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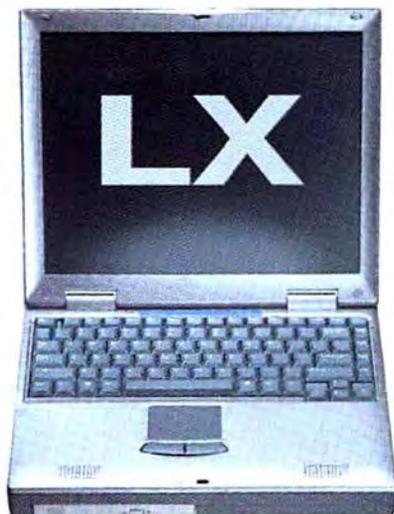
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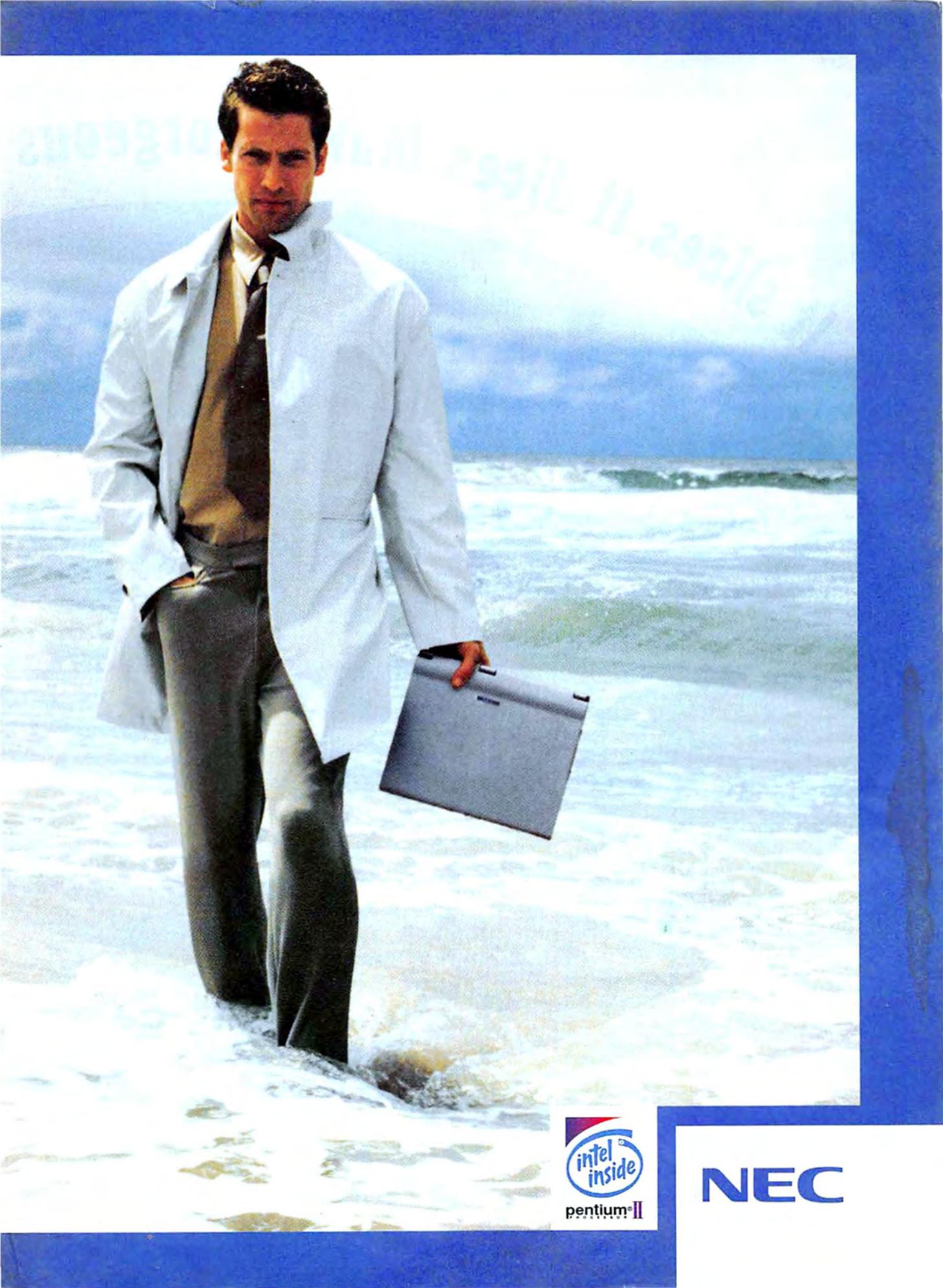
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Annual Report

Matrox Graphics
1997-1998 of

Matrox Graphics
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to this year

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Diamond FireGL 1000 Pro 8MB AGP	549

*Estimated Street Price. All tests were performed without independent verification by Ziff-Davis. Ziff-Davis makes no representations or warranties as to the result of the tests. WinBench, 3D WinBench and WinMark are trademarks of Ziff-Davis Inc. in the US and other countries. All tests performed on a Dell Dimension XPS R400 configured with a 400MHz Pentium II and 64MB of RAM. WinBench 98 Business run at 1280x1024x24bpp@75Hz. Matrox Millennium G200 configured with 8MB of SGRAM for the AGP bus and using driver revision 4.00. Diamond FireGL 1000 Pro configured with 8MB of SGRAM for the AGP bus and using driver revision 4.10.01.2348. ATI Xpert@Work was configured with 8MB of SGRAM for the AGP bus and using driver revision 4.10.01.2312.

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COVER STORY

100 WINDOWS 98:

MAKING THE UPGRADE WORK

HOW-TO Thinking of stepping up to Windows 98? Check out our upgrade guide to Microsoft's latest. We'll show you how to reclaim valuable disk space, cut your clicks in half, get updates of your favorite Web pages, and even schedule automated system maintenance while you snooze.

Plus: Did Windows 98 fly or flop on our performance tests? See *Top of the News*.

FEATURES

124 THE NEW MEGASITES

TRENDS All-in-one supersites are luring consumers with free e-mail, search tools, online stores, chat, news, and more. Only some of them are worth your time. We rate eight "portals" to the Internet—from AltaVista to Yahoo—and predict where these rapidly evolving sites are headed.

146 WHIZ-BANG GRAPHICS:

TOP AGP AND PCI BOARDS

REVIEW You don't always need the newest technology to get state-of-the-art performance. Take AGP graphics cards. Tests turned up lightning-fast boards, but the results on some dynamite PCI cards prove you don't need AGP to get top-flight business or game graphics.

171 WHAT'S WRONG WITH THIS PICTURE?

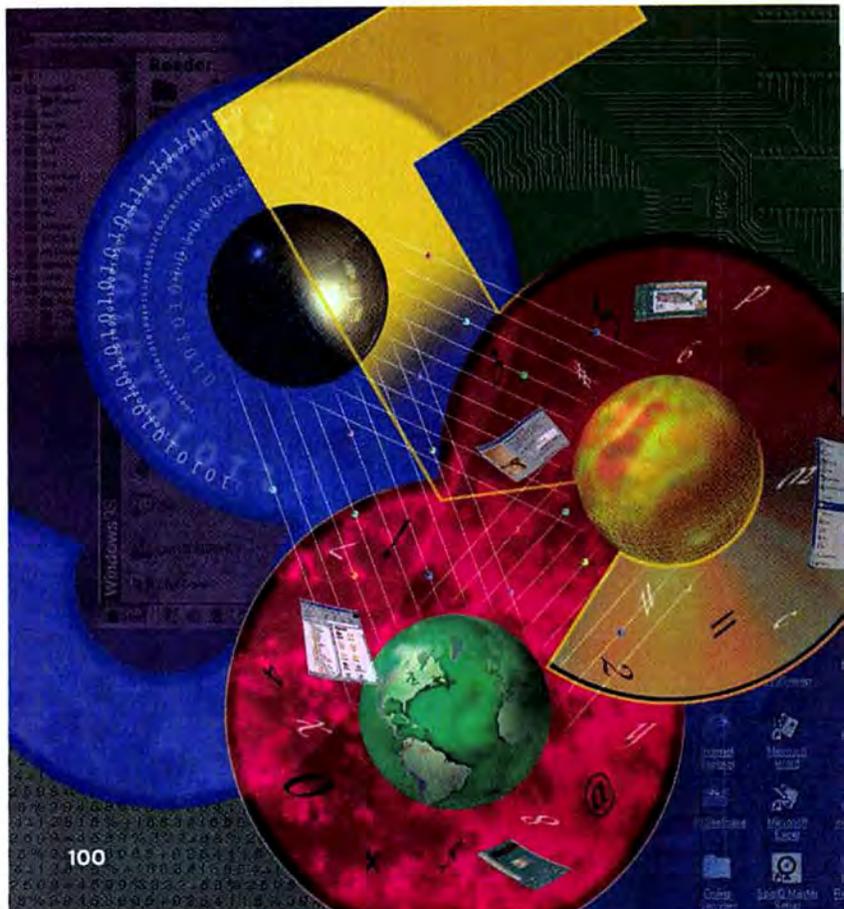
REVIEW The Jetsons had all the bugs worked out on videoconferencing; today's users aren't so lucky. We installed six PC videoconferencing kits to find out which ones deliver acceptable still and moving pictures.



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Additional material available on PC World Online: www.pcworld.com



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SPECIAL REPORT

SMALL OFFICE/HOME OFFICE

191 MAKE THE WEB DO THE WORK



Who's got time to get a business license, nab a loan, buy office supplies, or take care of other pressing small-business minutiae? You do, with the Web's help.

Plus: Our hot picks for the home office include a \$249 scanner/fax/copier, a service that lets you respond to e-mail without a notebook or PDA, and more.

COVER Digital composition by Nick Fain

TOP OF THE NEWS

54 AMD GOES 3D WITH A SPEEDY PENTIUM II COMPETITOR

PCs sporting AMD's K6-2 chips and 3DNow technology are as fast on business apps as Pentium IIs, for at least \$250 less. But lackluster graphics performance and a dearth of 3DNow software mean the jury is still out.

58 NOTES 5, FINALLY!

Lotus Notes 5 addresses old problems with its e-mail and collaboration tools.

60 NEED SPEED? WIN 98 DISAPPOINTS

A speed demon it's not: Your PC will probably take a bit longer to start up and shut down after your upgrade.

66 DVD REWRITABLE DRIVES: DON'T BUY

Drives are available, but incompatible standards could make early purchases obsolete.

70 XML PROMISES SMARTER SURFING

XML should make Web searching more efficient but needs time and industry support.

72 ROOM SERVICE? GET ME THE WEB

Hotels with loaded PCs and Web access.

NEW PRODUCTS

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80 Print Office 1.0, The Print Shop 6.0 Deluxe; Epson Stylus Photo 700 and Stylus Photo EX

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TOP 100

205 MMX LIVES ON: GOOD-BYE DESKTOPS, HELLO NOTEBOOKS

TOP 100 The Pentium II may have eclipsed MMX technology on the desktop, but well-priced, energy-efficient notebooks are giving the old chip a second wind. A prime example is Gateway's \$1749 Solo 2300 SE, our budget Best Buy.

208 POWER DESKTOPS

TOP 20 Pentium II-400 and -350 systems crowd the chart, with sprinters from Dell, Gateway, and Micron. They're joined by Sys Technology's Performance Pro 400BA, the fastest Windows NT PC we've tested.

218 BUDGET DESKTOPS

TOP 20 Bargain hunters are in for a treat after price drops on selected Pentium II-300s and -333s. Case in point: Best Buy Quantex QP6/300 SM-4X, \$300 off at \$2149.

228 NOTEBOOKS

TOP 10 Micron's new GoBook has a double-layer battery design for long-lasting power. Just expect a few compromises.

232 HOME PCS

TOP 10 This month's PCs come in two flavors: fully loaded screamers like Dell's new \$3199 Dimension XPS R400 and dirt-cheap slowpokes like Micro X's \$1499 Celeron-based MPD 8010.

235 PERSONAL PRINTERS

TOP 10 The latest must-have feature: photo-quality reproduction. Epson's \$279 Stylus Photo 700 (and others) have it.

239 19-INCH MONITORS

TOP 10 Best Buys from Iiyama and Cornerstone hang on despite a challenge from the color-rich NEC E900.

243 GRAPHICS BOARDS

TOP 10 The new Diamond Stealth II G460, a great all-around performer, debuts as our AGP chart-topper.

245 EXTERNAL, PC CARD MODEMS

TOP 10 Boca's fast 56K Tidalwave scoots up the chart while Archtek's bargain-price SmartLink 5634TS dives in at sixth.



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@HOME

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Driving a hard bargain: shopping for a car on the Internet.

250 KEEPING UP

Web sites and services for consumers.

252 HOME OFFICE

 Steve Bass builds the perfect PC for a mere \$10,000.



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PCW ONLINE

AOL 4.0: YOU'VE GOT TIPS!

HOW-TO Get lots of tips and tricks to make the most of AOL's newest software. www.pcworld.com/aug98/aol

BUDDY, CAN YOU SPARE ME A CHAT?

HOW-TO Do you like the Instant Message and Buddy List features in AOL but not much else? Here are several Web-based options that do the same thing—for free. www.pcworld.com/aug98/im

THE MILLENNIUM MENACE

NEWS Keep up with all the latest on the so-called Year-2000 Bug by visiting a special section in PC World Today. www.pcworld.com/news/year2000

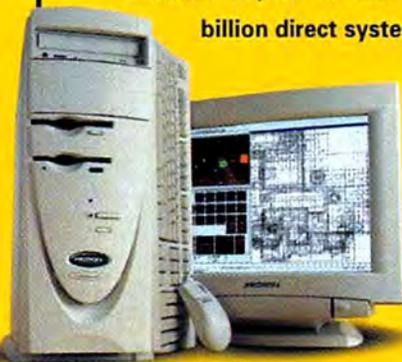
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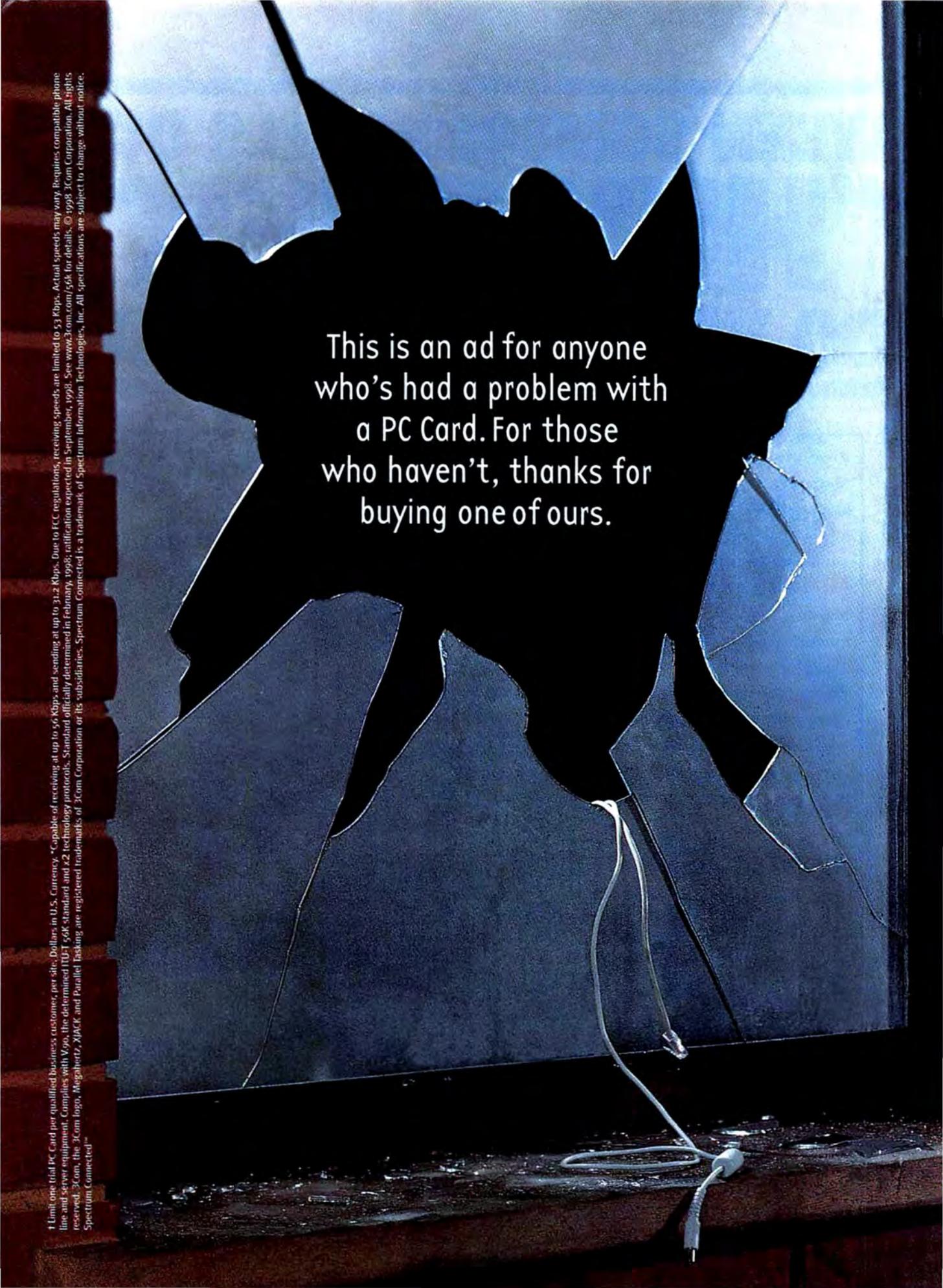


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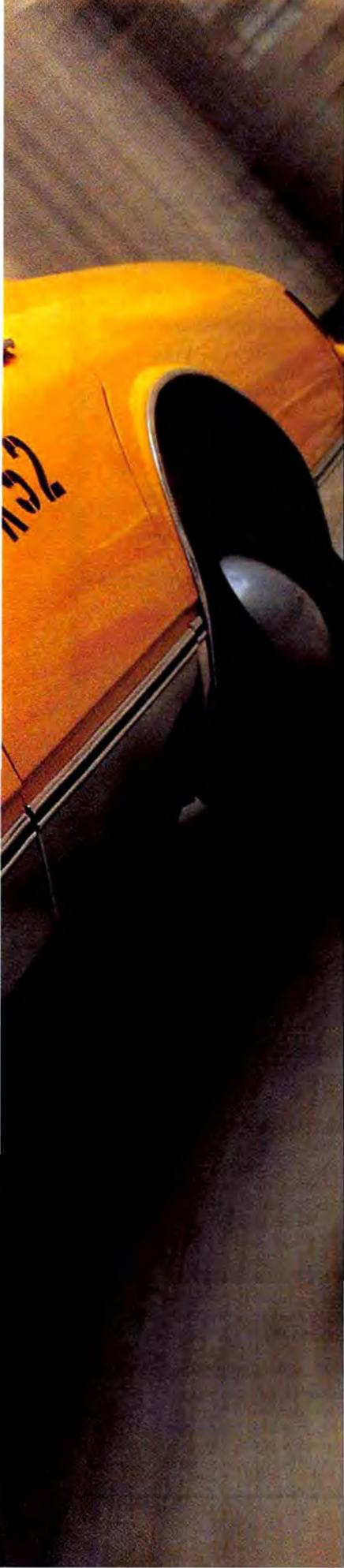
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Buy Intel, Buy Microsoft, Sell Babies

EACH NEW REVELATION about Intel's and Microsoft's hardball tactics seems more shocking than the last. Many practices come down simply to, "Give in or we'll take away the product you need to stay in business." Whether the product is CPUs or Windows, other companies must knuckle under. Even mighty Compaq appears to be a two-time loser. It had to hand over its system board patents to

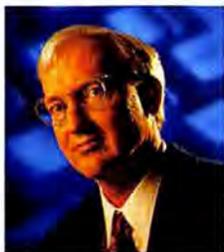
Intel or lose access to Intel processors, and to change its browser plans to avoid cancellation of its contract for Windows 95. If even the biggest PC company has to capitulate, what of smaller companies whose interests clash with the monopolies in any way?

Fret no more. As it turns out, those of us who find monopolies and monopoly fiats distasteful are dead wrong. We dwell too much on quaint notions like justice, fairness, competition, and free enterprise. The very practices that make us cringe should make us cheer. We have failed to grasp fundamental changes in the American system. In short, we are sadly in need of remedial education.

