nondollar data. So, if you work with feet and inches, you can represent 11.5 feet as 11.06 (11 feet, 6 inches) by using the formula =DOLLARFR(11.5,12). The value will then appear as '11 [feet] 6 [inches]'.

The DOLLARFR() function is for display only. You can't use the value it returns in other calculations or in charts. To perform calculations on such values, reconvert them into decimal values by using the DOLLARDE() function (also part of the Analysis ToolPak).

UNLINK A CHART SERIES FROM ITS DATA RANGE

NORMALLY, AN EXCEL chart stores data in a range. If you change the data in that range, the chart updates automatically. Sometimes you may want to unlink the chart from its data ranges and produce a static chart that remains unaffected by later changes in the data. For example, suppose you plot data generated by various what-if scenarios, and you want to save a chart that represents some baseline scenario for comparison with others.

One way to create a static chart is to copy and paste it as a picture. Activate



Avoid Error Displays

SOMETIMES A FORMULA may return an error message. Usually, you'll want to know when a formula error occurs. But now and then you may prefer to avoid the messages. You can do so by using an IF() function to check for an error. For example, the formula =IF(ISERROR(A1/B1),"",A1/B1) displays a blank if the division results in an error. You can adapt this technique to any operation. The original formula serves as the argument for the ISERROR() function, and it repeats as the last argument of the IF() function.

your chart, hold down the <Shift> key, and choose *Edit>Copy Picture* (this option is available only when you hold down <Shift> as you select *Edit*). The *Copy Picture* dialog box will appear. Click *OK* to

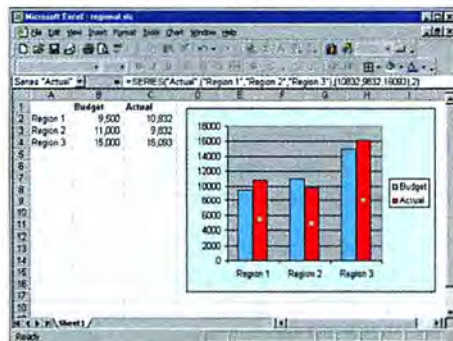


FIGURE 2: A CHART IS NOT linked to data ranges if its SERIES() formulas use arrays.

accept the defaults. Then click anywhere in your worksheet and choose *Edit>Paste*.

Another way to create a static chart is to convert the range references into arrays. Select a chart series and then click the formula bar to activate the SERIES() formula. Press <F9> to convert the range references into arrays. Repeat this for each series in the chart. Now the chart remains formattable rather than becoming a picture. The formula bar in FIGURE 2 shows the SERIES() formula after conversion of the range references into arrays.

Send questions and tips to john@j-walk.com. We pay \$50 for published items. Contributing Editor John Walkenbach is the author of *Excel 2000 Formulas* (IDG Books, 2000) and maintains *The Spreadsheet Page* (www.j-walk.com).

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The inside story on CMOS ♦ Don't delete—uninstall ♦ Speed your arrow keys

How to Overcome Your BIOS Fear

SURE, YOU CAN TELL a lot about people from the way they look. But to find out what makes 'em tick, you need to do some serious psychoanalysis. Your enigmatic PC is no different. Beneath its colorful screens and fancy pull-down menus lurks the BIOS—a bit of software that acts as the subconscious of your PC. And just as your subconscious controls your behavior, your PC's BIOS exerts a powerful influence on the machine's performance.

Here's what you need to know to gain the greatest insight into your PC's hidden psyche.

BIOS—short for Basic Input/Output System—is the low-level software that translates instructions and data from the language of the people-friendly commands Windows (or DOS, Linux, or whatever operating system you're running) uses into the cryptic language that controls the chips in your PC. Because the BIOS code resides in a chip that's located on your PC's motherboard, it's not easy to replace.

To properly govern the behavior of your computer's chips and devices—including hard drives, memory, parallel ports, and a great many others—the BIOS needs to know what types of devices your PC contains and (where you have a choice) how you want them to function. And it must have this information before loading the operating system. To make that possible, your PC stores the relevant settings on a separate memory chip known as CMOS (which stands for complementary metal-oxide semiconductor). The program used to access and change BIOS settings is called the CMOS Setup program.

This program has settings that both beginners and veterans will find useful. You can do things as simple and obvious as adjusting the time and date maintained by your system or as complicated and obscure as altering the number of "wait states" your PC uses to coordinate the flow of data between the RAM and CPU. And since some settings here can override the corresponding settings in Windows—for example, to assign a specific IRQ to a serial port—the CMOS Setup program is the first place to look when you aren't able to resolve a hardware conflict in Windows.

Many PCs come with a motherboard manual that describes the PC's CMOS Setup program, setting by setting. If yours doesn't, check your PC manufacturer's Web site for documentation (sometimes PC makers customize the BIOS for their systems) and then the motherboard manufacturer's Web site.

PLAY IT SAFE

CHANGING CMOS settings can be useful—or dangerous. Resetting the time and date isn't hard; but if you select the wrong wait-state setting, for example, you may lock up your PC—a problem that can take many hours to fix. So use caution when working with the CMOS Setup program.

First, back up your CMOS settings—and not just as a safeguard against making unintended changes. When your PC

Faster Than a Speeding Finger

CAN YOU SCROLL faster than you can talk? No? Maybe your keyboard's holding you back. To speed things up a bit, open *Control Panel* and double-click the *Keyboard* icon. Under the *Speed* tab, you'll find a sliding bar labeled 'Repeat rate' that's designed to set the speed of character repeats. Move the slider all the way to the right, to the side labeled 'Fast'. It won't make your fingers move faster, but you'll probably notice a big performance difference when you use the arrow keys to scroll through large text documents.



is off, a battery on the motherboard constantly refreshes the CMOS settings. But when the battery dies—and they all do, eventually—so do the settings.

Some CMOS Setup programs come with a backup feature that writes your settings to a floppy. If yours does, use it. If not, try software that backs up CMOS settings; candidates include Norton Utilities and a number of shareware programs. But CMOS settings aren't standardized, so many of these programs—including Norton Utilities—only capture certain core settings common to all PCs.

Next, make a hard copy of your CMOS settings. If your PC is connected to a printer, try pressing the <Print Screen> key to get a hard copy of each screenful of information in the CMOS Setup program. If that doesn't work, sharpen your pencil and start writing it all down.

GET WITH THE PROGRAM

ACCESSING YOUR computer's CMOS Setup program is easy; you just press a key (or key combination) when the PC starts up. Different BIOS makers use different keys—usually <Delete> or <F1>, though Compaq PCs use <F10>. Your monitor screen should announce which key(s) to press. If it doesn't, check your PC's documentation.

Once you reach the CMOS Setup program, you need to figure out how to get safely out of it. The main screen will list a number of submenus—like Standard, Advanced, Security, and Power Manage-



ment—as well as the program's exit options. Be sure to find the Exit Without Saving Changes option (or its equivalent). It's your escape route if you ever suspect that you've altered a setting that you didn't mean to change.

You may also notice one or two menu choices that allow you to restore CMOS settings to their default values. Before using one of these, check your documentation to determine which choice restores what. One option—labeled something like 'Restore BIOS Default'—may return CMOS settings to a minimal configuration for troubleshooting purposes, an arrangement that sacrifices performance in favor of compatibility. Meanwhile, the other choice—possibly labeled 'Load Setup Default'—may restore settings to the optimal performance-oriented values they were given at the factory.

Following are just a few of the CMOS settings that you may find useful. The precise names given below may not match the settings in your BIOS—in fact, some may not even be offered in your setup program—but you should be able to find their equivalents without much difficulty. As a rule of thumb, if you don't know what a setting does, don't play with it. But if you're a diehard tinkerer who can't resist the temptation to squeeze a little more speed out of your computer, you should consult Phil Croucher's excellent book, *The BIOS Companion*, before playing with the values for any of the more arcane memory or chip set defaults.

Hard Disk Settings: This table of settings, which in most cases is located under the Standard menu selection, holds the configuration parameters that your PC needs to recognize your hard disk. The hard disk settings table can record data for up to four drives, one for each of the four EIDE

devices supported by most motherboards.

You can enter the hard disk parameters manually, but almost all PCs made in the last few years come with a hard-disk auto-detection program that reads and enters the proper configuration data into CMOS. If you like, you can run the program manually from the CMOS Setup program.

Floppy Disk: This option lets you select the type of floppy drive (for instance, one designed for 3.5-inch, 1.44MB floppies) that you have in your A: and B: drives. Check this setting if you find yourself running into floppy drive problems. Some BIOS versions have a separate *Floppy Read only* setting that prevents data from being written to a floppy disk.

Boot Sequence: This setting determines the order in which the PC examines the drives for boot-up instructions. For example, it may begin with A: and go to C:. Or it may go from C: to the Zip drive, or from C: to A:. If you want to boot your machine from a CD-ROM, Zip, or LS-120 drive, you'll likely have to change this setting.

Password Protection: You can set the BIOS to ask for a password before you boot up, but be careful with this one. If you forget the password, you may have to reset a motherboard jumper, disconnect your CMOS battery (and lose all your settings), or even buy a new motherboard. (In some cases, your system manufacturer may be able to provide you with a "back door" password to use in an emergency—if you can prove that you're the owner.)