OVERCOMING LEGAL DISABILITY

WE MUSTN'T FEEL GUILTY or stupid because we need remedial education. Our disabilities are clearly the fault of our parents and generations before them. For starters, they taught us to believe in the rule of law. In this naive state, we sometimes go back and read the antitrust laws when we're trying to understand the business news. Take the Sherman Act. Section 1 says: "Every contract, combination...or conspiracy, in restraint of trade...is...illegal." Section 2 says: "Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States...shall be deemed guilty of a felony...." Our miseducated minds scan the Sherman Act in vain for exceptions based on alleged efficiencies or consumer benefits from monopolies.

Our parents did us another disservice by bringing us up to believe in representative democracy. They even had us convinced that we live in one. Thus impaired, we think because the Sherman Act was passed by Congress and signed into law by the pres-



First, we must get a copy of the Sherman Act. Second, we must draw a line through every word of it.

ident of the United States that it has some meaning. We think the executive and judicial branches of government should recognize that restraining trade or monopolizing an industry violates antitrust law. We wonder why both branches ignore the fundamentals of the law. Why do they spend so much time looking for economic benefits in every monopoly, and for heroism in every restraint of trade?

What's to be done with people like us? Our re-education requires two steps. First, we must get a copy of the Sherman Act. Second, we must draw a line through every word of it. It's easy if we download the Act, select it all, and change the type style to strikethrough. This will bring us into compliance with the great minds of the American judiciary, the Department of Justice, and the Federal Trade Commission. After special training in economics (sometimes during expensive junkets funded by private interests) many of them scotched the Sherman Act long ago.

COMPLETING OUR REHAB

INTEL AND MICROSOFT are doing exactly as they should under the circumstances. But we must not think the new era of antitrust law is good only for giants like them. Its theoretical foundation supports new opportunities for everyone, even those just emerging from rehab. Take the views of Chief Judge Richard A. Posner of the 7th Circuit Court of Appeals, brilliant author of *Economic Analysis of Law*. His cohorts have trained a generation of federal judges. Judge Posner has been quoted as saying fairness and justice are "terms which have no content." What more could we want in a judge?

Concern for the welfare of children, you say? The learned judge has that in spades. He has argued for legalizing trade in human babies.

After all, "willingness to pay is a generally reliable...index of value, and the parents who value a child the most are likely to give it the most care...." Now and then a buyer may resell a baby for medical experimentation, but economic analysis is unlikely to find fault with anything that boosts the revenues of a growth industry such as trafficking in human beings. Think of the synergies with biotech!

With proper analysis, you'll probably find that *your* children belong to anyone who outbids you. Oh, you might be too stupid to sell. But once you consider economic efficiency and wealth maximization, it will be bye-bye kids, hello wealth.

Call me sentimental, but I plan to hang on to my kids. Above all, I plan to stay out of court.

Phil Lemmons is editorial director of PC World. ■



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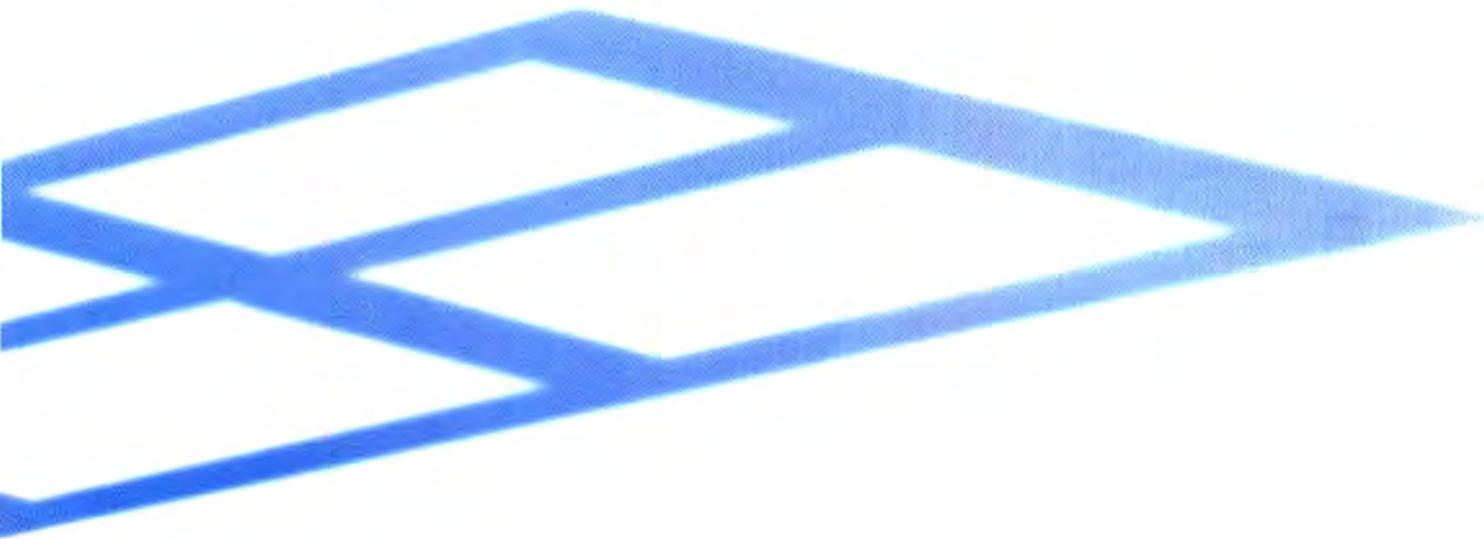
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YOUR TAKE ON: Consumers vs. software ♦ Tree-saving spam ♦ Internet speedup

ISP RATE HIKES: PRO AND CON

PC WORLD REPORTED getting many letters complaining about IBM Internet Connection's rate increases [*Letters and Just In*, April]. In my opinion, the move by some Internet service providers to limit fixed-fee access to 100 hours a month is a great idea.

I can't imagine anyone having any serious use for more than 3 hours a day online. People who just connect and stay on or who are addicted to chat rooms and online games

make access for the rest of us more difficult. If rate increases or online charges send many such users to another service, that will make things better for me.

Rodney McFarland, Bay City, Michigan

THOUGH MY AVERAGE usage is less than 50 hours per month, in one recent period

it was far heavier than normal. Because IBM Internet Connection had raised its rates, I constantly worried about the time I was using. As it turned out, I went 20 hours over my 100-hour limit, resulting in an extra charge of \$40 for that month, on top of the regular \$20. In other words, the additional 20 percent of time resulted in an extra charge of 200 percent.

Bob Heiges
Internet



I WONDER when that ISP price war you reported will get to us out here ["AOL Rate

Hike Ignites Internet Service Price War," *Top of the News*, May]. My ISP charges \$25 a month for unlimited access! I live in a small town of 10,000, and I guess everyone thinks only city people are worthy of these price reductions. I also own a WebTV (which my ISP won't support) that I access through my ISP's lines at an additional \$9.95 a month from WebTV, so I

pay \$35 a month for unlimited access. I have searched for cheaper ISPs, but it's always the same: not in my area code, goofy deals like MCI's customers-only thing, and disagreeable service choices from AT&T. I just want unlimited access for \$19.95 a month like everyone else. I am sick and tired of my ISP's runaround.

Leslie Slay, Graham, Texas

CRASHING WINDOWS

IN THE HOT BUTTON section of May *Letters*, a reader announces that her computer, which receives constant use running Windows 95, has not once crashed in two years of operation. I find such testimony more than just slightly hard to believe. Where I work, we have about 20 machines running Windows 95 and one running Windows NT 4.0. All of them—including our NT server—have crashed numerous times over the last year, and the computer I use has crashed three times in the last two days. All operating systems crash, and Windows 95 crashes frequently—it's that simple.

But further doubt is cast on incredibly ▶

HOT BUTTON

Microsoft and the Marketplace: Trust, Mistrust, or Antitrust?

YOUR EDITORIAL ABOUT Microsoft and its monopoly on application programming interfaces ["Flattery Will Get You Bad Publicity," *Up Front*, June] says Microsoft changes the APIs to discourage competition. However, I'm sure it also does so to speed up the computer and respond to innovation on the hardware side. And while putting API standards in the hands of some central body fair to everyone would be nice in a perfect world, I doubt it would solve much here.

Have you tried to make a compatible Web page lately? An international body governs HTML [a standard for the displaying of Web pages]. But it can't move fast enough for the major players. Microsoft and Netscape now have different standards in their browsers.

Ditto with the 56-kbps standard for modems: two camps and one governing body. We have waited a year or more for a standard because the two sides couldn't get

together. For what? At best, a meager increase in speed? What's going to happen when ADSL, cable, and all the other high-speed solutions become widespread?

Let's be practical. Within the law, ensure that Microsoft is playing fair. But let it innovate as needed to bring us useful products. Let IBM, Corel, Netscape, Novell, even Apple, get together, make a viable operating system, put out software products that use it, and compete. Until then, give consumers a break and back off.

Donald Beck, Maumelle, Arkansas

DEAR MICROSOFT: Like many loyal customers, I have growing concerns about where you are going. You became successful because you provided products that consumers like myself continued to purchase. Yet you persist in acting like a small, immature start-up company that is

always fearful of the competition. Through the years you have used many competitive practices that are very questionable. That is what the federal and state lawsuits are about. You need to remember that those lawsuits also represent the interests of your customers. I do not think you understand that you are sowing the seeds of your own destruction with your behavior.

If you reach a rapid and equitable settlement of the antitrust suits—a settlement that promotes increased competition in the computer industry—you will start on a needed new direction, one that projects a new corporate personality of humility, generosity, and increased respect for legitimate consumer concerns. You need to get back to the task of providing better products that fulfill customers' needs!

Jerry C. Lefever
Golden Valley, Minnesota



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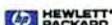
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favorable Windows reviews as a result of the recent news—noted in June's *Up Front*—that Microsoft had plans for a secret and unethical campaign of letters to magazines and newspapers from supposedly regular people to support the company and its products. Whether or not such a campaign exists, it certainly seems to be Microsoft's style.

Mike Stephens
Redwood City, California

DOWNHILL UPGRADE

NOT ALL PRODUCT upgrades are improvements, a lesson I am learning the hard way. Quicken 98 eliminated the Savings Goals feature mentioned in your May *Answer Line* column. This was one of my favorite budgeting tools, helping me set aside money for estimated taxes, vacations, and large purchases.

Quicken 98 also requires an ISP before you can pay bills by electronic funds transfer, something it never required before, and not mentioned in any of the sales literature—you find out only after the software has been installed.

Now Intuit is pushing everyone to upgrade by not making earlier Quicken versions year 2000 compliant. As a Quicken user since 1991, I am very disappointed.

Tom Flournoy III, Atlanta, Georgia

Editor's response: According to an Intuit spokesperson, (1) Savings Goals is not included in Quicken Basic, but it is available in the Deluxe, Home & Business, and Suite versions of Quicken 98; and (2) for electronic funds transfers, Intuit offers free access to an ISP for a limited time each month. The company spokesperson couldn't comment on year 2000 compliancy, since a lawsuit has been filed against the company over this issue.

SOFTWARE HEARTBURN

I DON'T KNOW IF I'M the only one, but I've had my worst blood pressure spikes sitting in front of a computer. They typically come during asthma season, when I've had to hit the inhaler repeatedly, and when I'm dealing with buggy, squirrely software. Once, when my CPU chip went bad in the middle of a project and I tried to install Windows NT, I got chest pains.

My blood pressure soared again last week as I was trying to write a scientific

report using Microsoft Word 97. No matter how I set the word wrap on the figures in text boxes, they kept sliding up over the text. I've had text and figures jump from page to page even when I've made only format changes that should have left things in place. This week, I've had entire sets of figures and equations disappear and reappear for no apparent reason other than changes in view-scale settings.

I've called Microsoft twice, spending over an hour at a time on toll calls with people who sound sympathetic, but who don't have solutions and don't call back. I honestly don't give a damn which removable icon appears on the front page of a new computer.

What burns me is spending hundreds of dollars on software—from any vendor—that doesn't work as advertised on even the most straightforward projects. I've had to throw away about half the software I buy because it's so full of gewgaws that it can't do simple jobs well.

How about somebody doing a study to

find out how many of us get sick or even die from the frustrations of dealing with bad software? It would be nice if once in a while the greedy makers had to recall their turkeys as a danger to public health.

Don Baker, Fayetteville, Arkansas

KILL BUGS WITH MONEY

MONTH AFTER MONTH I READ about software bugs and the frantic efforts of customers to keep up via patches, upgrades, bug reports and, as a last resort, lawsuits ["You May Lose Your Right to Sue," *Full Disclosure*, May]. Some consumers even pay to be beta testers, as with Windows 98. Now some companies are opening their source code to the public to let users find and fix the bugs.

Rather than arming ourselves with bug-killing weaponry, we should insist that hardware and software manufacturers do their jobs properly. They should beef up their quality assurance departments instead of relying on their paying customers. This change won't happen ▶

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until consumers take a stand: Don't buy buggy products till they've been through several revisions. Computer users are famous for their insatiable desire for computing power; it's about time they realized the supremacy of their purchasing power.

*Courtney Graff
Cambridge, Massachusetts*

STREETWISE, LOCATION FOOLISH

ONE CRITERION missing from your review of map software ["Streetwise," May] is the map's accuracy.

In my experience with Microsoft Expedia Streets 98, things are often not located where the map says they are. In the Washington, D.C., area, I've found key subway stops mislabeled or missing, street names misspelled, and buildings on the wrong side of the street or intersection. The house my parents live in has mysteriously moved after 25 years. Feedback to Microsoft goes unacknowledged and unincorporated via patches or updates.

Sure, the interface and usability are important; but in the end, if the map isn't accurate, it hasn't served its purpose.

Mike Jones, Germantown, Maryland

WOW!

TO STEVE BASS: I read with some skepticism your article on changing the Windows Registry MaxMTU entry to speed up Internet throughput by as much as two or three times, thinking you were probably overstating the benefit of this trick ["Unclog Your Net Access for Fast Relief," @Home Office, June].

I've just made the change and it's amazing! By cranking up the power of my modem, you justified the price of my subscription with your article alone.

Congratulations! Your suggestion is the best computer tip I've seen in any magazine in the last few years.

Steve Mussey, Fredericksburg, Virginia

SEND A SPAM, SPARE A TREE

I AM ONE OF THOSE horrible people who use spam e-mail to promote their business. Most closed-minded people dislike receiving junk e-mail or spam mail because it overloads servers and fills up their inbox. These selfish people obviously don't

see the whole picture. Every day my snail mail is full of junk mail from supermarkets, local shops, drug stores, and so on.

Does anyone realize how many trees are cut down per year to make the paper for this junk mail? Or the amount and types of chemicals that are released into the environment to process the trees into paper?

I welcome spam mail for the environmental benefits alone. It takes no resources to create, doesn't clog a landfill when thrown away, and takes minutes to review.

Jeff Kalvin, Granada Hills, California

ONLINE INVESTING: A SAFE BET?

THE ARTICLE IN the May 1998 issue of *PC World* about online investing was useful. Perhaps the most important question about online investing is this: How can I be sure that an online broker is legitimate? How can I feel safe sending a large check to such a firm? The reference sites you list (www.onlineinvestors.com and www.gomezadvisors.com) may provide some help in researching brokers. With-

out doing such research, one could well become a victim of a scam artist who puts up a Web site claiming to be a broker, collects and cashes a few days' worth of checks, and then skips out.

Ed Fogle, San Antonio, Texas

BLAMING THE VICTOR

BEYOND THE HYPE and the PR, the government's antitrust suit against Microsoft boils down to the government trying to punish Bill Gates for being a smart businessman. Yes, Windows is the operating system shipped on most PCs. That doesn't mean consumers must use it. They can switch to OS/2 or UNIX. Nor does bundling Internet Explorer into Windows 98 mean consumers have to use IE. They are free to choose Netscape's or any other browser.

You also have to chalk up part of Microsoft's market share to consumer laziness. You can't blame Bill Gates if the people buying his products don't look at competitors' offerings. Gates is in the business of selling Microsoft operating systems and soft- ▶

Or should you go

to Windows



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ware. It's IBM's responsibility to try to sell you OS/2, not Gates's.

I am particularly distressed at the suggestion that the Windows API be made an open architecture. Following this logic, give me the recipe for Famous Amos cookies and let me market the same product under my own brand name. Bill Gates legally developed and patented the Windows API. The patent laws are in place to protect businesses from having their products stolen. Whether you love him or hate him, Mr. Gates deserves the same legal protections that every other businessperson in this country enjoys.

Andy Rutberg, Lovelock, Nevada

MORE HEAT OVER REPAIR TESTS

I BELIEVE THAT Tracy Miller ["Cross Fire," *Letters*, June] was mistaken in asserting that, once tested, IDE cables don't go bad. Cables do go bad. Period. Anything with electric current will eventually be destroyed, whether it's an IDE cable or a telephone cord.

I am not an A+ certified computer repair specialist, but a 16-year-old high school student who would like to enter computer programming or repair as a career. I am offended that someone with Miller's experience would make such brash and nearly unprovable claims. When a customer brings in a PC with a problem, you should check out every possibility, inside and out.

Robert Jacowski, Plover, Wisconsin

MY HAT IS OFF TO the Einsteins who managed to correct your sabotaged equipment ["PC Repair Rip-Off!" April], though I

would have asked if you had been playing around inside your electronic marvel. All in all, this article was poorly thought out and inflammatory. Give technical repair people a break—we are sorely underpaid and seldom appreciated.

Stephen R. Lopez, Birmingham, Alabama

MAXIMUS REDUX

A FOOTNOTE TO June's *PCW Advocate* item on Maximus Computers: I bought my first PC (a 486) back in 1995 from Maximus—mainly because of the price. But from the word go, Maximus gave me nothing but headaches.

An order I placed didn't arrive on time, and I couldn't get a person on the phone to explain why. I got so angry that I drove from my place of work in Santa Monica (a grueling drive in the Southern California heat on the packed freeways) to the Maximus facilities in Irwindale, only to find out that my PC hadn't even been built yet, though it was days after the promised ship date—and I was local! I had to wait for

hours, while employees ignored phones, chatted, and smoked cigarettes before finally putting the system together.

A month later the math coprocessor failed. Then my machine had bad sectors on the hard drive. But it wasn't until I moved to Washington, D.C.—toting my computer along—that I learned how bad things really were. I had paid for 8MB of RAM, but when I installed Windows 95 I found out I had been given only 4MB.

I wish I'd known about *PCW Advocate* then. My old Maximus is now in parts, distributed to folks who needed them after I wised up and built my own machine. I'm extremely happy to see that not only did the Better Business Bureau catch up with this company, but your magazine removed its PCs from the Top 20 charts. Bravo. Justice is served.

Rick Scully, Washington, D.C.

PC World welcomes your responses, ideas, and other letters to the editor. See page 14 for contact information. ■

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CORRECTIONS AND CLARIFICATIONS

CLARIFICATION: In June's "Windows Utilities: Rx for Your PC," we stated that Norton Utilities Speed Disk has no status bar. In fact, it does have a status bar, but it shows its progress only on each part of the defragmenting process, rather than for the entire job start to finish, as we would have preferred.

Clarification: In June's *Windows Tips*, the icons for the items "Recover Deleted Files" and "Better Ways to Your Desktop" should have indicated that the material applied to both Windows 95 and Windows 98, not just to the latter.