Serial Port Settings: These are great places to investigate if you're having trouble installing a modem. Fixed IRQ and COM settings can wreak havoc on Windows and plug-and-play installations. For their part, serial ports may be turned on or off; so a serial port that seems dead may just be set to "disabled" in CMOS.

Parallel Port Settings: The preceding serial port tips apply here, too. But these settings also let you select which mode—standard, bidirectional, ECP, or EPP—the parallel port uses, and they determine the speed and transmission capabilities of the parallel-port connection. Most printers manufactured three or more years ago use the slower, standard mode. Many new, full-featured printers won't function ►

Norton Utilities

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www.symantec.com

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HARDWARE TIPS

without ECP connections. Printer problems can often be traced to a parallel port with the wrong mode setting.

Fan RPM and CPU Temperature: You can find the correct values for both of these critical parameters in the CMOS Setup program. Check the settings here periodically to ensure they are accurate.

THE GHOST IN THE MACHINE



EVERY TIME I start my PC I get a 'Modem Not Ready' error message from my old ISP's software. I have a new ISP, a new modem, and I *thought* I deleted the old software. Is my PC haunted?

Helen Fairbairn, Eugene, Oregon
IT SOUNDS MORE like secreted software than pesky poltergeists. If you deleted the software without uninstalling it, you may have missed something. To track it down,

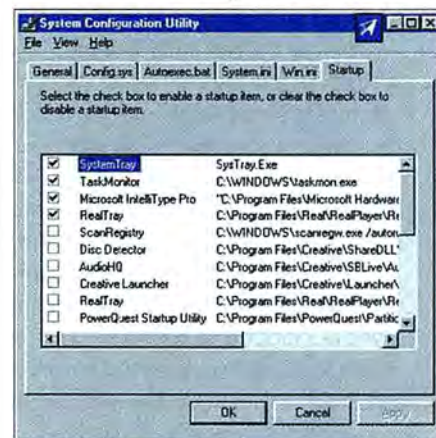


FIGURE 1: WINDOWS' CONFIGURATION Utility lists all programs that load at system start-up.

select **Start•Run**, type **msconfig**, and press **<Enter>**. Then select the **Startup** tab. You'll see a list of all the software that automatically loads when your system starts (see **Figure 1**). If you don't recognize the offending program at once, begin disabling programs one by one—by unchecking the associated box—and restarting the system after each effort. When the error message goes away, you've found the culprit.



For additional hardware tips, see www.pcworld.com/heres_how. Send your questions and tips to kirk_steers@pcworld.com. We pay \$50 for published items. Kirk Steers is a PC World contributing editor.



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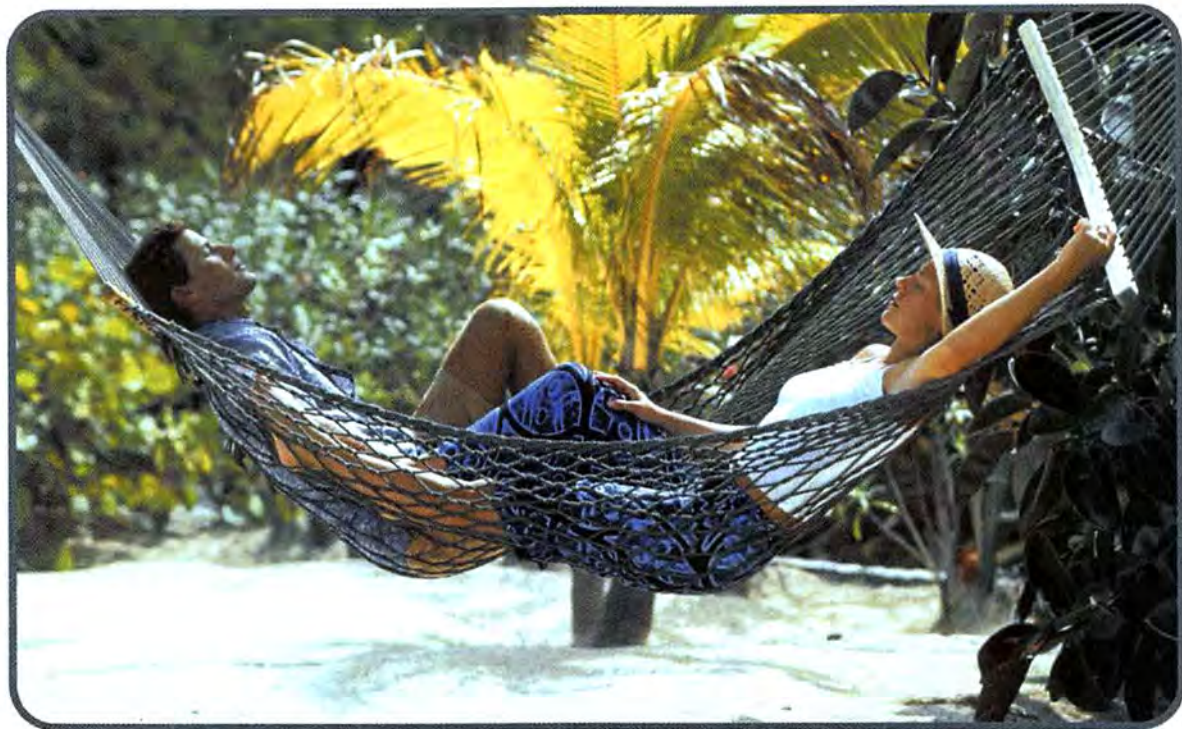
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Edit Digital Video With Your PC

IF YOU'D LIKE TO TURN your home videos into Fellini-like masterpieces (or try, anyway), the new generation of digital camcorders—working in tandem with a PC equipped with a special add-in card and editing software—can get you started.

Because digital camcorders, as their name implies, produce all-digital video, you can load the video footage directly into your PC, edit it, and rerecord the finished product back into the camcorder without any loss of quality. Conventional camcorders produce analog video that must be converted to digital for PC use (with the help of an analog capture card), then converted back to analog to produce a finished tape. Each conversion results in a slight loss of quality.

To load video from your digital camcorder into your PC, you need an IEEE 1394 (FireWire) capture card—an ultra-high-speed serial interface. These cards are widely available, both as stand-alones and bundled with video editing software.

Here's how to install an IEEE 1394 card in your PC, including instructions on how to configure your PC and hook up the parts of a digital editing setup.

For lots more information on PC-based video editing hardware and software, see "Move Over, Spielberg," page 154.

Stan Miastkowski is a contributing editor for PC World.

THE TOP DOWN

Benefits: Ability to capture and edit video from digital camcorders on your PC

Cost: IEEE 1394 card \$175-\$600; complete editing packages (with IEEE 1394 card) \$200-\$800

Time required: 30-60 minutes

Tools required: Phillips screwdriver, antistatic wrist strap (recommended)

Other requirements: Purchase and installation of Windows 98 (Windows 98 Second Edition preferred) if you're not already running it

Expertise level: Intermediate

Vendors: See video editing roundup, page 154



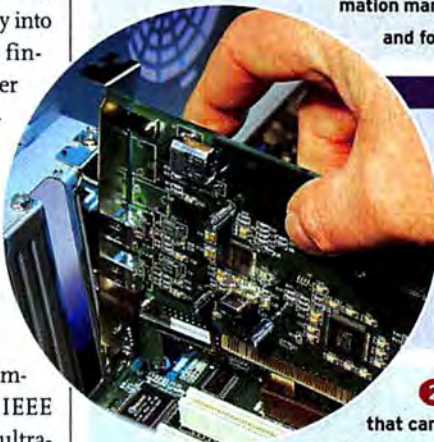
BEFORE YOU BEGIN

1. **Perform a full backup of your PC.**
2. **Scan and optimize your hard drives.** Open *My Computer*, right-click the drive icon, select *Properties*, click the *Tools* tab, and click *Check Now*. When that's done, click *Defragment Now*. Repeat both steps for all hard drives in your PC.
3. **Make sure your PC doesn't have any hardware conflicts.** Select *Start>Settings>Control Panel* and double-click the *System* icon. Select the *Device Manager* tab. If you see any exclamation marks, highlight each entry one by one, select *Properties*, and follow the directions to resolve the conflict.



BASIC STEPS

1. **Install the IEEE 1394 card.** Turn off your PC, unplug it, and remove the cover. Consider using an antistatic wrist strap (available at most electronics store) to minimize the possibility of electrostatic damage. Find a free PCI slot, and remove the metal slot cover behind it. Carefully insert the card, press it firmly into the slot, and screw it down.



2. **Install the driver software.** Make sure the software that came with your card (usually on CD-ROM) is nearby. Turn on your PC. Windows should detect the new card and start the Add New Hardware Wizard. Check *Search for the best driver for your device* and click *Next*. Insert the CD-ROM into your PC, check the *CD-ROM Drive* box, uncheck all the other boxes, and click *Next*. Follow the remaining directions to finish installing the drivers.

IMPORTANT: Do not install Windows' default IEEE 1394 FireWire drivers. For optimum software performance, you must install the drivers that come with your specific card.