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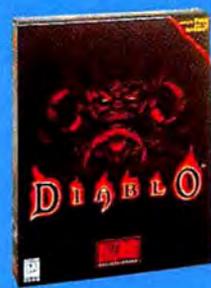
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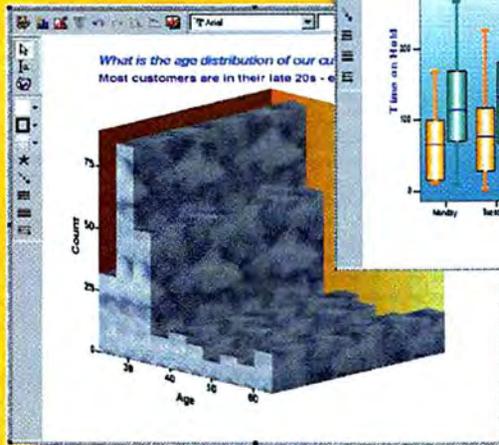
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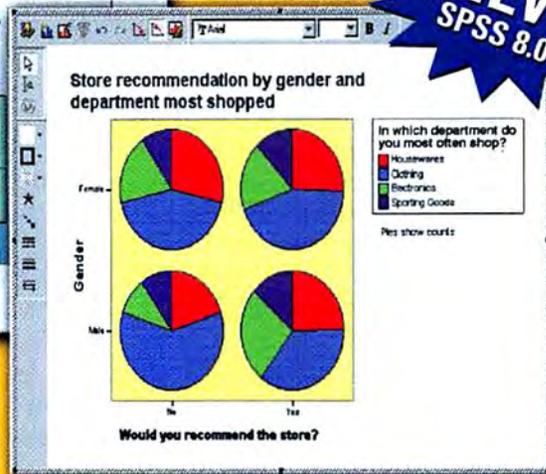
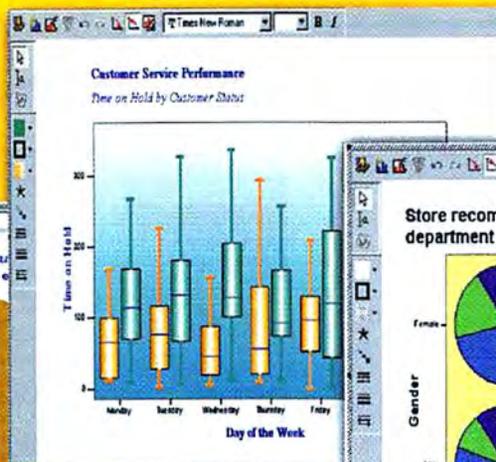
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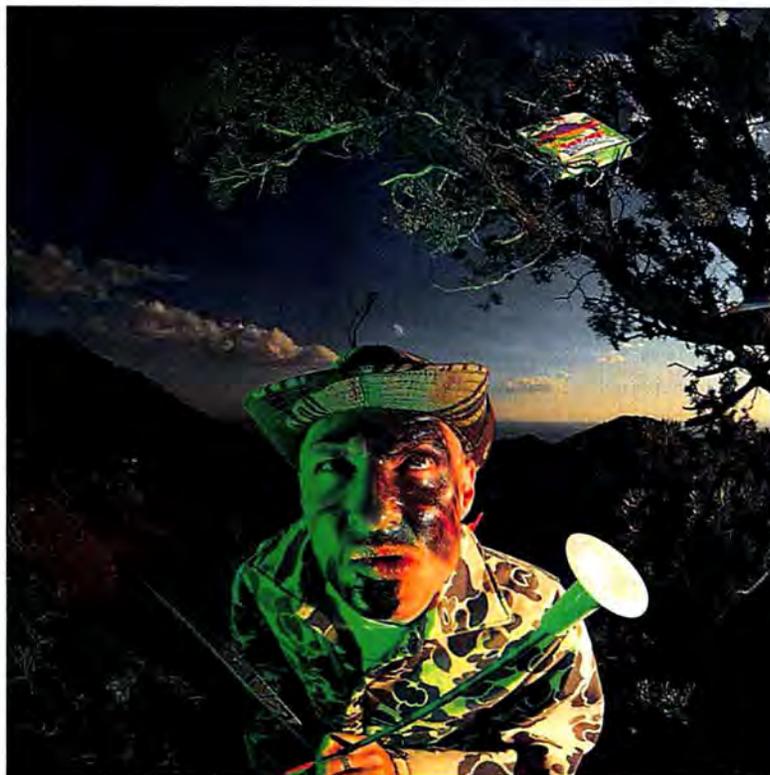
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The Great Software Hunt

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HAVE YOU SHOPPED FOR software lately? I have, and let me tell you, it's not pretty. The stores are jam-packed with freestanding displays (don't even think about trying to maneuver through them with a shopping cart), merchandise is poorly organized, and the largely untrained salespeople might just as well be working at the In-N-Out Burger next door.

If you're looking for anything but the newest or best-selling games or productivity applications, you may want to save yourself the trip.

Consider my latest exercise in frustration: My kids came home a few weeks ago raving about a CD-ROM game called Backyard Base-

ball from Humongous Entertainment (of Putt-Putt and Freddi Fish fame). We're not exactly hurting for computer games at our house, but after a few weeks of their begging, I gave in and agreed to buy it. There was just one problem: We couldn't find it. Not at CompUSA, not at Target, not at Costco. It took half a dozen calls before I finally located it at a Computer City nearly 20 miles away.

As it turns out, my experience wasn't unique. Sure, the computer superstores are seemingly chock-full of inventory. CompUSA, for example, boasts that it stocks thousands of titles at a time. But don't be deceived by all the boxes blocking the aisles. Unless you're willing to rummage through the bargain bins, all you're likely to find are the latest "A" titles from the major publishers, along with a few perennial best-sellers.

"Usually about 20 percent of a software publisher's active titles are on the shelf at any time," says Jeffrey Tarter, publisher of *Softletter*, a semi-monthly newsletter covering the software industry. "If a customer goes to a store looking for one of the other 80 percent of the titles, they're in trouble." Of course, blockbusters like *Myst* can be found just about anywhere, even years after their initial release. But aside from such anomalies, even the biggest publishers find themselves fighting to keep most of their titles on the shelves.

COMP U-RENT-A-SPACE

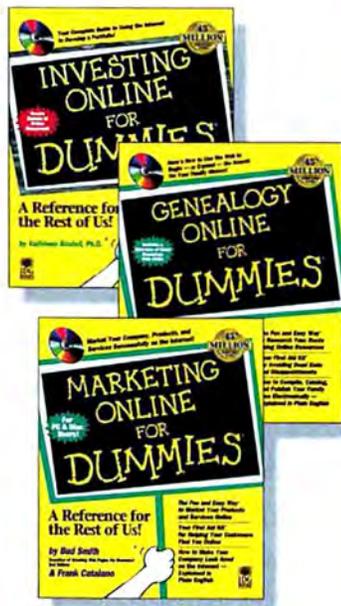
JUST AS CEREAL or detergent manufacturers pay premiums for eye-level shelf space in your local grocery store, software publishers are now paying big bucks to secure choice spots in your local computer superstore.

You don't have to look hard to see the effects of this recently booming business: IBM's end-of-aisle display (or "end-cap") tantalizes shoppers with ViaVoice Gold; Inoculan's crammed display pushes its new antivirus program; and there's no missing Quarterdeck's floor display at CompUSA, which takes up three-quarters of an aisle with bright yellow and red boxes of the company's many utilities. Nowhere is the rent-a-space system more obvious than in the educational software sections of many large retailers, where just about all the major players (Disney, Edmark, The Learning Company, Microsoft, and so on) have purchased space to display their latest offerings.

For consumers, the value of this trend is dubious at best. Comparison shopping becomes ▶



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a time-consuming hassle when your options are spread across different displays. Take the case of antivirus software at my local superstore: IBM, Inoculan, Quarterdeck, and Symantec each have their own end-cap or floor display, but there's no one place to compare all the programs, since the store's utilities section doesn't have all of the antivirus software.

DIAL 'S' FOR SOFTWARE

SLOWLY BUT SURELY, the failure of the retail channel is driving both software publishers and consumers to the Web. In fact, last spring Egghead announced it was closing down its retail operations and moving its software sales online. And many software publishers' sites now let customers purchase not only their current hits but many of their older titles.

If comparison shopping is what you're after, cruise by one of the many independent online software stores (see "Buy It Online"), many of which stock thousands of titles. The prices are usually competitive with retail stores and, except for back-ordered items, products are shipped within a few days. Want a title even faster? Increasingly, online sites are making it possible for users to immediately download a copy of selected titles.

Besides being able to use the software right away, customers who download save on shipping charges and typically aren't required to pay sales tax. But they do have to pay extra for any documentation not included in the download.

Return policies vary by site. Some merchants, such as PC Connection, permit software returns only when the product comes with a money-back guarantee from the publisher. Software.net and MicroWarehouse, on the other hand, accept returns of unopened software up to 30 days after purchase. And both Cyberian Outpost and Software.net allow refunds on their downloadable software (customers must, of course, delete the software from their systems).

Right now, online software sales represent only a small percentage of all software purchases, but that's changing. The local superstore may still be your best bet when you need a hot title right away ▶

COMING UP
IN SEPTEMBER

SPECIAL ISSUE: PRIVACY

The Web makes it easier for anyone to find out about you and your business. From stolen social security numbers to hacked financial data, here's how you're at risk—and what to do about it.

YOU'RE FOR SALE

Your information is brokered by everyone from businesses to the federal government. What does the buying and selling of your privacy mean to you?

IS SHOPPING ONLINE SAFE?

Countless businesses sell on the Web, but safety concerns keep many consumers offline. Is Web shopping riskier than giving a clerk your credit card?

KEEPING SECRETS

Ready to take your life back? We show you how to foil e-mail snoops, spammers, password hackers, and more.

PRODUCTS THAT PROTECT

You don't need the CIA to protect you from prying eyes. We unlock the best personal and corporate security software to help keep all your data safe.

BUSINESSES BEWARE

The hype: marauding hackers are waiting for a chance to ransack your network. But the real danger is often as close as the office next door.

ALSO NEXT MONTH

- ▶ **Top 100:** Power and budget desktops, notebooks, and home PCs, plus printers, monitors, graphics boards, modems.
- ▶ **Here's How:** *Windows Tips* on fixing year-2000 bugs in File Manager, *Hardware Tips* on monitor tweaks, *Upgrade Guide* on installing a tape backup drive.



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CONSUMER WATCH

and can't (or don't want to) download it. Otherwise, though, why not save the gas and skip the hassles by ordering online?

*Have you shopped for software lately? Share your stories and shopping tips by e-mailing consumerwatch@pcworld.com. Roberta Furger is a PC World contributing editor. Her book, *Does Jane Compute? Preserving Our Daughters' Place in the Cyber Revolution*, is available from Warner Books.* ■

BUY IT ONLINE

WHETHER YOU KNOW EXACTLY WHAT you want or just want to browse, you can find competitively priced software online. Check out these sites for easy shopping.

- **Computer Discount Warehouse** (www.cdw.com): This mail-order house turned Internet merchant has a respectable selection of both business and home software, including older titles and early versions of still-popular programs. You can search for programs by category, such as office suites, desktop publishing, games, and so on.
- **Cyberian Outpost** (www.outpost.com): The Outpost's selection can't be beat—more than 120,000 products, including an outstanding collection of children's games and difficult-to-find business productivity titles.
- **The Edutainment Catalog** (www.edutainco.com): This excellent source for home entertainment and productivity software offers many older programs in addition to the latest hits.
- **MicroWarehouse** (www.microwarehouse.com): Besides the standard fare of current home and business programs, this site features a wide selection of education titles, as well as older versions of many popular business applications.
- **PC Connection** (www.pcconnection.com): Less common business titles abound, but children's products are limited to the newer releases.
- **Software.net** (www.software.net): You can search more than 30,000 software titles for both home and business by product name, category, or publisher. Many of the programs can be either downloaded or shipped.

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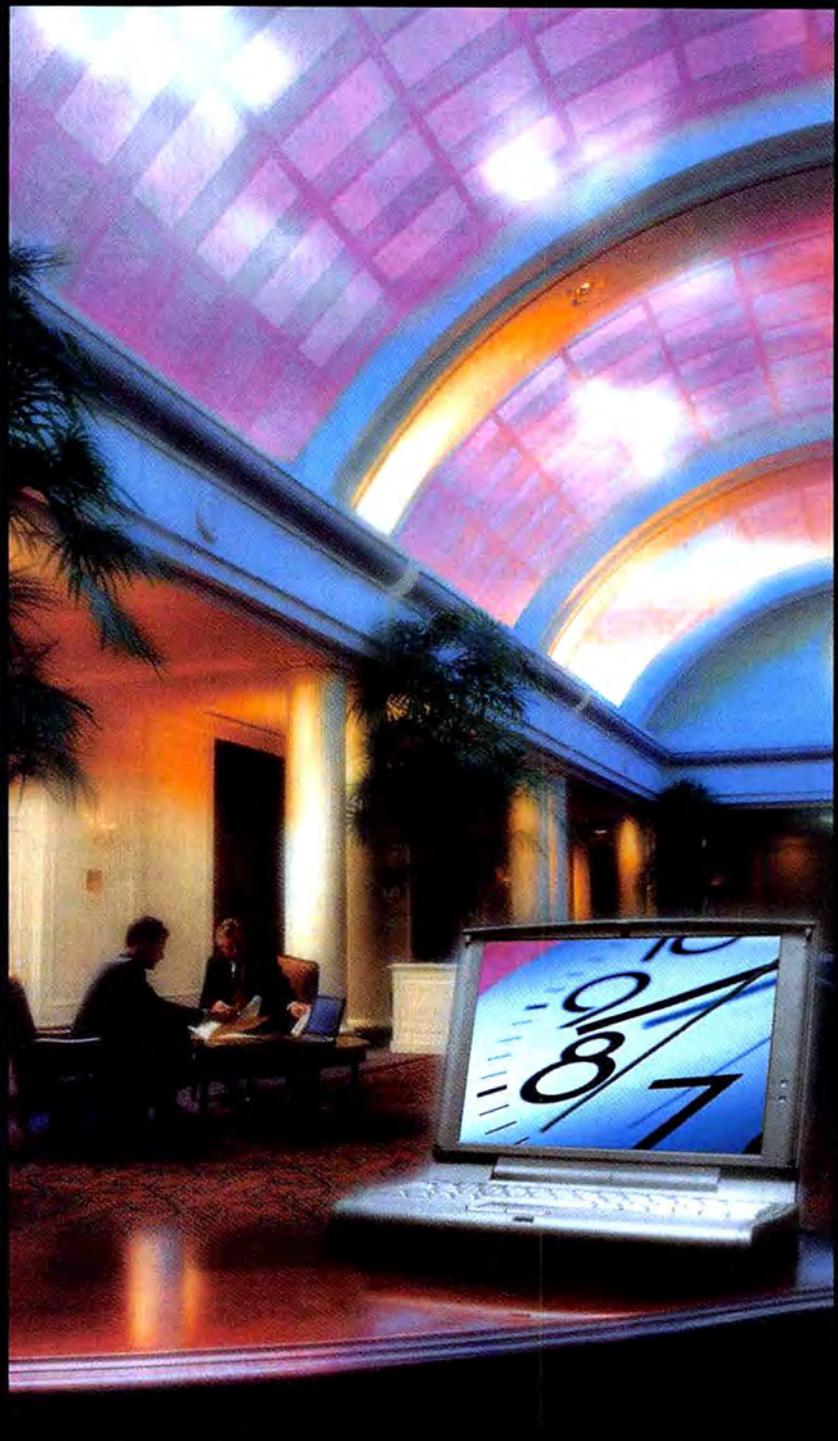
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GO CONFIGURE.

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Reference the appropriate order code to receive featured configuration and pricing.



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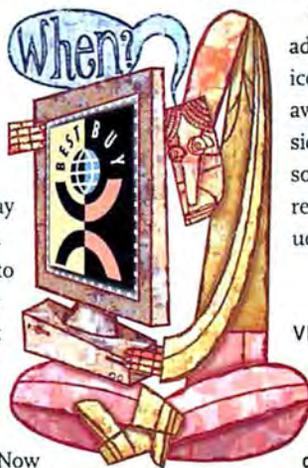


WE HELP WITH: Bogus Best Buy ♦ AOL password theft ♦ Newsgroup scams

Tempest Best Buy Causes a Stir

WHEN BOB SEBELIST of Waterford, Maine, saw a *PC World* Best Buy icon in a print ad for a Tempest Micro Giga Media system, he picked up the telephone and placed his order. But the unit came with a Cyrix processor instead of the Intel Pentium he'd ordered. When Sebelist attempted to return the PC, Tempest insisted that he pay a 15 percent restocking fee.

Furious, Sebelist wrote to me about that alluring Best Buy icon. In fact, the last time any Tempest PC won a Best Buy was in June 1996 for its Pentium 100-based Giga Media P5-100. Now the company is advertising a whole new line of Giga Media systems (up to Pentium II-400s), and Tempest is still trying to claim that old Best Buy. *PC World's* guidelines require that the date of the Best Buy award accompany our Best Buy logo. The



Tempest Micro ad in question does not include a date. Despite more than a dozen attempts to contact the company, Tempest Micro was unavailable for comment.

So, the next time you see an ad with a *PC World* Best Buy icon, check for the date of the award. If no date is given, consider the claim suspect and do some more research. You can read reviews of specific products at www.pcworld.com.

Hacked AOL Account

VICTOR HEIMUR OF Rutherford, New Jersey, couldn't log on to America Online recently, so he called the company to find out what was up. It turned out that AOL had canceled his membership because illicit activities had been traced to his account. Apparently, hackers had stolen his password. Upset that he was being punished for the hacking activities, Heimur wrote to me. Trish Primrose of AOL says the company had to cancel

the account. "It's to protect our subscribers, not punish them," she says. That doesn't mean Heimur is banned from AOL. He simply has to start a new account. Primrose contacted him to straighten everything out.

Primrose suggests some simple ways you can protect yourself from hackers on any online service. Never open e-mail attachments from someone you don't know; use an alphanumeric password (throw a couple of numbers in with the letters); no known decoder can break a password like that, says Primrose. And if your children use your account, set up separate screen names, and store your kids' passwords so they don't need to know them to log in.

Scam Alert: Newsgroup Ads

YOU PROBABLY KNOW to be cautious when buying over the Internet: Buy from a company you're familiar with, pay with a credit card over a secure connection, and research the company as thoroughly as possible before you buy. But what if you want to buy a temptingly cheap PC through newsgroup classifieds? You're taking more of a gamble.

According to Susan Grant, director of the National Fraud Information Center and Internet Fraud Watch Programs at the National Consumers League, "If you buy over the Internet and have a problem, you're probably dealing with someone far away—probably in another legal jurisdiction." That makes it nearly impossible to track down and sue the culprit.

Grant also points out a second, less widely recognized hazard of falling prey to small-change scams: You might earn a spot on a "suckers list" and be exposed to solicitations for big-ticket swindles. If you don't get your goods, report the scammer to www.fraud.org, or call Internet Fraud Watch at 800/876-7060.

GOTTEN A RAW DEAL?

Or a great one? Send PCW Advocate the details at advocate@pcworld.com. We'll investigate complaints and publish items of the broadest interest. Christina Wood is a contributing editor for *PC World*. ■

THE FINE PRINT

NET CONNECTION: 800 NUMBERS WILL COST YOU

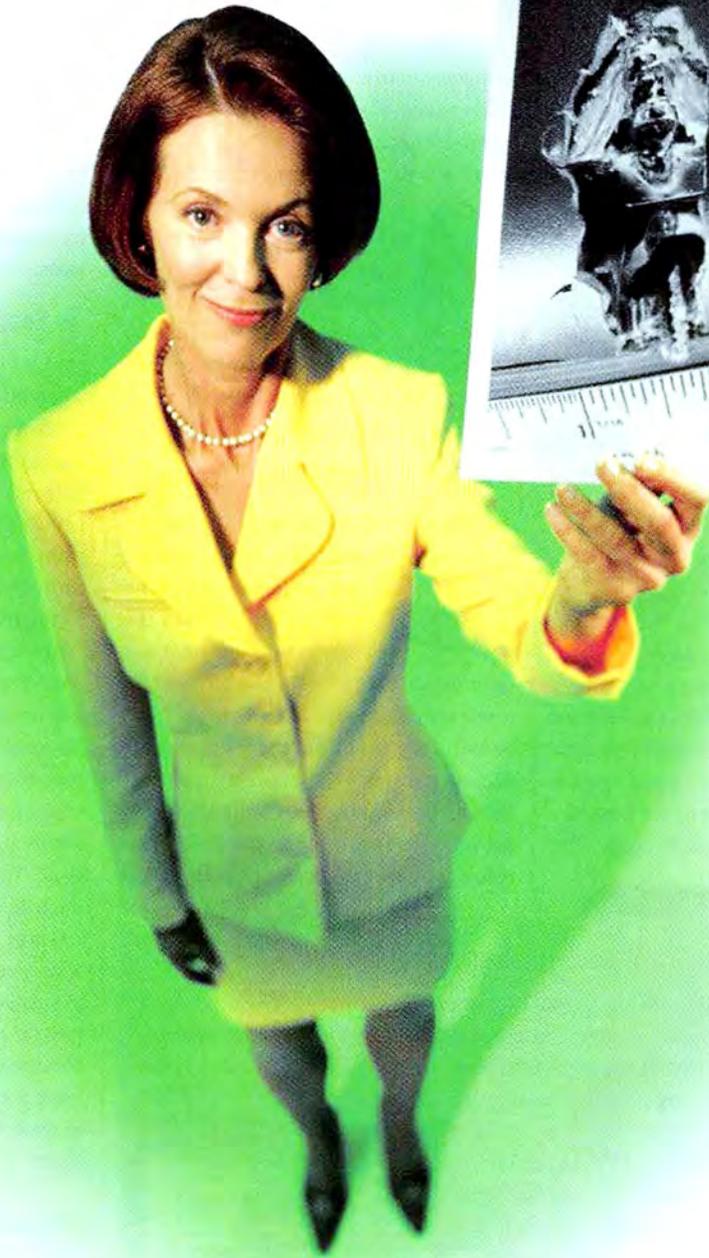


EVERYONE KNOWS that dialing an 800 number means you won't be charged a dime, right? But when it comes to online services, don't make that assumption. Connecting to your online service via an 800 number is actually pretty expensive. For instance, take CompuServe's rates, which are shown here. Calling an 800 number costs \$6 per hour. Charges vary by Internet service provider (roughly \$5 to \$8 and up), so check your ISP's rates. Connections through an 800 number might make sense if your only other choice is to call a more costly long-distance number (most phone companies charge at least 10 cents per minute). But if you're traveling, it's probably worthwhile to dig up a local access number rather than rely on the easier but more expensive 800 number.