3. **Check to make sure that the board is installed correctly.** Follow the directions in step 3 of the 'Before You Begin' box to ensure that your card is correctly installed. If problems continue, call the card maker's technical support line.



4. **Install the software and start capturing and editing video.** Follow the directions to install the capture and editing software (procedures vary by maker); then connect your digital camcorder to the IEEE 1394 (FireWire) card using the cable that came with the card, and get to work on your cinematic masterpiece.

MAKING YOUR PC READY FOR VIDEO EDITING

If you want to edit digital video, you'll need a PC with plenty of processing power, lots of RAM, and oodles of hard drive space. Here are the minimum requirements for occasional editing, and the power options for more-serious work.

Digital Capture Card

Minimum: Any IEEE 1394 card.
 Serious: IEEE 1394 card with high-speed SCSI interface so you can add a dedicated hard drive for video.

CPU

Minimum: Pentium MMX-233.
 Serious: Pentium III-500 or faster.

RAM

Minimum: 64MB to 128MB (depending on editing software).
 Serious: 384MB to 768MB.

CD-ROM Drive

Minimum: Any CD-ROM drive.
 Serious: CD-RW drive or DVD-RAM drive for producing video on CD-ROM or DVD.

System

Windows 98 supports IEEE 1394 cards. Windows 98 SE is preferable.

Monitor

Minimum: 17-inch.
 Serious: 19- to 21-inch.

Graphics Card

Minimum: High-performance PCI graphics card with 8MB of RAM.
 Serious: Ultra-high-performance AGP graphics card with 32MB of RAM and second output for video monitor.

Backup Tape Drive

Minimum: None.
 Serious: High-performance tape drive with 20GB to 40GB of storage per tape for archiving digital video.

Sound Card

Minimum: Any Sound Blaster-compatible sound card.
 Serious: High-end sound card with advanced MIDI capabilities, positional audio, and digital audio in/out connectors.

Hard Drive

Minimum: UltraDMA/33 hard drive with 10GB to 15GB of free space. (Digital video requires 183MB of drive space per minute of video.)
 Serious: A second dedicated Ultra DMA/66 or Fast/Wide SCSI drive with 25GB to 40GB of space.



PUTTING IT ALL TOGETHER

DV camcorder

IEEE 1394 port

IEEE 1394 card
(in computer)

IEEE 1394 cable

Hook up the PC and digital camera to a VCR and TV or monitor. To add a VCR and monitor to your PC and camera setup, read your IEEE 1394 card's or digital camera's manual, or review the video tutorial on the card's software installation CD-ROM (if it has one). You'll need a fair amount of room to set everything up.

Audio cables

Video cable
or

S-Video cable

S-Video cable

or

Video cable

Audio cables



MAKING DIGITAL TAPES FROM OLD-STYLE CAMCORDERS

If you have an older-style analog camcorder (VHS, VHS-C, 8mm, or Hi-8), you can convert your old tapes to digital for easy editing by "dubbing" between the analog camcorder and the digital one.

Hi-8
camcorder

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#56233	2140XCDs	450 K6-2	64	4.3GB	24X 13.0" DSTN	56K	W98		\$1,299
#54910	2180COT	475 K6-2	64	4.3GB	24X 12.1" TFT	56K	W98		\$1,549

Tecra 8100

#54552	8100	450 PIII MMX	64	6.0GB	24X 14.1" TFT	56K	W98		\$2,899
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Portege 7200CT

#56921	7200CT	600 PIII MMX	64	12.0GB	— 13.3" TFT	56K	W95		\$3,699
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#56909	7200CT	600 PIII MMX	64	12.0GB	— 13.3" TFT	56K	W98		\$3,699
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#53366	V300 400 Celeron	32	4.3GB	24X 12.1" HPA	56K	Win 95/98			\$1,499
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#54510	XL-110	475 AMD-K6-2	64	6.0GB	24X-Max 12.1" HPA	56K	W98		\$1,299*
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#54511	XL-145	500 AMD-K6-2	64	6GB	4X-DVD 14.1" TFT	56K	W98		\$2,099*
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#54512	XL-163	500 AMD-K6-2	64	6GB	4X-DVD 13.3" TFT	56K	W98		\$2,199*
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Thinkpad 570

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#52688	600X	500 PIII	64	12.0GB	24X 13.3" TFT	56K	Win 98		\$3,289
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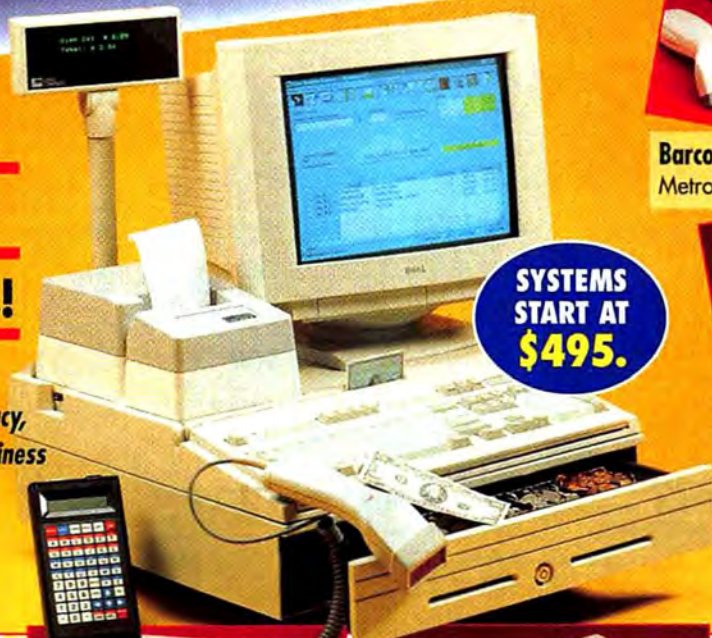


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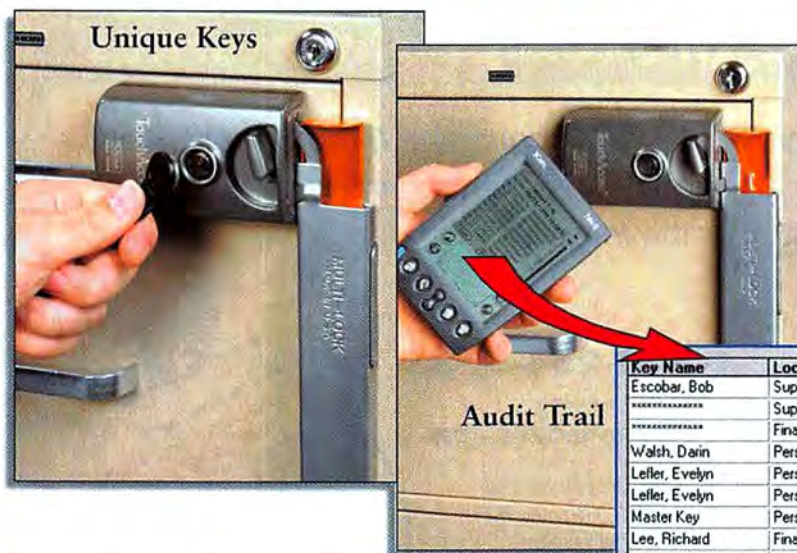


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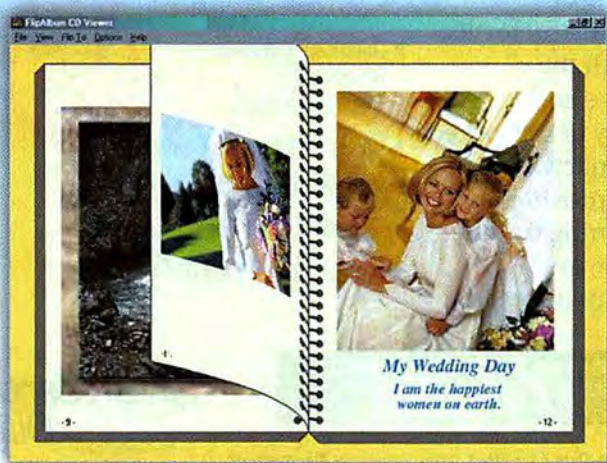
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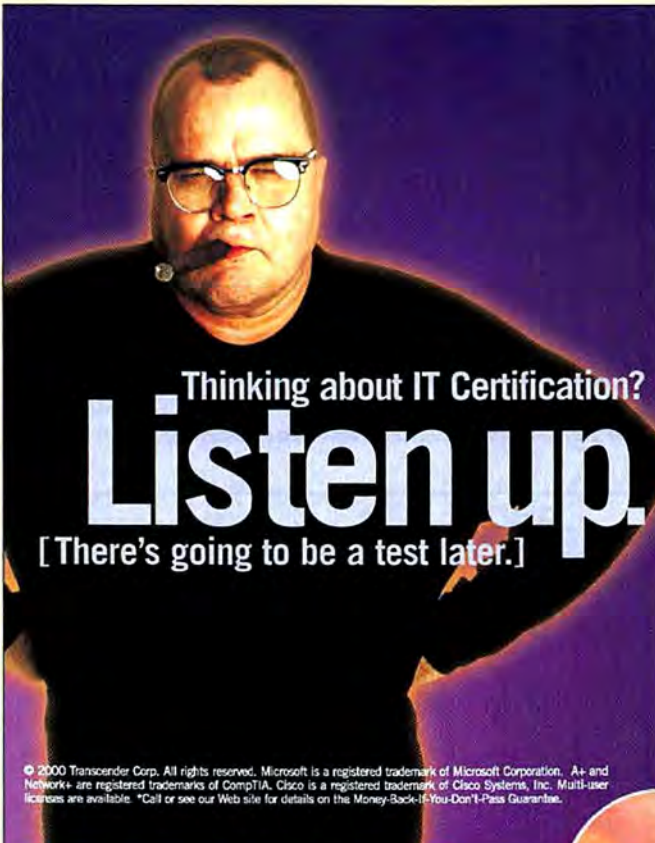
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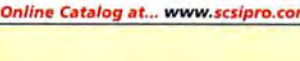
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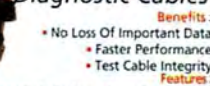
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From: \$39 • Diagnostic Indicators • Large Ferrite Filters • Triple Shielding (Unique Design) • Double Gold 20u" Plated Connectors • Extra Heavy 26 Gauge Wire • 100 Styles in Stock