COUNTRY	SURCHARGE
United States	\$ 6/hour
Canada	\$12/hour

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STORY #158:

The Bullet Hole

IMAGINE you're sitting at your desk, minding your own business (which happens to be VP of sales for a toy manufacturer) when one of your guys comes back from the daily battlefield with a casualty. A Fujitsu LifeBook™ notebook, ripped clean through with anything but a plaything from your factory.



[*"A slug had pierced the LifeBook's case."*]

The screen and the pointer were shot, but just for fun you hook the system up to an external monitor and mouse. Push the "on" button. And raise your eyebrows. The LifeBook notebook had taken a hit, but luckily, no vital organs were damaged and it was still running. Of course, this sort of target practice doesn't happen every day. But we do put LifeBook notebooks through our own type of "warfare"; we call it our QA process. Heat, cold and drop tests. And then we open and close select hinges thousands of times.

[*"If I don't buy reliable notebooks, the next bullet's for me,"*]



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might be the words you live by. We live by them, too. Built to withstand the daily grind of mobile computing, our notebooks deliver the leading-edge performance, human features, technical support and cost advantages you demand. Because it's not all fun and games out

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Performance.

Consider the time you spend staring at a computer monitor... you'll want the highest performing monitor in your price range. Impression monitors give you the clearest, and most vivid images available. That's because Impression's advanced image-enhancing circuitry produce pinpoint electron accuracy for crisp images and text. Do away with distortion. Impression's ultra-high refresh rates produce flicker-free images that virtually eliminate eye-strain and eye-fatigue.

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Our manufacturing facilities are ISO certified. That means we meet or exceed the world's strictest international quality assurance standards. And if that's not enough, your monitor investment is protected with a 3 year warranty on parts, labor and CRT. Impression also offers an industry-leading 5-year limited warranty on the reliable Plus series from 14" to 17" sizes. We've been in the monitor business since 1989, and we plan to stick with our customers for a long time. To support your needs, Impression offers 24 hours-7 days a week technical support. Can't afford any down-time? Impression guarantees defective monitor replacement within 48 hours.*

Value.

Impression monitors offer serious quality and features you'd expect from a more expensive brand. Features like micro-processor-based digital on-screen controls, MPRII low radiation compliance, and EPA energy-saving functions. And, we incorporate award-winning CRT technologies into our monitors like Hitachi's Hi-Contrast, Toshiba's Microfilter, and the ultra-vivid DiamondTron technology from Mitsubishi. Whatever your business application may be, Impression is your affordable display solution. So if you're buying a new computer, or upgrading to a larger screen size, insist on performance, reliability, and value from your computer dealer or manufacturer. Insist on the Impression standards. Call 1800-800-6328 x252 for the nearest reseller.

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VIEWABLE AREA	18.0"	16.1"	16.0"
H-SCAN (KHZ)	24.96	24.96	30-96
MAX RESOLUTION	1600x1200	1600x1200	1600x1200
OPTIMUM RESOLUTION	1280x1024 @ 85 Hz	1024x768 @ 85 Hz	1024x768 @ 85 Hz

MODEL	TVXL	TV	5VXL
CRT	17" MICROFILTER	17" S-MASK	15" S-MASK
DOT PITCH (MM)	0.26	0.27	0.28
VIEWABLE AREA	16.0"	16.0"	13.8"
H-SCAN (KHZ)	30-70	30-70	30-70
MAX RESOLUTION	1280x1024	1280x1024	1280x1024
OPTIMUM RESOLUTION	1024x768 @ 75Hz	1024x768 @ 75 Hz	1024x768 @ 75 Hz



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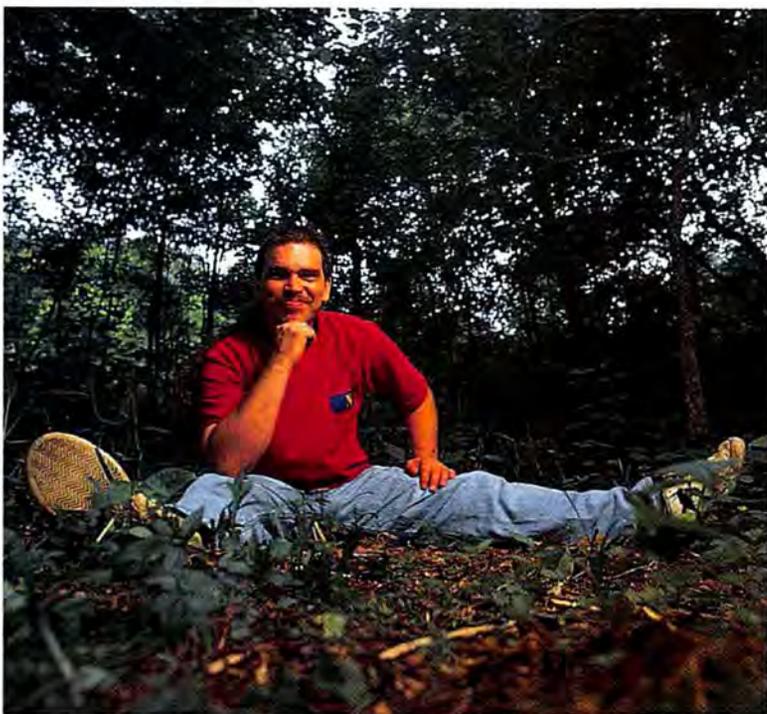
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Giving America Online the Heave-Ho

PROBLEM AOL's service doesn't justify its new, higher prices, so you want to upgrade to a real ISP.

SOLUTION Don't shut down immediately. First find a new ISP, then take the best of AOL with you.



RICK WILLIS IS FED UP with America Online. But it wasn't always that way. The 35-year-old systems designer from Cross Lanes, West Virginia, had sampled several online services before settling on AOL last year. Soon he was hooked on AOL's exclusive content and its Net access. "The chat rooms really hypnotized me," Willis says.

Then he began to encounter some of AOL's less mesmerizing peculiarities: "Trying to connect anytime between 6 and 11 at night, I ran into problems. One time, the lines were busy for three hours. Once I got on, the Internet access was so slow. Juveniles were always

pestering me with Instant Messages, and my mailbox was always full of spam. It was a pain."

The last straw came in April, when AOL raised its rates from \$19.95 a month to \$21.95. "I kept reading Steve Case's messages about how they were going to improve the service," says Willis, "but I wasn't seeing any improvement. And then they said they'd have to raise their rates to make more improvements. That was it for me."

So Willis decided to find a new service provider. But first, he needed to figure out how to take the good stuff—like his address book and access to his favorite chat rooms—with him.

MOVIN' ON

AOL OFFERS ITS members (over 12 million people) a great way to explore the Net or visit chat rooms on every topic from raising aspidistras to finding zebra-striped upholstery (see *Consumer Watch*, June 1998). But it's had its share of problems, too. And while the service has taken several steps to reduce the busy signals, many users continue to be frustrated. Because you have to go through the AOL network before you get out onto the Net, your access to the Web and other Net resources is slower than when you use a more direct ISP connection.

So if, like Willis, you're ready to move on, you should know that making the transition doesn't have to be hard. In fact, there are ways to preserve some of AOL's finest traits.

First you have to find another ISP. To help the conversion go smoothly, make sure you locate a replacement ISP *before* cutting off AOL. Your new provider should come with a 30-day free trial period, so don't worry about paying for two services at the same time. For aid in figuring out what kind of service is right for you, see "ISPs You Can Count On" in our January issue.

After setting up your new ISP, make yourself at home. The first chore? Rebuilding your e-mail address book. Unfortunately, you can't export your AOL address book to a file your new e-mail package can read. Willis took the direct route: He retyped his addresses into his new e-mail utility.

If that sounds too laborious, or if you have too many addresses to reenter, consider broadcasting a message to everyone in your AOL address book, telling them your new e-mail address and when it will be activated, and requesting that they send you a message once your new account goes live. Most e-mail programs let you automatically add anyone who sent you a message to your address book. You'll probably have to ▶

correct a few addresses and add details like full names and phone numbers, but at least you'll have a head start on the project. One national ISP that's actively courting disenfranchised AOL subscribers—EarthLink Network—offers an automated tool for composing individual change-of-e-mail-address letters to family and friends (see www.earthlink.net/quitaol/aolmail.html).

What if you've decided to jump to another ISP but don't want to give up particular features of AOL? You have a couple of options. If you're hooked on Instant Messaging, AOL will let you download software that brings this feature—the virtual equivalent of poking your head in the door and shouting, "Howdy, neighbor!"—to the entire Net. Like the AOL-only version, the IM software lets you create a "Buddy List" of friends, family members, and colleagues who also use Instant Messaging. Whenever your buddies log on to the Net or AOL, IM alerts you and lets you send them messages.

To get started, go to www.aol.com/aim/home.html, register as a user, and download the Instant Messaging software. After installing it, set up your Buddy List by adding your friends' IM screen names. Next time you go online, start up IM and you're ready to communicate.

If, like Willis, you love AOL's chat rooms, you can still access them without setting up a full-blown AOL account. For \$9.95 a month, the Bring Your Own Access plan will give you all of AOL's proprietary content, but not the Net access. Type keyword **byoa** to find out more about the plan.

Willis might like that option. "I do miss the chat rooms. I had a lot of friends up there," he says. But don't expect him to switch back to AOL anytime soon.

Dan Miller is a senior editor for PC World. If you're having trouble resolving a PC-related hardware or software problem, we'd like to hear from you about it. See page 14 for contact information.

CUTTING THE CORD

ONCE YOU'VE DECIDED you're ready to graduate from America Online, you'll find that canceling your account is the easy part: Just call the company's customer service center (800/827-6364) and tell the service rep to terminate your service, while resisting all offers of more free time. Next you have to remove AOL's software. Start with the usual routine: Use Windows 95's Add/Remove Programs utility (go to **Start>Settings>Control Panel** and double-click **Add/Remove Programs**). Then select **America Online**, click the **Add/Remove** button, then follow the instructions. But wait, there's more: Just to be safe, go back to Control Panel and double-click the **Network** icon. Make sure 'AOL Adapter' is not listed. If it is, select it and click the **Remove** button. Then select **TCP/IP>AOL Adapter**, and click **Remove** again. That should take care of any vestiges of AOL's software.

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Zip Plus, Buz bugs ♦ Outlook 98 snafu ♦ Compaq fools year 2000 tool

Zip, Buz, Splat! More Iomega Trouble

WITH ITS ZIP DRIVE click-and-die troubles barely behind it, Iomega has new product glitches and defects to contend with. First, the newer Zip Plus drive, which boasts the ability to connect to either a parallel or a SCSI port, may eat your data when connected to some SCSI bus configurations. Meanwhile, the company's popular Buz multimedia editing system turns out to be incompatible with quite a few computer systems and video boards; early models contain a defective chip; and that ain't all.

Zip Plus SCSI SNAFU In theory, you can connect the Zip Plus drive to your computer's high-speed SCSI bus. Though the packaging and documentation don't say so, you'd better not connect the drive using anything other than the included 25-pin AutoDetect cable. Don't use the drive in a daisy chain with other SCSI devices, or with SCSI cable adapters either. Otherwise, the company's Web site says, you'll "compromise the integrity of your data."

So if your SCSI controller has the common 50-pin (SCSI 2) connector, or you use a PC Card SCSI controller in your laptop, connecting the Zip Plus to the SCSI bus could scramble your data. And according to Iomega, no error message will alert you to the data corruption. Likewise, if you have another external SCSI drive or a scanner connected in a daisy chain, you'll have to connect the Zip Plus drive to the computer's slower parallel port instead.

Early Buz, Bad Cuts Initial versions of Iomega's Buz Multimedia Producer system that debuted this spring contain a faulty chip that can prevent your system from booting up. Iomega says only



a few early units contained the faulty chip, and it offers to replace your bad Buz for a good one (just call tech support).

That's not the only problem plaguing Buz buyers, however. A "known issues" page on the company's Web site lists many common systems and video boards Buz doesn't like, resulting in poor audio and video quality and even system lockups. Incompatible systems include all IBM Aptivas built before August 1997, Compaq's Presario 4850 and Deskpro XL 6150, Packard Bell's 869 CD and Platinum, Hewlett-Packard's Pavilion 7000 series and Vectra XA, and Gateway's P5-100. Iomega says Buz won't work at all with video boards based on the Cirrus Logic CL-GD5430 chip set, and remarks that "you may consider upgrading" boards based on the CL-GD5434, CL-GD5440, Trident 9440, Weitek P9001, Alliance Promotion, and ATI Mach64 chip sets.

The software that shipped with initial Buz boxes had problems, too. Video captured at 720 by 480 resolution displayed noticeable "jitter" during playback, and Buz couldn't capture SECAM-format (French) video signals, or still frames in RGB format. Appropriately, Windows 95's Device Manager reported the Buz driver version as "Beta Release 1." The 273KB Buz Drivers 1.2 update (<ftp://ftp.iomega.com/pub/buzupdat.exe>) rectifies all of these buglets. Be sure to read the important installation instructions first, at www.iomega.com/support/techs/buz/6040.html.

 Files from this article are available on PC World Online at www.pcworld.com/bugfix. Scott Spanbauer is a senior associate editor for PC World.

Outlook 98: Encryption Roulette

DO YOU RELIGIOUSLY use digital signatures and encryption in your e-mail? Me neither. Here's yet another reason to do without them: If you set Outlook 98's Digital ID security level to Medium, and then digitally sign an outgoing message, up pops a confirmation dialog box containing OK, Cancel, and Details buttons. To send the encrypted or signed message, you must click OK. But what if you change your mind and don't want to send the message? Don't click Cancel—instead of canceling message delivery, it sends the message without the digital signature. And if the message was encrypted, clicking Cancel sends the message with encryption—same as clicking OK. Microsoft says it will make the dialog box behave more logically in the next release of Outlook.

I N B R I E F

Compaq BIOS Breaks NSTL Millennium Bug Test

IF YOU USE YMARK2000 from National Software Testing Laboratories' Web site (www.nstl.com/downloads/y2000.exe) to test your Compaq PCs for year 2000 compatibility, you may have fewer problems than you think. The program behaves erratically or freezes during the Leap Year testing phase on non-MMX Pentium DeskPro 4000s and 6000s equipped with the G5 BIOS ROM (revision 97.12.23 or later). The freeze-ups don't mean the systems will behave improperly in the new millennium, though. According to Compaq, increasing the BIOS's I/O delay time to 2600 nanoseconds solves the problem. To make the change, press <F10> during boot-up, select *Computer Setup*, then *Built-in Devices*, and finally *System Information*.

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TOP OF THE NEWS



AMD Goes 3D With a Speedy PII Competitor

Starting at \$1249, K6-2 systems offer solid value from 266 to 333 MHz. But will AMD's highly touted 3D graphics technology make a difference on your desktop?

◆ BY LAURIANNE MCLAUGHLIN



ADVANCED Micro Devices has craved your respect for ages. But occasional bad designs coupled with recent manufacturing mishaps have kept its chips out of savvy

range Pentium II desktops typically cost from \$1499 to more than \$2000, while the K6-2 systems we tested cost \$1249 and \$1633.

Still, AMD may not have hit a home run yet. It won't have a

Mercury Research. And PC vendors are showing greater willingness to use chips from Intel's rivals. Expect to see K6-2 machines from Acer, CTX, IBM, and others by July. Compaq will likely follow this fall.

We tested preproduction versions of CyberMax's \$1249 PowerMax 3D-266, equipped with the K6-2-266 chip, and Polywell's \$1633 Poly 3D/300AG, running on the K6-2-300 chip. We also tested an AMD reference system built around the K6-2-333 chip. The K6-2 systems ran business apps at almost exactly the same performance levels as midrange Pentium II PCs and Cyrix-based systems.

The 266-MHz CyberMax earned a PC WorldBench 98 score of 148, compared to a score of 151 for the average Pentium II-266 system. Like a PII-266 computer, a K6-2-266 machine has a 66-MHz motherboard and system bus. The CyberMax comes well stocked with a 17-inch monitor, 64MB of RAM, 512KB of L2 cache, a 5400-rpm 6.4GB hard drive, a 14X-32X CD-ROM drive, an STB Velocity 128 graphics card with 4MB of SGRAM, a 56-kbps modem, a PCI sound card, and speakers. Similarly configured Pentium II-266 models typically cost \$1499 or more.

CyberMax's 3D-266 looks even better next to an Intel Celeron-266 PC. The average PC WorldBench 98 score for Celeron-266 systems with 64MB of RAM is 114—about 30 percent slower than the CyberMax. And our reviewers have been unimpressed with the configura- ▶

JUST IN



Intel Faces Antitrust Suit

THE FEDERAL Trade Commission has slapped Intel with an antitrust suit, charging the company with stifling innovation and competition. But proving that Intel's alleged actions have hurt consumers may be tough. Pressure from competing chip makers, including Advanced Micro Devices and Cyrix, and enthusiasm for sub-\$1000 PCs is keeping the heat on Intel even without government intervention. By the end of the year, you'll see new chips from AMD and Centaur, while Intel slashes prices further on existing Pentium II chips and rolls out the PII-450.

New AOL Software

AMERICA ONLINE 4.0 sports a new user interface, new e-mail options, and—based on our experiences with beta software—better navigation. AOL 4.0 can automatically dial as many access numbers as you assign to it, reducing the chance of a busy signal. Users can create up to five screen names on a single account and switch names without logging off. And new navigation features, such as Forward and Back buttons on the toolbar, make flipping between Web sites and AOL channels a breeze. The final product is expected to be available by late summer. ▶

I N T E R N E T



GET UP-TO-THE-MINUTE NEWS, including RealAudio daily news summaries, hot game demos, the latest reviews, and productivity shareware, at PC World Online. Just point your browser to www.pcworld.com/news.



A BRACE OF K6-2s: CyberMax's PowerMax 3D-266 (left) and Polywell's Poly 3D/300AG.

400-MHz chip until late this year. By then, Intel will be shipping 450-MHz chips. Moreover, AMD has yet to prove the worth of its 3D instructions. Few applications enhanced for 3DNow were ready at press time, and the outlook for more is unclear.

GOOD PRICES

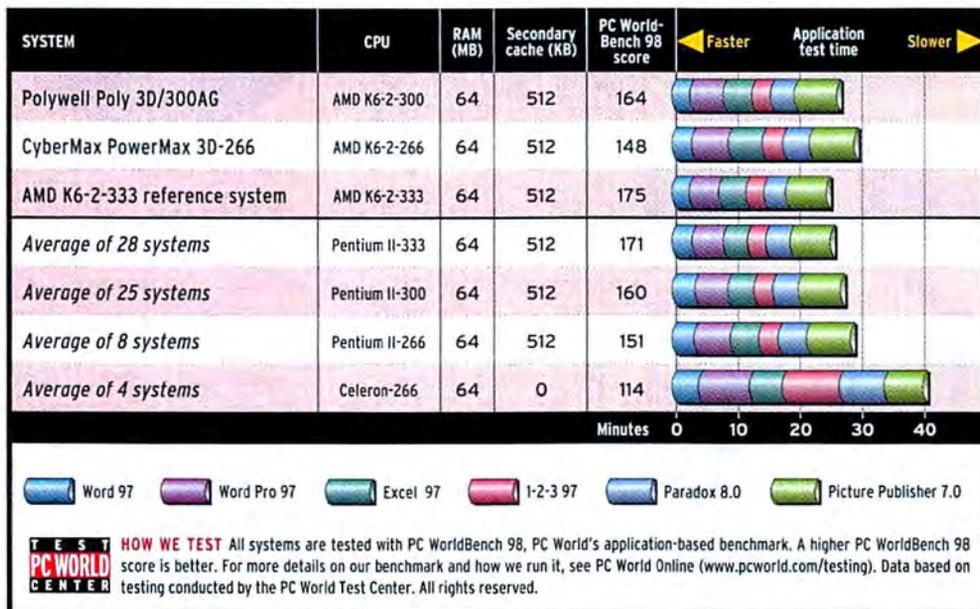
PREVIOUS K6 systems were scarce, largely because AMD could not produce its fastest chips in volume. But the company now makes a respectable 2.5 million chips per quarter, says analyst Mike Feibus of

users' PCs. Now the number two maker of microprocessors has a chance to stand tall, with a chip that has enhancements the Pentium II won't match for at least six months.

The K6-2, shipping now at 266 and 300 MHz (and later this summer at 333 MHz), keeps pace with Intel's PII on standard business applications and adds 3DNow, a set of 21 instructions designed to improve games and graphics-rich applications. Are K6-2 systems worth a serious look? Yes. Preproduction K6-2 systems we tested ran productivity apps as fast as similarly configured 266- and 300-MHz Pentium II machines—and cost at least \$250 less. Mid-

DESKTOP PCs: BUSINESS APPS TEST REPORT

K6-2 vs. Pentium II: Dead Heat on the Desktop



The 333-MHz AMD reference system, outfitted with 64MB of RAM and a 512KB L2 cache, earned a score of 175 on PC WorldBench 98, compared with an average score of 171 for Pentium II-333 systems. The reference system has a 95-MHz motherboard and system bus, an unusual setup that acts much like a 100-MHz board. CyberMax says that it has plans to offer a similar PowerMax system with the 333-MHz K6-2 chip sometime later this summer for about \$1399, at least \$200 less than you'd pay for a similar Pentium II-333 machine.

tion of the Celeron-based systems, which have no secondary cache (see our review in July's *New Products*).

Polywell's Poly 3D/300AG system posted a score of 164 on PC WorldBench 98—compared with an average score of

160 for PII-300 systems. Like other K6-2-300 machines, this PC has a 100-MHz motherboard and system bus. That's the same bus speed that Intel introduced in its 350- and 400-MHz Pentium IIs in April. The \$1633 Polywell comes with

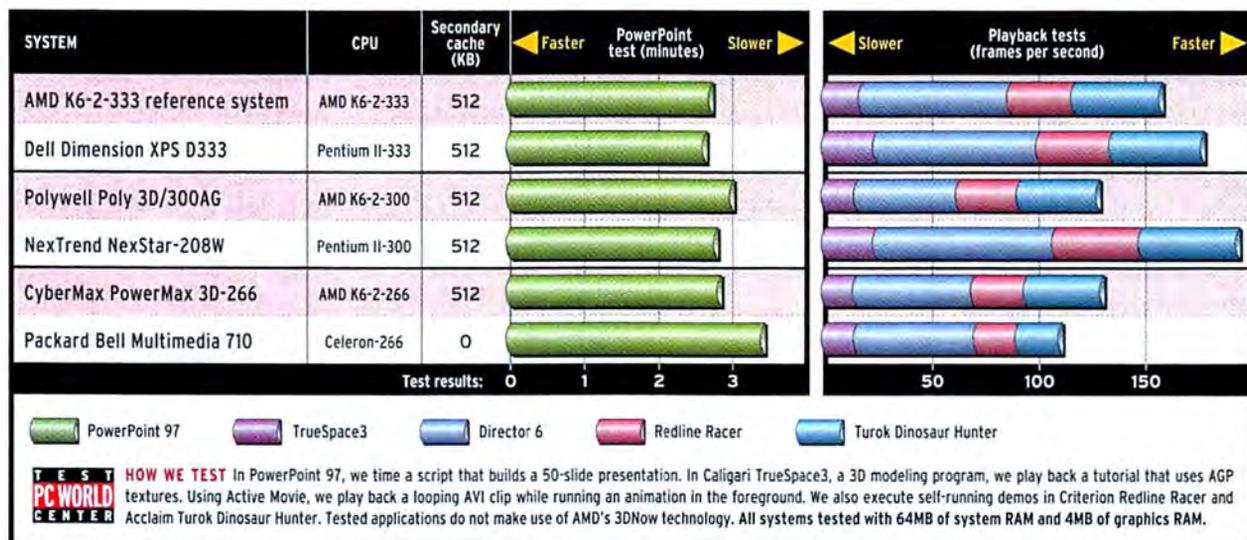
64MB of RAM, 512KB of L2 cache, a 17-inch monitor, a 7200-rpm 9.1GB hard drive, a 12X-32X CD-ROM drive, a Diamond Viper V330 graphics card with 4MB of SGRAM, a 56-kbps modem, a PCI sound card, and speakers.

GRAPHICS QUESTION

WE WOULD have been shocked if the K6-2 systems had not combined low price and good performance on business applications. The real question involves 3DNow.

DESKTOP PCs: GRAPHICS APPLICATIONS TEST REPORT

Early Returns: AMD's New Chip Lags in Graphics Performance



AMD says the K6-2's 3D performance is superior to that of today's Pentium II chips because of the 21 new CPU instructions for handling multimedia. Is it all hype? No. But the final score isn't in.

The new instructions, along with the K6-2's improved floating-point unit, are designed to speed up graphics-related tasks. To convert data points into 3D images, a system's CPU and graphics card work together. The CPU does complicated floating-point calculations (physics, geometry, and setting up perspective) and then passes the information to the graphics card to finish the rendering. The 3DNow instructions let the CPU do its work faster and get the data to the graphics card soon-

er, which is especially beneficial for work with complex Web pages, multimedia presentations, and 3D games.

To take full advantage of 3DNow, however, software developers must optimize applications to use the new instructions; this feature is called native support. But despite AMD's vows to excite the software community, only nine applications with native 3DNow support will likely ship by July, and eight of these are games. The single business application is ViewPoint Data Labs' LiveArt 98, which adds 3D effects to Word and PowerPoint documents.

Applications optimized for Microsoft's DirectX 6.0 should also benefit from 3DNow. (DirectX 6.0, a software layer between hardware and Win-

dows, was in beta form at press time. It will be bundled with graphics applications and games later this year.)

We first tested the K6-2 systems with our standard suite of graphics applications (which don't have native 3DNow support) and a beta version of DirectX 6.0. The results were not impressive. In most cases a PII-based system running at the same speed, with a comparable graphics subsystem, outperformed the K6-2.

We then tried out two applications optimized for 3DNow, both of which arrived



AMD vows to excite the software community, but only nine applications with native 3DNow support will likely ship by July.

too late to benchmark: beta versions of Rage's Incoming and Microsoft Baseball 3D. A PC World Test Center analyst played Incoming on the AMD K6-2-333 reference system and then on a Pentium II-333. Both PCs used graphics cards based on the same NVidia Riva chip set and had the same amount of graphics memory. Our analyst said that both machines afforded excellent graphics. Could he detect much difference between the two? No. "They appeared identical," he said.

Informed of the results of our testing, AMD engineers maintained that shipping versions of DirectX and its drivers will boost performance. They may well be right. Desktops can be sensitive to

slight variations in graphics drivers. But until DirectX 6.0 ships, we won't know if AMD has a point or just an excuse.

Also unclear is the extent to which developers are likely to embrace 3DNow. Analysts and software developers say AMD isn't making much headway. One factor that could help: Cyrix and Centaur plan to add 3DNow technology to their upcoming CPUs.

BUY OR HOLD?

THE BOTTOM LINE: If you have been shopping for a 266- to 333-MHz Pentium II system, a K6-2 system will save you at least \$250, perhaps even as much as \$400. But for true top-of-the-line business performance, the Pentium II-400 stands alone.

Keep a sharp eye on prices. Intel will surely lower the

tariff on Pentium II-266, -300 and -333 chips in order to protect its turf, thereby pushing computer prices even lower. AMD will roll out its K6-3 CPU at the end of the year. Regardless of whether the 3DNow technology becomes hot, the competition will remain at fever pitch. And that is welcome news for anyone who's in the market for a new machine. ▶

PowerMax 3D-266

\$1249; CyberMax Computer;
800/437-4596;
www.cybermaxpc.com

READER SERVICE NO. 741

Poly 3D/300AG

\$1633; Polywell Computers;
800/999-1278;
www.polywell.com

READER SERVICE NO. 742

Netscape Communicator 4.5

THIS SIGNIFICANT update to Communicator should be available as beta sometime in July, with a shipping version to follow in late fall. We saw many of the key improvements in a recent demonstration. With new support for AOL-style keywords, you can, for example, type **united** in the location box and be whisked to the United Airlines site. Or click the *What's Related* button to get a drop-down list of pages similar to the one you're looking at. Communicator 4.5 also offers a new three-pane e-mail window, improved filtering tools, more efficient handling of mail attachments, and easier addressing. Communicator 5 is expected to go into beta testing later this year (see *Top of the News*, July).



TidBytes

Antivirus Vendors to Merge: McAfee VirusScan and Dr Solomon's Anti-Virus Toolkit will be combined into a single product early in 1999. Dr Solomon's Anti-Virus Toolkit version 8 is expected to ship this fall as scheduled. Network Associates, which intends to buy Dr Solomon's, promises to provide continued support for owners of both packages. **Transfer Data Between PCs and Phones:** Bluetooth, a new technology that should debut in 1999, will enable notebooks, PDAs, and mobile phones to communicate without having to be within line of sight of each other, as they must with infrared technology.

Lotus Notes 5, Finally! A Face-Lift for Groupware's Granddaddy

PREVIEW

TIME MAY BE running out for e-mail software as we know it. Blame its demise on the emergence of integrated groupware programs like Lotus Notes, Microsoft Outlook 98, and Netscape's upcoming Communicator 5, which meld a browserlike interface with e-mail, scheduling, and basic file management. Until now, Notes—the product that pioneered this concept more than a decade ago—has been awkward to use. But all that may be about to change. The next version of Notes, Release 5, will feature an improved interface, designed to address navigation and usability issues.

Groupware packages let you perform multiple tasks without having to hop between dis-

parate applications. But Notes' proprietary interface has long flouted many Windows navigation conventions, creating

and more consistent with current Windows applications. Notes' core is its support for replicable, highly customiz-

Notes' New Navigation Features

To make Notes easier to use, Lotus added a variety of features. This screen shot is based on prerelease code and subject to modifications.

The screenshot shows the Lotus Notes 5 interface with several callout boxes:

- Customizable tabs let you group related bookmarks—like links to files and tools—into one view.** (Points to the Favorites sidebar)
- Browserlike navigation buttons let you go forward and back to view different pieces of information you've accessed from Notes.** (Points to the navigation buttons at the top of the browser window)
- Bookmarks provide access to documents, Web information, and Notes applications such as databases, calendars, and e-mail.** (Points to the Favorites sidebar)
- The Headlines feature provides a single customizable screen that shows updated news, calendar listings, important e-mail, data from Notes databases, and Web links.** (Points to the main content area)

undue confusion. The new Notes interface, which Lotus demonstrated for *PC World*, should make the product much easier to use

able databases; at press time, Lotus had not announced any changes to this technology.

Lotus plans to ship the upgrade late this year, and a beta version of R5 should be available as a download from the company's Web site by the time you read this. The final version will probably cost about the same as the current version, which sells for \$69 per user. Domino, the server-software component of Notes' groupware system, starts at \$1795.

Even if you're a newcomer to Notes or LAN-based e-mail, you may find that the revamped product deserves serious consideration. Like Outlook, Notes R5 can act as both a stand-alone Internet e-mail client and a personal information manager.

TAKING A PAGE FROM THE WEB

NOTES R5's interface borrows liberally from the Web. The first thing you see when you launch the application is Headlines, a Web-style at-a-glance tool that resembles Outlook 98's Outlook Today feature.

Buried by Paper? Novell's Next GroupWise Could Help

IF NEITHER Lotus Notes nor Microsoft Exchange meets your collaborative needs, you have other options. Netscape's Commu-



nicator is making strides as a groupware tool, and Novell isn't about to give up the enterprise turf it helped pioneer: The com-

pany's next upgrade to GroupWise (version 5.5, due out by the end of the year) boasts sophisticated document-sharing features, improved calendar tools, and the ability to collaborate seamlessly with any other GroupWise organization over the Internet.

GroupWise 5.5's document-sharing and management capabilities should appeal to firms that handle a large number of documents—law firms and researchers, for example. The upgrade will maintain a full-text index of all shared documents, which users can easily search by keyword or other attribute (such as author or category). If you

work on documents remotely, you'll appreciate the dynamic syncing feature, which automatically records changes to all copies—regardless of where you're working—whenever the file is saved. Similarly, GroupWise 5.5 can generate HTML versions of documents as you save them, for instant publishing to the Internet or a corporate intranet.

Headlines gives you a single-screen view of news headlines, a daily meetings summary, and even direct links to critical e-mail messages (such as those sent by people you designate as important, like your boss). You navigate through Headlines and other Notes sections by single-clicking and using the Back and Forward buttons.

Like a browser, Notes R5 lets you use bookmarks to organize vital information for easy access. But Lotus says that its bookmarks can link to just about anything: Web sites; Notes databases; mail folders; and folders and documents on your PC's hard disk or on a network server. That's not a new idea—Outlook does much the same thing already, and Netscape's Communicator 5 promises a similarly holistic approach. Still, it represents a boon to die-hard Notes users who'd like to use the application as a home base throughout their workday.

In addition, Lotus plans to beef up Notes' capabilities in knowledge management, a fancy way of describing search tools that collate information

from far-flung sources both on and off the Web. If you enter a keyword, Notes can launch your Web browser and search Yahoo, your company's Notes databases, and even documents on your hard disk before returning a single list of documents ranked according to their relevancy.

umpteen recipients of an e-mail message, Notes R5 won't flood your screen with dozens of e-mail addresses, an annoyance that forces you to scroll extensively to reach the body of the message. Instead, the list of addressees appears in a small, scrollable window. The company also aims to stream-

appeal to any Notes user who now juggles a group scheduler in Notes with a personal calendar in a stand-alone PIM.

BENEATH THE SURFACE

LOTUS CONTINUES TO add features to please big-company IS staffers. For example, Lotus will add features to help organizations move to Notes from other e-mail packages, including its own cc:Mail. In any case, most cc:Mail users will eventually move to Notes or one of its competitors, since Lotus plans not to release any major upgrades to that venerable e-mail system.

Shortly before press time, Lotus acquired DataBeam, a maker of real-time document-sharing software, and Ubique, a maker of online chat software. The products might appear in Notes R5 or be offered as add-on modules.

If your company uses a stand-alone e-mail product like cc:Mail, you may want to consider an integrated product like Notes R5. But switching e-mail systems is complicated. And though the core networking technology for Notes has been around for years, the new interface has not been battle-tested. We'll reserve final judgment until we can do hands-on testing. But if the improvements pan out, Notes R5 could establish itself as a must-have upgrade for current users and an attractive option for anyone seeking a groupware package with calendaring, scheduling, and collaboration features.

—Harry McCracken ▶

Notes Release 5

\$69 per user (list); Lotus; 800/353-5414; www.lotus.com

READER SERVICE NO. 750

GROUPWARE TOOLS

Notes R5: New Look, More Features

Where to find it	What's new
Throughout the program	Browser-style navigation; revamped menus and dialogs; more Windows conventions such as drag and drop and right-mouse clicks.
E-mail	Refined user interface; fancier formatting options; enhanced HTML support; easier tools for creating rules for mail handling; LDAP directory searching.
Group scheduling	Streamlined look; more customizable calendar views; better printing; quicker performance.
Databases	No changes announced at press time.
Other tools	Bookmarks for documents, databases, Web sites, and more; unified search tools for the Web, Notes databases, and other data sources.

E-MAIL MAKEOVER

E-MAIL REMAINS the central workgroup application for most users, and Lotus plans to introduce some long-overdue refinements to Notes' often-frustrating mail features. The changes aren't revolutionary; in fact, many are basic niceties that users of other packages have enjoyed for years. For example, when you're one of

line basic jobs such as addressing e-mail and deleting or archiving messages, and R5 enables you to exchange richly formatted messages with users of HTML-capable e-mail packages, such as Microsoft's and Netscape's clients. (HTML support lets you embed a photograph in a message, among other things.)

The major goal of R5's group-scheduling features is to bring this capability up to the standards set by current stand-alone PIMs, such as Lotus's own Organizer. Lotus says that the group scheduling will have a less cluttered, more customizable look, and that scheduling tasks will be simpler. You'll be able to print out your schedule in a variety of formats, such as a pocket-size trifold or one that fits into a Franklin Day Planner. Again, these additions aren't groundbreaking, but they should

network that also uses GroupWise, the message will behave as if it had been sent internally, adding a note to the recipients' calendar if they accept. If the recipients don't have GroupWise, the invitation will look and behave like a normal e-mail.

—Yardena Arar

• GroupWise 5.5; \$3480 for 25 users; Novell; 800/638-9273; www.novell.com

READER SERVICE NO. 749

GROUPWARE IMPROVEMENTS

ON THE calendar front, GroupWise 5.5 lets managers view and change several workers' schedules at once.

Finally, you'll be happy to know that GroupWise 5.5 extends its groupware features to any other GroupWise user on the Internet, without requiring any special effort by you. So if you e-mail a meeting invitation to a person or persons on another

Seeking Speed? Windows 98 Disappoints



THERE MAY be reasons to upgrade to Windows 98 (see our July preview, "Windows 98: Now or Never?"), but performance is not one of them. Microsoft claims that starting your system, launching applications, and shutting down your system are all faster under the new operating system. We've found that only the second claim holds true: Apps can launch in half the time. But your system will probably start slower; and shutting it down can take just as long or longer.

How do we know? Until now, our evaluations of the new operating system were based on prerelease beta versions. But we finally got our hands on the shipping code and immediately sent it to our lab for testing. Now the numbers are in.

LAUNCH INTO FAT32

WINDOWS 98'S NEW Disk Defragmenter utility is the key to faster application launch-

ing. It monitors which applications you launch, and how often, then reorganizes program files on the disk for maximum launch speed. Because Windows loads applications in bits and pieces, it isn't enough just to organize files contiguously, as past defraggers have done. The new Disk Defragmenter watches to see which pieces of which applications are loaded most often. Then it fragments your program files accordingly, putting the most frequently used pieces in optimum order on the disk's outer edge to minimize time-consuming hard disk seeks.

Though defragging our 2GB drives took between 30 minutes and 2 hours (Windows 98 can perform the task unattended), the results were well worth the wait. The slowest-launching applications before

optimization—Adobe Photoshop 4.0, Corel Paradox 8.0, Netscape Navigator 4.04, and Picture Publisher 7—loaded in roughly half the time after defragging. Programs that loaded quickly before the operation—specifically, two Microsoft Office 97 apps, Word and Excel—showed more modest gains. One caveat: We're talk-

Apps can launch in half the time, but your system will probably start slower, and shutting it down can take just as long.



ing seconds here, not minutes. Before optimizing, Paradox took 14.49 seconds to load; afterward, it took 6.86.

You should also note that these speedups occurred only when we were using the FAT-32 file system. Introduced with Windows 95 OSR2, FAT-32 is an optional feature in Windows 98; you have to in-

voke a special utility to convert your hard drive to it. Our advice: Just use it. On FAT16 drives, optimizing improved launch speed negligibly.

Converting to FAT32 has the added benefit of letting you squeeze tens or even hundreds of extra megabytes from your disk. The reason: FAT16 uses 32KB clusters—meaning every file on your drive, no matter how small, takes up a minimum of 32KB. On most drives, FAT32 stores files in 4KB clusters. In our tests, converting a 2GB partition from FAT16 to FAT32 freed up 266MB of drive space that was previously occupied.

There's only one time you shouldn't use FAT32: when you've set up your PC to dual-boot with an operating system that can't read FAT32 partitions (meaning any OS but Windows 95 OSR2.x).