Teflon™ 90 Ohm External Cables

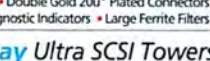
- Benefits:**
- Ultra SCSI 40 MB/s operation
 - Fixes Ultra SCSI Cable Problems
- Features:**
- Perfect 90 Ohm Impedance Match
 - Triple Pronged Connector With Gold contacts

Gold .8mm Ultra SCSI Cables

- Benefits:**
- Faster Performance
 - Test Cable Integrity
 - No Loss Of Important Data

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14 & 29 Bay Ultra SCSI Towers



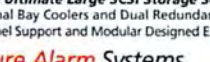
From: \$999



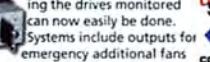
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Temperature Alarm Systems Temperature is the number one cause for drive failure. Keeping the drives monitored can now easily be done. Systems include outputs for emergency additional fans and computer notification.



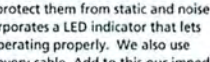
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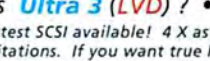
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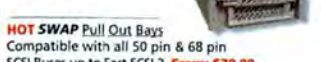


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ATX 5U Enclosure



ATX 6U Enclosure **From: \$1969**

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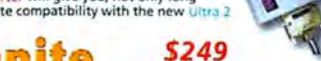


Ultra 3 (LVD)-TPO Internal Cables

- Benefits:**
- Less Errors, Ultimate Performance
 - TPO Shield Improves Signal Quality

Features:

- Perfect 132 Ohm Impedance • Custom in 1 Day
- Triple Pronged Connector - Gold contacts Silver Wire

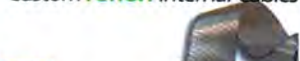


From: \$39

68 Pin Internal LVD Cables, custom or stock, from 1 to 15 SCSI devices per cable. The perfect cable for LVD. We usually take just 1 to 2 days to process all orders, including custom cables!

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Custom Teflon™ Internal Cables



- Benefits:**
- Less Errors, Ultimate Performance
 - Silver Wire Improves Signal Quality

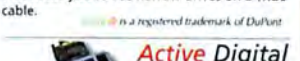
Features:

- Perfect 90 Ohm Impedance • Custom in 1 Day
- Triple Pronged Connector - Gold contacts Silver Wire



From: \$39

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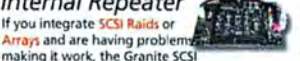


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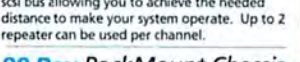
- Benefits:**
- Models for all SCSI types
 - Fixes SCSI Cable Problems
 - Doubles Cable Length (up to 18')

Features:

- Active Termination and Signal Purification
- Ultra Fast Performance for Added Capabilities
- Diagnostic Capabilities • 30u" Gold Contacts



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ATX 4U Enclosure

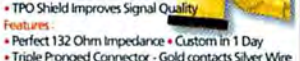


ATX 5U Enclosure



ATX 6U Enclosure **From: \$1969**

Our complete line of RackMount Enclosures also includes monitor, keyboard, and mouse compartment.

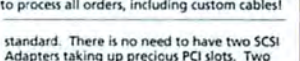


Ultra 3 (LVD)-TPO Internal Cables

- Benefits:**
- Less Errors, Ultimate Performance
 - TPO Shield Improves Signal Quality

Features:

- Perfect 132 Ohm Impedance • Custom in 1 Day
- Triple Pronged Connector - Gold contacts Silver Wire



From: \$39

68 Pin Internal LVD Cables, custom or stock, from 1 to 15 SCSI devices per cable. The perfect cable for LVD. We usually take just 1 to 2 days to process all orders, including custom cables!