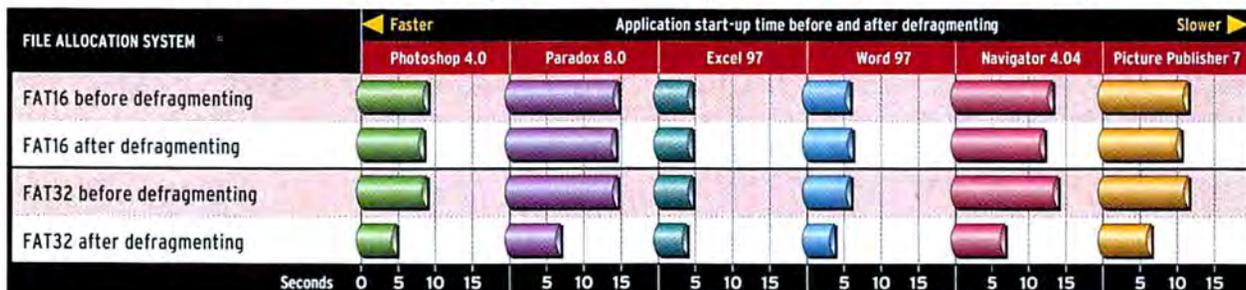
TURN ON, TURN OFF

THE STORY WAS different when we turned our attention to start-up and shutdown times. Microsoft has claimed that ▶

APPLICATION START-UP

TEST REPORT

Windows 98: Defragger Helps Open Apps More Quickly



TEST HOW WE TEST We compare the application launch times before and after application start-up optimization. We open applications from the Start menu and measure the time from when we press <Enter> to when the application is fully loaded and ready for use. We average the results of three trials. After running System Tuneup (WinAlign) and deleting existing application launch log files, we optimize application start-up by launching each application ten times. We then run Disk Defragmenter. We repeat the application launch tests three more times and average the results.

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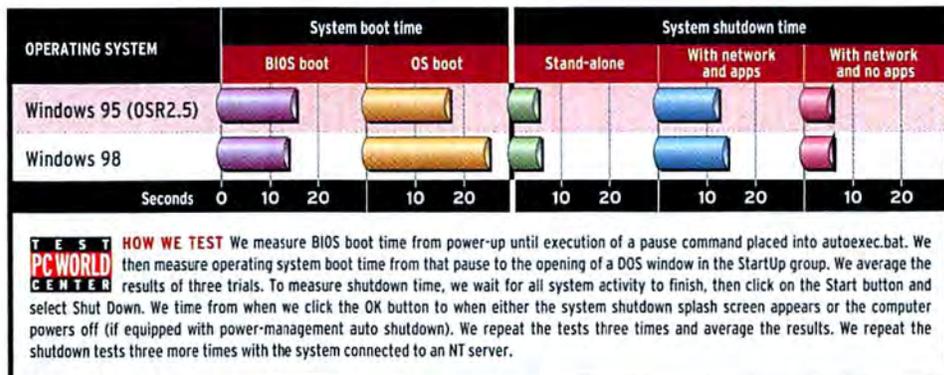
both processes should be faster under Windows 98 than under Windows 95. Our tests don't bear out those claims.

The problem? In the case of start-up times, Microsoft's claims apply only to systems using something called a Fast-Boot BIOS. Developed jointly by Microsoft, Toshiba, and Intel, the FastBoot BIOS spec should (as its name implies) help PCs start up faster. But at press time, no FastBoot systems—not even preproduction units—were available for testing. And there's no telling when such systems will arrive. Until they do, you may see the initial BIOS boot portion of your start-up process drop a second or two. But those gains will be more than offset by the extra time it takes to load Windows 98 itself—the new OS simply has more stuff to load than its predecessor does; hence it takes longer to boot.

Microsoft also claims that Windows 98 shuts down

START UP, SHUT DOWN TEST REPORT

Windows 98 Drags Its Feet at Start-Up



faster, especially on networked systems. But we saw no such gains. On stand-alone systems, Windows 95 and Windows 98 shutdown times were virtually identical. On networked systems we found either no improvements or, in some cases, slowdowns.

DEAD HEAT

ALTHOUGH MICROSOFT has improved Windows 98's per-

formance in launching applications, you won't notice any difference in running those apps: When we compared PC WorldBench 98 tests on Windows 98 and Windows 95 systems, the results were virtually the same.

To be fair, no existing performance test, PC WorldBench 98 included, will demonstrate Win 98's most significant performance en-

hancement: MapCache promises to use the disk cache and system memory more efficiently, thereby reducing the need for virtual memory and its time-consuming reads from the swap file on your hard drive. This should be particularly helpful when you're multitasking or otherwise taxing memory.

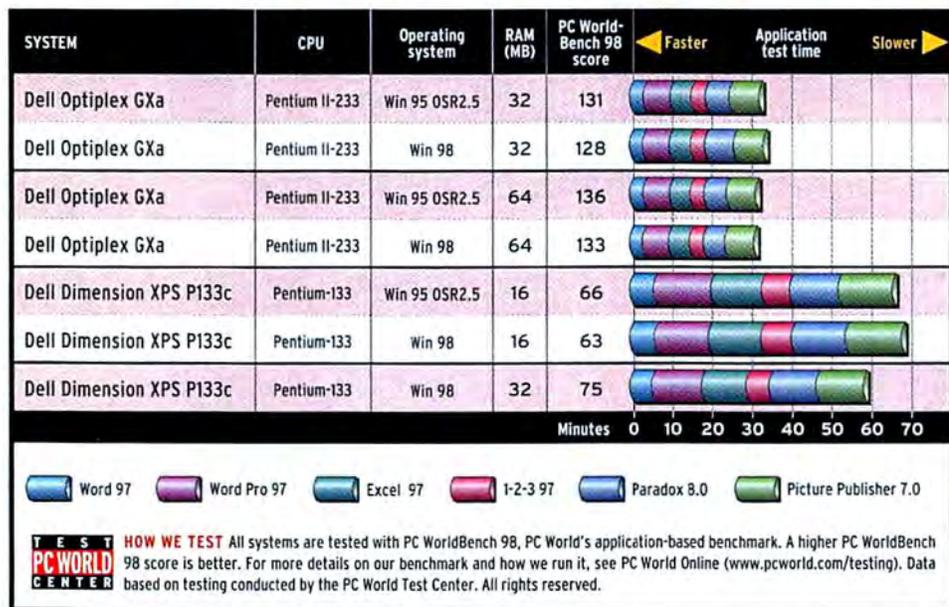
For MapCache to work, however, your executable files (those that run when you launch an application or Windows itself) must first be internally reorganized into 4KB segments. Unfortunately, no applications—including those used in PC WorldBench 98—have yet been rewritten to work with MapCache. Only after developers start compiling their software with the 4KB boundary requirement in mind (and you upgrade your software) will you see any benefit from MapCache.

OVERWEIGHT OS

ONE MORE FINDING we recorded in the course of our performance testing: Thanks to all its new utilities, doodads like WebTV, and the integration of the Internet Explorer 4.0 Web browser, this new ▶

APPLICATION PERFORMANCE TEST REPORT

Running Apps, the Speed's the Same



TECHNOLOGY

LG makes it work better



Electronics

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Circle 96 on reader service card

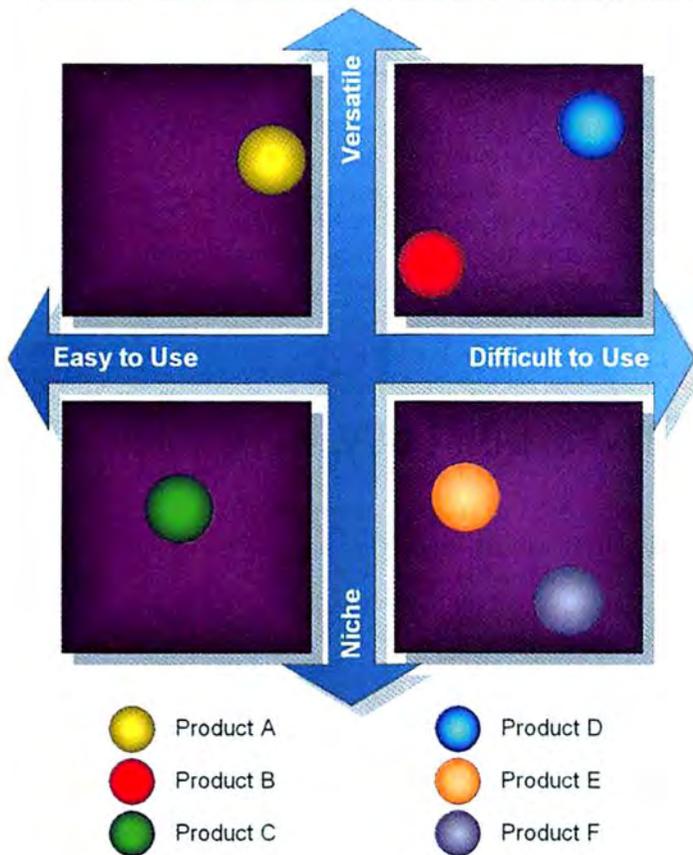
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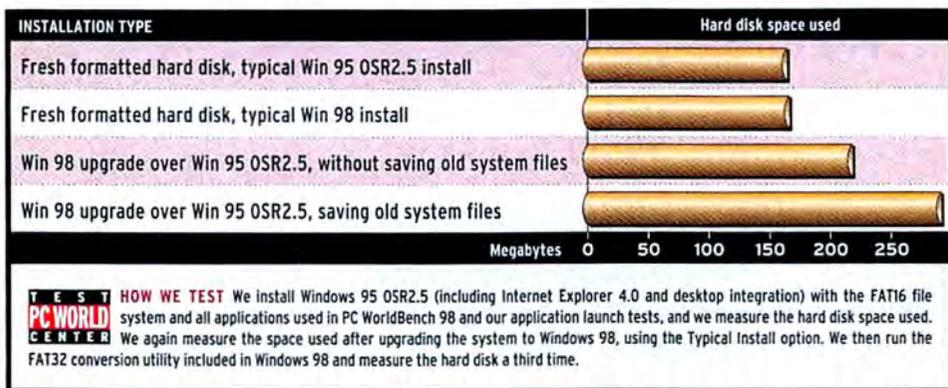
Product Positioning Map



Visualize your business™



Win 98 vs. Win 95: How Much Room Do You Need?



operating system chews up plenty of disk space. When installed on an empty hard disk, Windows 98 takes up about as much space on your drive—roughly 160MB—as

Windows 95 OSR2.5 does. But you're more likely to install Windows 98 over Windows 95, and that's when the megabytes really start adding up. Depending on your instal-

lation options, you could be talking 300MB.

You also have to consider how much free space Win 98 requires during installation, when it creates all sorts of

temporary files and (optionally) backs up your old Win 95 installation. Our tests suggest that you'll need from 120MB to 200MB of free space. That might be okay for those of us with multigigabyte drives. But if you've got an old 500MB drive, Win 98 could be a good reason for replacing it.

As we've said in earlier reviews, Windows 98's advanced features—Universal Serial Bus support, browser-style file management, a customizable taskbar, Outlook Express—make it a worthwhile upgrade for many users. But beyond speedier application launching, don't expect it to solve your performance problems.

—Scott Spanbauer

Rewritable DVD Drives: Don't Buy, Here's Why

CONSUMER ALERT

IF YOU'RE CRAVING high-capacity storage, you might have your eye on one of the rewritable DVD drives now hitting the market. But hold on to your wallet. The optical storage industry has divided itself into four hostile camps, producing four mutually incompatible disc formats for recordable DVD. The result—a disc using one format won't play on a drive supporting another. Our advice: Wait until the dust settles and one format emerges victorious before you invest.

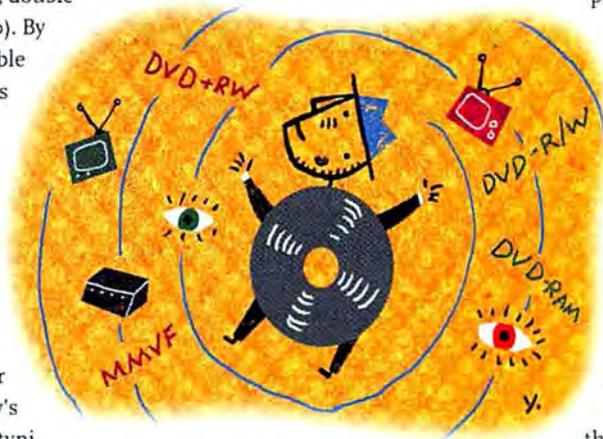
THE FIRST TO MARKET

BY THE TIME you read this, Toshiba, Panasonic, and Hitachi should be shipping drives supporting DVD-RAM, the first of the four formats to come to market. Ranging in

price from \$750 to \$1000, these drives will let users record and rerecord data onto discs holding 2.6GB per side (single-sided discs will cost about \$30 each, double-sided about \$50). By contrast, writable CD-ROM discs hold 650MB.

According to preliminary vendor specs, DVD-RAM drives will record at 1350 kilobytes per second, or 9X speed; today's CD recorders typically write data at just 2X or 4X. While such speeds don't make much difference in playback—titles aren't yet optimized to take advantage of

faster drives—they affect recording. Because cutting a disc can tie up all of your PC's resources, the faster your drive can record, the



sooner you can get back to work.

DVD-RAM drives will both record and play DVD-RAM discs. But what happens if you

want to share a disc you've recorded? Unless your friends have a DVD-RAM drive (or one of the DVD-ROM drives due out this fall from manufacturers supporting the DVD-RAM spec) they won't be able to play your disc. (As if that's not confusing enough, DVD-RAM drives will be able to

play CD-ROM, CD-Recordable, CD-Rewritable, DVD, and DVD-ROM discs.) Another drawback: The DVD-RAM discs utilize caddies, the same clumsy disc holders that are found on older CD-ROM drives.

DVD-RAM is just the first recordable DVD format out. By the end of this year, you can expect to see drives supporting a second format: DVD+RW (it stands for DVD+Rewrit- ▶



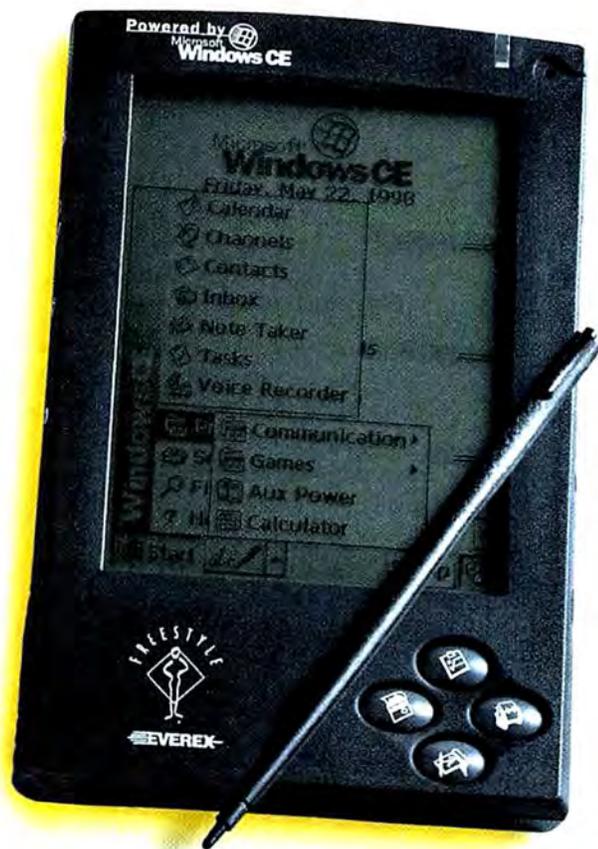
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DVD-3: More Speed Than You Need?

WHILE REWRITABLE DVD drives stumble to market, manufacturers continue to push their DVD-ROM players ever faster. This summer a number of companies will release DVD-3 drives, which spin DVD-ROM discs at speeds of 4X and faster and play CD-ROM titles at 24X or more.

The problem is, all that speed may be wasted. Like today's standard DVD drives (which adhere to

the DVD-2 standard), DVD-3 drives will be able to play CD-ROM, CD-R, and CD-RW discs, making them adequate replacements for an aging CD-ROM drive. But unless titles are specifically written for a given drive speed, they won't play any faster at 24X than at 12X—the speed at which today's DVD-ROM drives play CD-ROM discs. More important, with so few DVD-ROM titles (other than movies) on the market, there's very little compelling busi-

ness need to purchase a DVD-ROM drive in the first place.

WAIT OUT THE BATTLE

DESPITE THESE drawbacks, Sony plans to ship its \$379 DDU220E/H DVD-ROM drive upgrade kit, due out by the time you read this. The kit contains a 5X DVD/24X CD-ROM drive, a PCI MPEG-2 decoder card from Sigma Designs, and two DVD-ROM titles. You'll also see this drive aboard Sony's new Vaio PCV-E203, which at press time

was scheduled to ship in June. Toward the end of this summer, DVD-3 drives from Hitachi, Pioneer, and Toshiba should also hit store shelves. Speed, specs, and pricing are not yet final; Pioneer says its drive will run DVD-ROMs at 4X or 6X, CD-ROMs at 32X.

Our suggestion: If you're looking for high-speed DVD, wait until the rewritable standards battle is settled, and then pick a drive based on the winning format. Otherwise, stick with today's DVD-2.

able). DVD+RW drives should cost about the same as their DVD-RAM counterparts, but their vendors (including Hewlett-Packard, Mitsubishi, Philips, Ricoh, Sony, and Yamaha) claim they'll perform up to 50 percent faster. Furthermore, DVD+RW media will offer slightly more storage capacity—the discs hold 3GB per side—and the drives won't require caddies. As with DVD-RAM, DVD+RW drives will play all of today's existing CD-ROM and DVD-ROM formats; future DVD-ROM drives from HP, Philips, and others will

also play DVD+RW discs. But you won't be able to read DVD-RAM discs on a DVD+RW drive, or vice versa.

HIGH-END OPTIONS

WHILE DVD-RAM and DVD+RW are the likeliest candidates for mainstream success, two high-end rewritable DVD formats are waiting in the wings. By the middle of next year, Pioneer plans to ship a product for the company's new DVD-R/W format. The upside: The discs hold 4.5GB per side, and you can play a DVD-R/W disc on any DVD-ROM

player. The downside: You can expect to see a price tag of \$3000 to \$5000. (Pioneer already ships the only recordable DVD product on the market, the \$16,959 DVR-S101 drive, which uses the write-once DVD-R format.)

Meanwhile, NEC is backing the MultiMedia Video Format standard, which will support a voluminous 5.2GB per side. As its name suggests, MMVF is designed specifically for video; 5.2GB can hold 2 hours of video. NEC plans to release MMVF drives in Japan at the end of this year. It is not yet

known when the drives will arrive on U.S. shores or whether they'll be compatible with DVD or CD media. But the drives will likely be targeted at—and priced for—professional video editors.

So which recordable DVD format will prevail? According to analyst Bob Katzive of Disk/Trends, it's too early to tell. He says the format battle will resolve itself in one of two ways. Either optical storage vendors will join together and agree on one universal standard, or the formats will duke it out on the open market; Katzive believes the battle scenario is more likely. And while DVD-RAM is first to market, DVD+R/W follows so closely that this early advantage may not mean much.

Thus, our word to the wise: If you need an optical storage recorder now, buy a CD-RW drive. But if you can wait, sit tight for 12 months until the confusion over rewritable DVD clears. If you leap in now, the results could prove as useless as a warehouse full of Betamax tapes.

—Dean Andrews ▶

REWRITABLE DVD COMPARISON

Dividing Over DVD: Vendors Vie to Set the Standard

STANDARD	Supporters	Capacity (GB per side)	Likely price	Advantages	Disadvantages	Availability
DVD-RAM	Hitachi, Panasonic, Toshiba	2.6	\$750 to \$1000	first to hit market	lower capacity; current DVD-ROM drives can't read these discs	now
DVD+RW	HP, Mitsubishi, Philips, Ricoh, Sony, Yamaha	3	\$750 to \$1000	greater capacity and possibly better performance than DVD-RAM	current DVD-ROM drives can't read these discs	year-end
DVD-R/W	Pioneer	4.5	\$3000 to \$5000	current DVD-ROM drives can read these discs	too expensive	mid-1999
MMVF	NEC	5.2	unknown	huge capacity	compatibility and pricing unknown	in Japan by year-end, U.S. release unknown

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XML Spoken Here: New Web Language Promises Smarter Surfing

ANALYSIS
THIS TIME next year, if predictions pan out, the Web will be a very different place to surf. You'll conduct searches with surgical precision; sort tables of data in a flash; and enjoy faster performance, enhanced online shopping, and seamless file swapping between programs.

All this comes thanks to a new technology called XML. Short for Extensible Markup Language, XML was officially adopted as a standard this past February by the World Wide Web Consortium—the ad hoc governors of the Web. Since then, a Who's Who of software companies—including Microsoft, Netscape, Lotus, IBM, and Adobe Systems—have publicly committed to supporting the language.

So what's all the fuss about?

THE XML DIFFERENCE

THE TYPICAL WEB page is a mix of text and graphics whose appearance is controlled by the Hypertext Markup Language. HTML is good at describing a Web page's layout, but it's incapable of describing the page's content—it can't identify a piece of text as an author's byline, or a number as a price.

This lack of content description presents a serious hassle for Web users. Take searching (please!). Submitting a query today on the word *prince* will summon up pages about the

enigmatic musician, Prince Edward Island, and Prince Charles. Today's search engines don't know whether the word *prince* refers to a musician, a member of the royal family, or part of Canada.

more relevant results. Meta-tags could also enhance commerce on the Web. Imagine online booksellers using a standard set of metatags to mark titles, descriptions, and prices. With a single command, you could quickly search all of the online bookstores for the lowest price on a book—an impossibility today.

In addition, XML metatags would let browsers manipulate Web data. Currently, recalculating data on a Web page requires time-consuming back-and-forth communications between your browser and the Web server. You send the server your recalculation request, it performs the operations and sends you the results, and your system then redraws the page.

SHORTEST DISTANCE

XML CUTS OUT the back and forth. Suppose you wanted to identify the top five hitters on your favorite baseball team. With XML, the team's server could spew out a stream of metatagged stats, and your XML-savvy browser—using a Java applet or scripts written in JavaScript or Microsoft's VBScript—would do the calculations. XML gurus call this local computation; you'll call it fast. As a bonus, the process puts less strain on the server, so it can respond to other requests more quickly. The result: better overall Internet performance.

XML's potential extends beyond the Web. XML-coded files could be ideal vehicles for moving data between programs. Microsoft has announced that the next version of Office (to be released late this year or early next) will use XML to permit "round-tripping"—moving Office documents to the Web and back without losing formatting. Lotus also pledges to support XML in its next office suite. Such support could well kill off other cross-platform formats such as RTF.

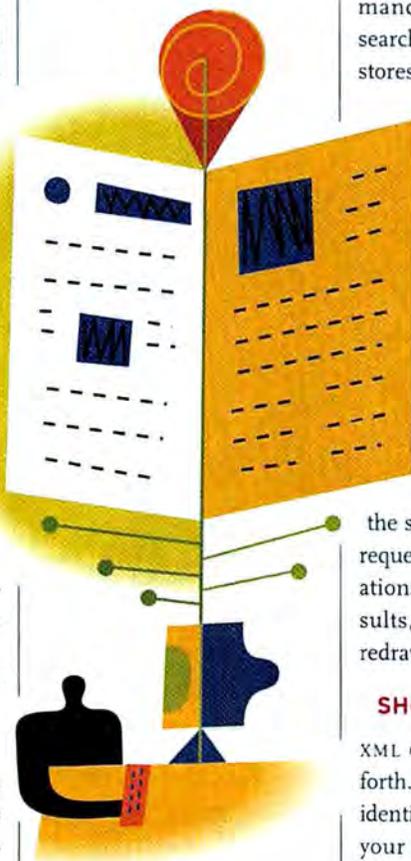
NOT SO FAST?

BUT BEFORE XML can live up to its promise, it must surmount two big obstacles.

First, there's browser support: Only Microsoft's Internet Explorer 4.0 currently supports XML. Netscape will be adding support in Communicator 5. But millions of Web surfers still use older browsers that don't understand the new language. Second, for XML to work, content providers need to implement it consistently. How can you compare book prices if each bookseller uses different tags? Each separate industry will have to reach consensus on the metatags its members will use.

Given the chaos that is the Web, that consensus could be difficult to achieve. That's one reason experts predict it will be another year before XML's effects begin to be felt. But the language has so many advantages, says Donald DePalma, an analyst with Forrester Research in Cambridge, Massachusetts, the required cooperation will eventually come. Ultimately, he says, "XML will be [the Web's] lingua franca."

—Jim Heid ▶



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Hello, Room Service? Get Me the Internet



FORMERLY, no matter how fast your modem was, going online from a hotel room phone was inevitably slow and difficult—if you could connect at all. But for some travelers, that's starting to change. Hotels and motels across the country are beginning to offer high-speed Internet access in at least some of their rooms.

Judging from our experience, you should seek out these establishments the next time you travel and want to browse the Web, collect e-mail, or access a corporate network that's reachable through standard dial-up Internet service. (You're out of luck, however, if your company's firewall prevents access from unauthorized IP numbers.)

While some inns are working on their own, a dozen

hotels and motels are testing a new service called IPort, developed by San Diego-based ATCOM/Info. Still other hoteliers are equipping rooms with Windows 95 PCs as well as high-speed connections.

BRING YOUR OWN

I PORT OFFERS connections from guest or meeting rooms on a local area network connected to the Internet over a T1 (1.5 megabits per second) or other high-speed line. You must bring a PC, ethernet card, and cables. You also have to install Public Internet Port, a small, free Microsoft program available on ATCOM/Info's Web site or at the hotel. IPort connects at up to 50 times the speed of a 28.8-kilobits-per-second modem. Some hotels include the service in the basic room rate; most charge \$5 to \$10 per day.



T1s FOR TRAVELERS: Hotels are offering high-speed Internet access in guest rooms. Users must bring PCs and ethernet cards to hook up (right).



For many hotels, high-speed Net access is not only a great selling point but a necessary upgrade. Standard hotel phone systems, designed to accommodate 5-minute calls, have experienced problems with guests going online for 30 minutes or more at a sitting. The system gets so jammed that other guests can't call out.

In an informal test of IPort service at the Hotel Vintage Park in Seattle, I hooked up an ethernet PC Card in my notebook to the IPort line on the desk, fired up a browser (any brand will do), and within moments was loading Web pages quickly—some the instant I clicked.

PRINTERS AND PCs

SOME HOTELS ARE working with local ISPs and offering extras. At the upscale Four Seasons in Austin, Texas, guests can print over the hotel network for the same fees charged for faxing. The hotel reports a brisk business in ethernet

cards sold at the gift shop. The Crowne Plaza Hotel in Foster City, California, equipped all rooms in its new executive wing with Windows 95 PCs as well as high-speed access—at no additional charge.

Several major chains and smaller independent hotels are considering similar offerings. But even if you know a hotel provides Internet access (see list at left), be sure to ask for this service when you make your reservation. Not every room at the inn may be Internet-ready. You may also want to check with your IS department about restrictions on outside access to the company network. But for most mobile workers, high-speed Internet access from the comfort of a hotel room should be as useful as it sounds.

—Michael S. Lasky ■

IPort

ATCOM/Info; 800/552-8266;
www.atcominfo.com/iport

Places to Go for Fast Net Access

All the hotels listed offer ethernet hookups in some or all rooms. Guests must supply their own notebook and ethernet card.

■ **Austin, Texas:** Four Seasons, 800/332-3442, \$9 plus tax per day

■ **Bellevue, Washington:** Courtyard by Marriott, 800/321-2211, price to be announced; Hyatt, 800/233-1234, price to be announced

■ **Foster City, California:** Crowne Plaza Hotel, 650/570-5700, free in executive wing

■ **Hillsboro, Oregon:** Hillsboro Candlewood, 800/946-6200, \$5 per day

■ **Kirkland, Washington:** Woodmark Hotel, 800/822-3700, \$9 per day

■ **La Jolla, California:** La Jolla Marriott, 800/228-9290, \$10 per day

■ **Redmond, Washington:** Homestead Village, 800/782-9473, \$5 per day

■ **San Jose, California:** Hyatt San Jose, 800/233-1234, \$7 per day²

■ **Seattle:** Hotel Vintage Park, 800/624-4433, no extra charge; Marriott Sea-Tac Airport, 800/643-5479, price to be announced

■ **Washington, D.C.:** Summerfield Suites, 800/424-2999, price to be announced; Washington Marriott, 800/228-9290, \$10 per day

¹Site offers PCs in some rooms. ²Charges only in rooms with PCs.

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NEW PRODUCTS

LCD Desktops: The Price Is Getting Right



ON DISPLAY: Systems from Tangent (left) and Toshiba come standard with LCD monitors.

DESKTOPS
PCs WITH SLEEK flat-panel displays are among the sexiest products on the market, but they've been too expensive for most businesses. They're still not cheap, but falling prices for LCD panels are making the systems more affordable. I looked at preproduction versions of two PCs shipping with 15-inch flat-panel displays—a Toshiba and a Tangent model.

Toshiba's \$3299 Equium 100 is a one-box desktop; the LCD panel connects directly to the computer's case. Tangent's \$2995 Medallion TFT/333 is a midtower with a handsome LCD monitor. Both are worth checking out, especially if you were planning to buy a PC and LCD separately.

Slim and compact (16 inch-

es tall and 9 inches deep), the Equium occupies less space than a standard 17-inch CRT monitor, making it ideal for cramped offices. Its 15-inch LCD panel is connected to the PC with rounded brackets. The Equium comes with two Universal Serial Bus ports for extra peripherals like printers, and its drive bays are concealed behind two doors on the case's side. The CD-ROM tray pops out vertically, so you'll need to push CDs onto the loading spindle before the tray retracts back into the case.

A NOTEBOOK IN DESKTOP CLOTHING?

MY EQUIUM DESKTOP came with a Pentium II-333 CPU, 64MB of RAM, and 512KB of secondary cache. Its PC World-

Bench 98 score of 171 is dead-on average for desktops of its processor class. To save space, Toshiba used some components more commonly found in notebooks—for example, the 2MB S3 ViRGE/MXT+ video card. The 3.2GB hard drive is on the skimpy side for a desktop, and you can forget

Tangent Medallion TFT/333

PRO: Outstanding performance, good image clarity, upgradable.
CON: Lacks stylish design of some other LCD PCs.
VALUE: Good price for a fast system with a quality LCD monitor.
Street price: \$2995

Tangent Computer
800/800-8550
www.tangent.com

READER SERVICE NO. 732

about upgrading: There are no open drive bays. You can snap in additional memory, but only after removing several annoyingly tiny screws.

I found the flat panel's image quality disappointing. Set at the optimal 1024 by 768 resolution, the LCD monitor produced washed-out colors. Text was adequate for most business applications, but I would have preferred crisper, smaller type on my test newsletter and spreadsheet.

Tangent's Medallion, on the other hand, has a scrappy, can-do charm. Its ViewSonic LCD panel fits into tight quarters, but the midtower doesn't save any desktop space. Although it won't set any fashion trends, the Medallion performed with gusto: Its PC WorldBench 98 score of 188 establishes a new record for a PII-333 system equipped with 64MB of RAM and 512KB of secondary cache.

The ViewSonic VPA150 flat panel, which features built-in speakers and a sculpted base that curves slightly outward,

Toshiba Equium 100

PRO: Sophisticated design.
CON: Display colors look lifeless, limited upgrade options.
VALUE: Stylish and competitively priced, but not the best choice for graphics work.
Street price: \$3299

Toshiba America Information Systems
888/598-7802
computers.toshiba.com

READER SERVICE NO. 733

displayed vibrant, eye-catching colors and crisp text. I couldn't use the display panel in portrait mode; Tangent said the problem would be corrected in shipping units. However you orient the monitor, you'll want to have it directly in front of you: As with most LCDs, the viewing angle is fairly narrow compared to that of a CRT.

Toshiba's warranty—three years for parts and labor, with

one year of on-site service—beats Tangent's, which is similar to Toshiba's for the mid-tower but runs only one year for the LCD panel.

You can get a PII-333 desktop with a 17-inch CRT monitor for about \$2300, so you'll still be paying a premium for these LCD PCs—but not as much as you'd shell out if you bought the LCD and a comparable desktop separately.

Of the Equium and Medallion, which is the better buy? If you want one of the sleekest desktops around and your work is mostly text-based, try the Equium—but also check out other one-box systems by Akia and Hitachi. On the other hand, if style and desk space are less important than performance and display quality, consider the Tangent.

—Mick Lockey

Point & Speak: When I Talk, My PC Listens

VOICE RECOGNITION

DRAGON POINT & SPEAK doesn't care if you're from down South or downtown. This \$50 program learns your speech habits, then lets you dictate into Windows 95 productivity applications, including most popular word processors and e-mail programs. But judging from my tests of a preproduction copy, Point & Speak is better for short messages than for lengthy documents needing revisions.

Using the same speech recognition technology as Dragon Systems' higher-end NaturallySpeaking, Point & Speak lets you talk normally without pausing as you dictate. You train the program by reading aloud for about 18 minutes. To dictate, you just click a microphone icon in the Windows taskbar, then again in the window of your application.

Dragon says the dictation program can absorb up to 160 words a minute. I can't talk that fast, but it handled my 100 words per minute just fine. Dragon also promises up to 97 percent accuracy, but I achieved more like 80 percent after dictating into Word 97



TESTING 1,2,3: Click on the microphone in the Windows 95 taskbar (detail and lower right) to start dictating with Dragon Point & Speak.

and Lotus Notes for two weeks.

Of the 230,000 words in the package's vocabulary, 30,000 of them stay active in memory. You get a larger vocabulary with higher-end products, which also perform desktop operations—such as launching programs by voice command—that you can't do with Point & Speak.

Dragon's Web site lists PCs and cards that should work with the program, but the list is inevitably incomplete. You'll need at least a Pentium 133 with Windows 95 and 32MB RAM (48MB recommended). For Windows NT, 48MB RAM

is required, 64MB recommended. Dragon bundles an adequate microphone headset.

Drawbacks? Revisions can be complicated; you can't cut and paste, for example. I frequently had to correct plurals and possessives, and—as with other voice recognition programs—for gratuitous small words like “a,” “it,” “in,” and “the” that creep in when you pause or breathe at the wrong moment. Also, Point & Speak is slower than my touch typing, so I didn't find it handy for writing articles. Hunt-and-peck typists may find it more useful, and it's fine for firing

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- 90 Visual Page 2.0; Lava Parallel-PCI parallel port
- 96 Microsoft IntelliMouse Pro; Aviator Wireless Network

INTERNET



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

off e-mail when your hands are occupied.

Repetitive strain injury sufferers may prefer to go with more expensive and sophisticated products offering a larger vocabulary and desktop command capability. But whether you have RSI or not, Point & Speak is an inexpensive way to try dictation software.

—Laurianne McLaughlin ▶

Dragon Point & Speak

PRO: Easy to train, handy for dictating memos and e-mail.

CON: Complicated revision process, not for long documents.

VALUE: Inexpensive choice for basic dictation.

Street Price: \$50

Dragon Systems

800/437-2466

www.dragonsys.com

READER SERVICE NO. 734

NEC's Stylish, Slim Notebook

NOTEBOOK

IF YOU LIKE the chrome-plated look and need a superlight notebook that can double as a desktop, consider NEC's Versa SX, a thin-and-light laptop that comes with a faux brushed-steel case. Just be prepared to dig deep into your wallet: A Pentium II-233-based SX costs more than many PII-266 notebooks. I evaluated a preproduction model of the \$3499 PII-233 version with a

NEC Versa SX

PRO: Lightweight, fast, comes with versatile multipurpose bay.

CON: Expensive, can't load both floppy and CD-ROM drive at once.

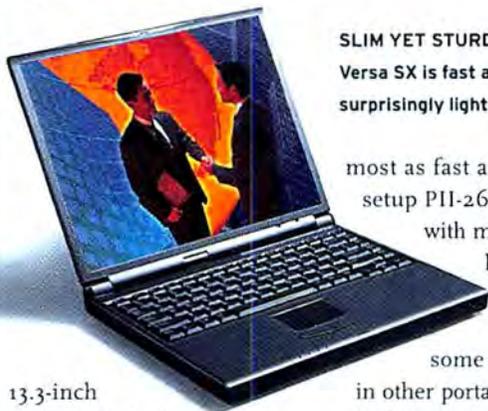
VALUE: Good choice for travelers prepared to pay through the nose for a thin, fully loaded notebook.

Street price: \$3499

NEC Computer Systems Division
888/863-2669

www.necnow.com

READER SERVICE NO. 735



13.3-inch active-matrix screen and a 2GB hard drive.

The SX, a slimmer successor to NEC's Versa 5080X (see June's "Different Notes for Different Folks," page 158), is impressively light and fast. Measuring 1.3 inches thick with a traveling weight of 6 pounds (with AC adapter and a floppy and CD-ROM drive), it's one of the lightest portables we've seen with a dedicated battery and full-size keyboard. With a PC WorldBench 98 score of 128, it's also al-

SLIM YET STURDY: NEC's Versa SX is fast and surprisingly light.

most as fast as a similarly setup PII-266 laptop. As with most thin-and-lights, however, the SX leaves out some items found in other portables. There's no built-in modem (an optional 56-kbps x2-based PC Card modem costs \$149). You get two drives, a floppy and a 12X-24X CD-ROM, but you can install only one at a time in the lone multipurpose bay.

The SX does give you more options for that one bay than any other notebook we've seen: a SuperDisk LS-120 drive (\$159); a Zip drive (\$250); a DVD-ROM drive (\$199); a second hard drive (\$299 for 5GB, \$499 for 6GB); or a second lithium-ion battery (\$129),

which you'll need if you'll be away from an outlet for more than 4 hours. If you want to go even lighter, plug the included place-holding "travel module" into the drive bay to reduce the weight to 4.8 pounds. All components are hot-swappable (you can install them without turning the notebook off) and work in NEC's new, slightly higher-end Versa LX line.

NEC says the SX's good-looking, quarter-inch-thick screen is 33 percent thinner than those in standard notebooks. It seems fairly rugged, too. The four-inch-wide wrist rest made for luxurious typing, but looked slightly cheesy.

The SX comes with either Windows 98 or (for \$100 more) Windows NT. No major software applications are bundled, but you do get some system and network utilities. NEC also sells two docking stations. All in all, the SX is a real head-turner that should make a good corporate laptop.

—Carla Thornton

A Hefty Windows CE Handheld

MOBILE COMPUTING

TIRED OF HAULING around a notebook, but unimpressed by most personal digital assistants? NEC's MobilePro 750C is a tempting alternative. This Windows CE 2.0 handheld looks like a standard laptop sliced in half lengthwise, with a lovely 256-color touch screen and—at last!—a truly usable keyboard. It's larger than sub-notebooks like Mitsubishi's \$1500 Amity CN, but weighs less (under 2 pounds). And at \$899 it's a lot cheaper.

The 750C comes with an

array of output options. PC Card and compact flash card slots, a built-in 33.6-kbps modem, and a surprisingly ample 16MB of RAM.

The rechargeable lithium-ion battery lasted the advertised 8 hours.

The disadvantages? Unlike most Windows CE handhelds, which fit in a sports-coat pocket, the 750C demands a brief-



HANDHELD—HA! The MobilePro 750C is more a subnotebook than a PDA.

case or a big handbag when you're traveling. And don't expect the speed or versatility—or ISP support—of a Windows 95 Pentium-based notebook: The MobilePro 750C is sluggish and can't cope with graphics or anything else requiring full-blown Windows. But for

basic office work, e-mail, simple presentations, and moderate Web browsing, the 750C's light weight and outstanding keyboard and display make it a worthy substitute.

—Yardena Arar ▶

MobilePro 750C

PRO: Best keyboard ever on a Windows CE 2.0 machine, nice display.

CON: Large for a handheld, sluggish, less versatile than a subnote.

VALUE: Limited notebook functions at a good price and great weight. Street price: \$899

NEC Computer Systems Division
888/863-2669

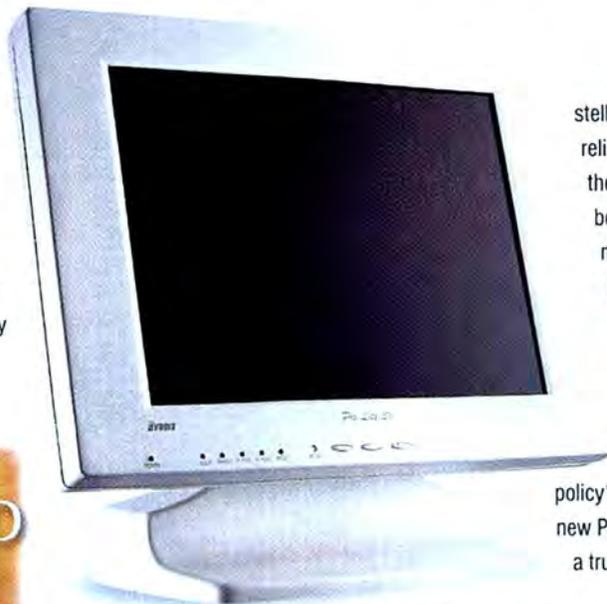
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LCD Panel	36cm (14.1" Viewable) TFT Color Liquid Crystal Display, flat panel Pixel Pitch: 0.279mm V, response time: 80ms nominal
Display Colors	Full Color
Sync Frequency	Horizontal: 23.0 - 62.5 kHz, Vertical: 50 - 200 Hz
Maximum Resolution	1024 x 768
Dot Clock	79MHz maximum
Power Consumption	27 W maximum Power Management: 6W (max)
Dimensions/Net Weight	15.4" x 14.2" x 7.8" (W x H x D) / 2.3 lbs
Tilt-Swivel Angle	Upward: 30 degrees
Approvals	CE, TÜV GS / MPRI / ISO 9241-3 / ISO 9241-8, FCC-B, TCO 95, UL/CUL, VCCI-B
Warranty	3-year limited warranty - LCD/Parts/Labor 1 year backlight, Vision Care, 48 hour exchange available



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**Three year parts and labor, 1 year backlight. Estimated Street Price is shown, actual price may vary. Prices do not include shipping, handling and any applicable taxes. Specifications are subject to change without notice.