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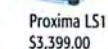
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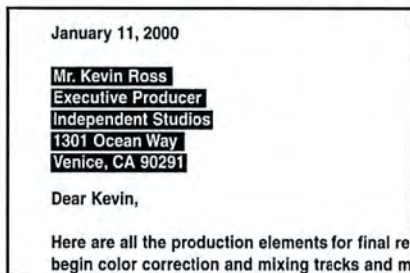
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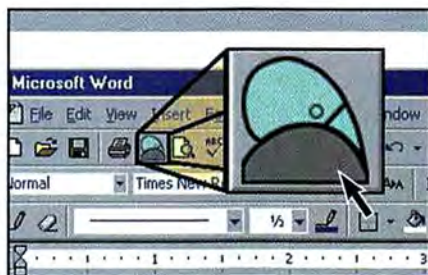
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Cut the Cable? We're Almost Able

WHEN YOUR HOME OFFICE has three phone lines and a cable modem, people tend to think you're a wired kind of person. But recently another side of me has emerged from years of frustration: When you get right down to it, I'm really a wireless kind of guy.

I've always been a big proponent of the TV remote control; just ask my long-suffering wife. I walk around the house with my cord-

less phone. I was the first on my block—maybe even my state—to regularly use the infrared port on a notebook computer. I even bought the first decent Web-enabled cell phone I could lay my hands on—Sprint's little Sanyo SCP-4000.

But the more wireless I get, the more wireless I realize I could be—if the many glitches that plague the unwired world ever get solved. Here are the things I'm hoping for:

Better coverage: No matter which network you're on, you'll find annoying coverage gaps—particularly when you're indoors. But even under the open skies, there can be problems. On one block near my home in Seattle, you can count on losing your cell phone signal—no matter whose service you use. Coverage maps tell only part of the story.

The big problem with wireless phones in this country, of course, is the fragmentation of service into incompatible systems. Unless you get special multimode phones, none of them work with one another, so AT&T's digital phones are useless on Sprint's network, and vice versa. This coverage situation may change when new networks roll out and the standards converge.

Better speed: Once you're used to even a dial-up modem, the speed of wireless systems—usually no more than 14.4 kilobits per second—seems glacial. Metricom has long promised higher speeds for its Ricochet system, but it still crawls along at about 28.8 kbps in the few areas where it's available. Cellular providers are promising "3G" (third generation) speed improvements of 384 kbps and up; they can't arrive soon enough for me.



The more wireless
I get, the **more**
wireless I realize I
could be—if the
many **glitches** ever
get **solved**.

Better interfaces: When it comes to accessing data over the ether, cell phones start with two strikes against them: the screen and the keypad. I've tried newer phones with larger screens, like the NeoPoint and Qualcomm's Palm-based PdQ, but they're too big to be convenient. One solution may be a phone module that plugs into the Handspring Visor and takes advantage of its screen. So far, though, that's just a promise.

News on the input front is better. The T9 system from Tegic Communications, recently acquired by America Online, turns a phone keypad into a keyboard by making educated guesses about which of the possible letters you mean as you tap the number keys. The little e-mail and paging devices from Motorola and Research in Motion have keyboards that make a good case for typing with your thumbs. And the clever fold-up Palm keyboard is also promising.

Better prices: Wireless hardware and services are getting cheaper, but you have to look carefully at the pricing. Motorola's snappy PageWriter 2000X goes for a stiff \$400; and the monthly service fee of \$35 gets you just 14,000 characters of data, beyond which you pay about a penny a character. I could run up a bill for \$100 in a busy afternoon. Palm Computing offers a better deal for heavy users: an unlimited plan of \$45 a month for the \$450 Palm VII. There are also pretty good plans available for the various RIM pagers.

But even the cheapest of those devices would seem redundant now that I have a wireless Web phone—if it weren't for the bill. Sprint charges about twice as much for data as for voice. That's at least twice as much as it should be.

New mini-nets: Once you begin to think wireless, you'll want to use the technology for local connections, too. Prices are dropping fast for products based on the 11-megabit 802.11 local area networking standard, making wireless home networks affordable for regular consumers. And the debuting Bluetooth standard promises cheap, reliable connections between devices like your cell phone, headset, and computer at speeds up to 721 kbps.

I won't be cutting all my cables soon. But cutting back on my consumption of plastic spaghetti is one diet I could live with.

PC World Contributing Editor Stephen Manes is the cohost of Digital Duo, a series appearing on public television stations nationwide. For program information, see www.digitalduo.com. ■



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