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Perfect Five-Star Rating
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Performance & Technical Excellence
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VisionMaster Pro 21



Six Time Winner
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April 1997, May 1997, June 1997
VisionMaster Pro 21



October 7, 1997
VisionMaster Pro 17



March 1997
VisionMaster Pro 21



Seven Time Winner
July 1995, Jan 1997, March 1997,
July 1997, Sept 1997, Jan 1998, May 1998
VisionMaster Pro 17
April 1998
VisionMaster 450

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AMD 

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Circle 16 on reader service card

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PUBLISHING

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Print Office 1.0

PRO: Feature rich, includes organizer.

CON: Limited Web capabilities.

VALUE: For image tinkerers.

Street price: \$69

Corel

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www.corel.com

READER SERVICE NO. 662

The Print Shop 6.0 Deluxe

PRO: Lots of art and layouts.

CON: Limited image editing tools.

VALUE: Good for SOHO users.

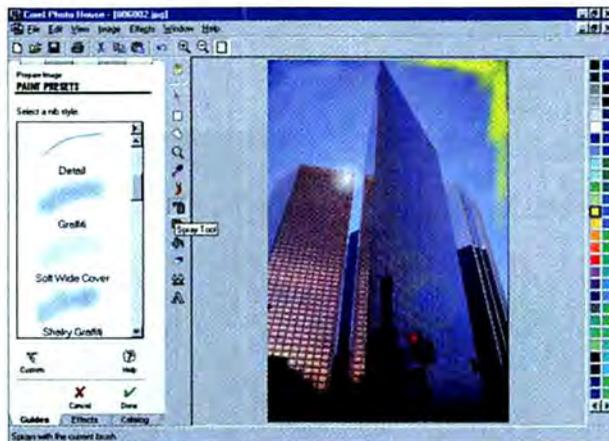
Street price: \$50

Broderbund Software

800/521-6263

www.broderbund.com

READER SERVICE NO. 663



EFFECTS MADE EASY: Corel's \$69 Print Office gives you many tools found in the company's higher-end graphics package, Photo-Paint.

Shop 6.0 Deluxe and Corel's \$69 Print Office 1.0 (a sibling of Print House Magic) both come with new tools for photo editing and Web design. Both programs offer easy-to-follow interfaces, predesigned layouts, and larger-than-ever collections of stock photos, clip art, and fonts. The preproduction copies I tested also include

tools for retouching, sharpening, brightening, darkening, and coloring, and for adding special effects to photos.

Though both products convert files into HTML documents, The Print Shop also lets you design your own Web site and comes with canned animated Web graphics and banner effects. In addition,

The Print Shop's ClickArt collection, with 100,000 images, is more substantial than Print Office's (though searching six different CDs to find a specific object is a drag). Finally, The Print Shop lets you manage your photos via thumbnails organized in an album.

But when it comes to photo editing, Print Office wins. Its image editing tool, Photo House, has more nifty effects (such as warp and blur), along with 30 brushes and painting tools copied from the higher-end Photo-Paint. Finally, it includes an organizer that tracks addresses and events—unusual for a publishing package, but potentially helpful.

Automation and useful wizards make both packages ideal for beginners. With more projects like cards and banners, The Print Shop is a better option for small-office/home-office users. But if you plan to edit lots of images, consider Print Office instead.

—Grace Aquino

Epson's Do-Everything Photo Printers

PRINTERS

HOLD IT, digital darkroom mavens: Don't plunk down big bucks for a photo printer that produces only dinky, snapshot-size prints until you've seen Epson's versatile Stylus Photo 700 and Stylus Photo EX. Unlike most photo printers, these are affordable, general-purpose ink jets that just happen to do a smashing job with photographs.

Essentially an upgrade to last year's original Stylus Photo, the \$279 Stylus Photo 700 delivers improved print quality

and speed at a lower price. The \$499 Stylus Photo EX ups the ante by also printing on 11-by-17-inch paper. At their best, shipping versions of both models produced images as photo-realistic as any I've seen from a personal printer: My vacation pictures, blown up to miniposter size on the EX, looked fabulous. But for maximum quality, you'll need plenty of disk space and time; my scanned photos ate up about 25MB each, and each took almost half an hour to print. I also got nice results in just a

few minutes with small, low-resolution JPEG images, and both printers did a competent job with text on plain paper (though at about a page per minute, the pace was sluggish).

Adding to these printers' appeal is Epson's large and growing selection of special print media. You can get snapshot-size paper that looks and feels like real photo stock (\$6.54 for 20 sheets), 8.3-by-23.4-inch panoramic banners (\$16.57 for 10), and even canvas cloth for prints that look like paintings (\$81.60 for a

9.84-foot, 16.5-inch-wide roll). Do enough printing on these pricey media, and you could put yourself into debt—but at least you'd have fun doing it.

—Harry McCracken ▶

Stylus Photo 700 and Stylus Photo EX

PRO: Spectacular photo reproduction, adequate with text; EX handles tabloid-size paper.

CON: Slow, especially at best-quality setting.

VALUE: Great photo output at a reasonable price.

List price: \$279 (700), \$499 (EX)

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1997 Direct Channel Achievement Award for Systems

PC Computing

1997 Most Valuable Product: QP6/266 SM-4x

Windows Magazine

WINLIST Award QP6/233 SB-3 (03/98)

PC Magazine

Editors' Choice Award QP5/233 M-3 (12/97)

PC World

16 Best Buy Awards Oct '97 - July '98 M & SM Series Desktops

PC World

2 Best Buy Awards #1 Rated Notebook H-1331 Notebook (06/98,07/98)

PC Computing

4-Star Rating Notebook Torture Test H-1211 Notebook (04/98)

PC Portables

Best Buy Award H-1331 Notebook (03/98)

C/Net Online

Editors' Choice Award H-1330 Notebook (02/98)

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Gateway	80%
Acer	74%
Digital	69%
Toshiba	61%
Compaq	58%
Packard Bell	51%

Windows Magazine, 8/97

OVERALL RANKINGS Technical Support Survey

PC VENDOR	GRADE
Quantex	Excellent
Dell	
IBM	
Compaq	Good
Gateway 2000	
Micron	
Acer	Fair
Toshiba	
Digital	
Packard Bell	Poor

Windows Magazine, 8/97

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At speeds of up to 400MHz, Intel's latest, most powerful Pentium® II processors deliver unprecedented performance on all intense business applications. They also improve overall system performance with enhancements like an integrated 100MHz system bus and AGP graphics optimization.



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- 512KB Secondary Cache
- 2GB HD / 3.5" 1.44MB Modular Floppy Drive
- PCMCIA K56flex protocol Fax/Modem*
- 24X Modular CD-ROM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 98
- Corel Office Suite 8
- Carrying Case
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

H-1210 w/Pentium processor w/MMX Technology 266MHz \$1649

Quantex H-1331 \$2699

Business lease: \$95/Mo.

- Pentium® II processor 266MHz
- Intel Mobile Module II (M.M.I.) Architecture
- 13.3" XGA Active Matrix Display
- 80MB SDRAM (expandable to 144MB)
- 512KB Secondary Cache
- 4GB HD / 3.5" 1.44MB Modular Floppy Drive
- PCMCIA K56flex protocol Fax/Modem*
- 24X Modular CD-ROM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- 2nd Lithium Ion Battery
- Mini Docking Station
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 98 or Windows NT Workstation 4.0
- MS Office '97 Small Business Edition
- Carrying Case
- 3-year limited warranty on CPU and Main Memory
- Upgrade to DVD-ROM Drive for only \$299

H-1331 w/Pentium II processor 233MHz or Pentium processor with MMX Technology 266MHz \$2499

Quantex H-1410 \$2499

Business lease: \$88/Mo.

- Pentium® II processor 233MHz
- Intel Mobile Module II (M.M.I.) Architecture
- 14.1" XGA Active Matrix Display
- 64MB SDRAM (expandable to 144MB)
- 512KB Secondary Cache
- 4GB HD / 3.5" 1.44MB Modular Floppy Drive
- PCMCIA K56flex protocol Fax/Modem*
- 24X Modular CD-ROM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 98
- MS Office '97 Small Business Edition
- Carrying Case
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

H-1410 w/Pentium II processor 266MHz \$2699

Above system also available with Pentium II processor 233MHz, 13.3" XGA Active Matrix Display, and 3GB HD \$2249

Quantex H-1411 \$3299

Business lease: \$108/Mo.

- Pentium® II Processor 266MHz
- Intel Mobile Module II (M.M.I.) Architecture
- 14.1" XGA Active Matrix Display
- 128MB SDRAM (expandable to 144MB)
- 512KB Secondary Cache
- 6GB HD / 3.5" 1.44MB Modular Floppy Drive
- PCMCIA K56flex protocol Fax/Modem*
- 24X Modular CD-ROM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- 2nd Lithium Ion Battery
- Mini Docking Station
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 98 or Windows NT Workstation 4.0
- MS Office '97 Small Business Edition
- Carrying Case
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

H-1411 w/Pentium II processor 233MHz \$3099

Business Desktops

Options: ■ Internal 100MB Zip Drive with one cartridge \$79 ■ HP LaserJet 6L Printer \$379 ■ Business Audio Kit \$49 ■ APC Back-UPS 300 \$99 ■ APC Back-UPS 500 \$129 ■ APC Back-UPS 550 \$139 ■ Seagate 4.8GB IR-4 Tape Backup \$199 ■ Seagate 10/20GB TR-5 Tape Backup \$299

QP5/233 SB-1 \$999

Business lease: \$35/Mo.

- Pentium® Processor with MMX® Technology 233MHz
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 32MB SDRAM Memory / 512KB Pipelined Burst Cache
- 2 1GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 64-bit 3D PCI Graphics Card with 4MB VRAM
- 15" Digital Monitor (13.8" viewable)
- Intel Pro 10/100 PCI Ethernet Adapter w/RJ-45
- 32X Max EIDE CD-ROM Drive
- Quantex Mid Tower Case
- 104 Key Keyboard with MS Mouse
- MS Windows 98
- 3-year limited warranty with 1-year On-Site Service**
- 24 hr./7-day Technical Support
- OSentry Technology (including Intel LANDesk Client Manager V.1.1)
- Upgrade to Windows NT Workstation 4.0 for \$99

QP6/266 SB-1 (w/ Pentium® II Processor) \$1099

QP6/300 SB-1 (w/ Pentium® II Processor) \$1199

QP6/266 SB-2 \$1399

Business lease: \$49/Mo.

- Pentium® II Processor 266MHz
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 32MB SDRAM Memory / 512KB Secondary Cache
- 4 3GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel 740 AGP Graphics with 8MB SDRAM
- 17" Digital Monitor (15.8" viewable)
- Upgrade to 17" Monitor w/NEC ChromaClear CRT for \$99
- Choice of Intel Pro 100 Ethernet Controller with Wake-On-LAN Technology or K56flex protocol Fax/Modem*
- 32X Max EIDE CD-ROM Drive
- Quantex ATX Mid Tower Case
- 104 Key Keyboard with MS IntelliMouse
- MS Windows 98
- MS Office '97 Small Business Edition
- 3-year limited warranty with 1-year On-Site Service**
- 24 hr./7-day Technical Support
- OSentry Technology (including Intel LANDesk Client Manager V.1.1)
- Upgrade to Windows NT Workstation 4.0 for \$99

QP5/233 SB-2 (w/ MMX Technology) \$1299

QP6/300 SB-2 (w/ Pentium® II Processor) \$1499

QP6/333 SB-2 (w/ Pentium® II Processor) \$1599

QP6/350 SB-3 \$1999

Business lease: \$70/Mo.

- Pentium® II Processor 350MHz
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 64MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel 740 AGP Graphics with 8MB SDRAM
- Upgrade to 3D Labs Permedia 2 w/8MB SGRAM for \$59
- 17" Digital Monitor w/NEC ChromaClear CRT (16.0" viewable, 25 dp, 1600x1200 max resolution)
- Choice of Intel Pro 100 Ethernet Controller with Wake-On-LAN Technology or K56flex protocol Fax/Modem*
- 32X Max EIDE CD-ROM Drive
- Quantex ATX Mid Tower Case
- 104 Key Keyboard with MS IntelliMouse
- MS Windows NT 4.0 Workstation
- MS Office '97 Small Business Edition
- 3-year limited warranty with 1-year On-Site Service**
- 24 hr./7-day Technical Support
- OSentry Technology (including Intel LANDesk Client Manager V.1.1)

QP6/300 SB-3 (w/ Pentium® II Processor) \$1649

QP6/333 SB-3 (w/ Pentium® II Processor) \$1749

QP6/400 SB-3 (w/ Pentium® II Processor) \$2199

QP6/400 SB-4 \$2399

Business lease: \$84/Mo.

- Pentium® II Processor 400MHz
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8 4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 19" Digital Monitor 7 AGP Graphics Card with 8MB SDRAM
- 19" Digital Monitor (18.1" viewable)
- Choice of Intel Pro 100 Ethernet Controller with Wake-On-LAN Technology or K56flex protocol Fax/Modem*
- 32X Max EIDE CD-ROM Drive
- Quantex ATX Mid Tower Case
- 104 Key Keyboard with MS IntelliMouse
- MS Windows NT 4.0 Workstation
- MS Office '97 Small Business Edition
- 3-year limited warranty with 1-year On-Site Service**
- 24 hr./7-day Technical Support
- OSentry Technology (including Intel LANDesk Client Manager V.1.1)
- Upgrade to Internal 100MB Zip Drive for \$79

QP6/300 SB-4 (w/ Pentium® II Processor) \$1899

QP6/333 SB-4 (w/ Pentium® II Processor) \$1999

QP6/350 SB-4 (w/ Pentium® II Processor) \$2199

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Small Business Edition includes: Word 97 · Excel 97 · Outlook 97 · Publisher 97 · Small Business Financial Manager 97 · Automap Streets Plus

Business Servers

QX5000 Server \$2499

Pentium® II Processor 350MHz

Business lease: \$88/Mo.

- Pentium® II Processor 350MHz (Dual-Processor Upgradeable)
- 64MB 100MHz ECC SDRAM (1GB Max.) / 512KB L2 ECC Cache
- 32X Max EIDE CD-ROM Drive/3.5" 1.44MB Floppy Drive
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- Dual Channel Ultra Wide & Narrow SCSI-3 Controller
- Intel EtherExpress Pro™ 100B Fast Ethernet w/RJ-45
- Server Tower Case w/ 5 Hot-Swap Bays
- I/O Ready & RAID capable
- Emergency Management Port
- 3-year limited warranty with 1-year On-Site Service**
- 24 hr./7-day Technical Support

QX5000 Server \$4099

Pentium® II Processor 400MHz

Business lease: \$134/Mo.

- Pentium® II Processor 400MHz (Dual-Processor Upgradeable)
- 128MB 100MHz ECC SDRAM Memory
- 9 1GB Ultra Wide SCSI-3 Hot-Swappable Hard Drive
- MS Windows NT Server 4.0 w/10 Client License

Small Business Server \$3999

Pentium® II Processor 350MHz (Dual-Processor Upgradeable)

Business lease: \$130/Mo.

- Pentium® II Processor 350MHz (Dual-Processor Upgradeable)
- 512KB L2 ECC Cache
- 64MB 100MHz ECC SDRAM Memory (1GB Max.)
- 3.5" 1.44MB Floppy Drive
- 4GB Ultra-Wide SCSI-3 Hard Drive (7200 rpm)
- 15" Digital Monitor (13.8" viewable)
- Dual Channel Ultra-Wide & Narrow SCSI-3 Controller
- 32X Max EIDE CD-ROM Drive
- K56flex protocol Fax/Modem*
- Intel EtherExpress Pro™ 100B Fast Ethernet w/RJ-45
- Server Tower Case
- 104 Key Keyboard with MS Mouse
- Microsoft® BackOffice® Small Business Server Suite
- 3-year limited warranty with 1-year On-Site Service**
- 24 hr./7-day Technical Support
- Call for Special Server Support Options
- Call for additional processor configurations



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American Heritage Talking Dictionary • Internet the City • Compton's Reference Collection • Dr. Solomons Find Virus • MS Internet Explorer 4.0

QP6/233 M-1x \$1149
Lease: \$41/Mo.

- Pentium® II Processor 233MHz
- 32MB SDRAM Memory / 512KB Secondary Cache
- 4.3GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 128 bit RIVA 3D Graphics Card with 4MB
- 15" Digital Monitor (13.8" viewable)
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 32X Max EIDE CD ROM Drive
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-90 Speakers
- Quantex Mid Tower Case
- 104 Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3 year limited warranty with 1 year On-Site Service**

QP5/233 M-1 (with MMX Technology) . . . \$1049
QP6/266 M-1x (with Pentium II processor) . \$1199
QP6/300 M-1x (with Pentium II processor) . \$1299

QP6/266 M-2x \$1399
Lease: \$49/Mo.

- Pentium® II Processor 266MHz
- 32MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Toshiba MPACT2 3D Media Accelerator w/8MB VRAM
- 17" Digital Monitor (15.8" viewable)
- Upgrade to 17" Monitor w/NEC CinemaClear CRT for \$99
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 2nd Generation DVD-ROM Drive w/MPACT2 Decoding
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104 Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- Upgrade to Quantex "Ultimate Gaming Bundle" for \$299

QP5/233 M-2 (with MMX Technology) . . . \$1299
QP6/300 M-2x (with Pentium II processor) . \$1499
QP6/333 M-2x (with Pentium II processor) . \$1599

QP6/300 M-3x \$1599
Lease: \$56/Mo.

- Pentium® II Processor 300MHz
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Toshiba MPACT2 3D Media Accelerator w/8MB VRAM
- 17" Digital Monitor (15.8" viewable)
- Upgrade to 17" Monitor w/NEC CinemaClear CRT for \$99
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 2nd Generation DVD-ROM Drive w/MPACT2 Decoding
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- Upgrade to Quantex "Ultimate Gaming Bundle" for \$299

QP6/266 M-3x (with Pentium II processor) . \$1499
QP6/333 M-3x (with Pentium II processor) . \$1699
QP6/350 M-3x (with Pentium II processor) . \$1849

QP6/333 M-4x \$1999
Lease: \$70/Mo.

- Pentium® II Processor 333MHz
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel®40' AGP Graphics with 8MB SDRAM
- 19" Digital Monitor (18.1" viewable)
- Internal 100MB Zip Drive with one cartridge
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 2nd Generation DVD-ROM Drive
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104 Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- Upgrade to Quantex "Ultimate Gaming Bundle" for \$299

QP6/350 M-4x (with Pentium II processor) . \$2149
QP6/400 M-4x (with Pentium II processor) . \$2349

Power Multimedia Series

Software: MS Office '97 Small Business Edition • MS Money '97 • Office Mate • Day Planner Pro • Power Business Plans • Form Designer Pro
• Project Manager Pro • Labels Unlimited • Compton's Reference Collection • Dr. Solomons Find Virus • MS Internet Explorer 4.0

QP6/266 SM-1x \$1299
Lease: \$46/Mo.

- Pentium® II Processor 266MHz
- 32MB SDRAM Memory
- 4.3GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel®40' AGP Graphics with 8MB SDRAM
- 15" Digital Monitor (13.8" viewable)
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 32X Max EIDE CD ROM Drive
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104 Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 Small Business Edition
- 3-year limited warranty with 1 year On-Site Service**

QP6/300 SM-1x (with Pentium II processor) . \$1399
QP6/333 SM-1x (with Pentium II processor) . \$1499
QP6/350 SM-1x (with Pentium II processor) . \$1649
QP6/400 SM-1x (with Pentium II processor) . \$1849

QP6/300 SM-2x \$1649
Lease: \$58/Mo.

- Pentium® II Processor 300MHz
- 64MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Toshiba MPACT2 3D Media Accelerator w/8MB VRAM
- 17" Digital Monitor (15.8" viewable)
- Upgrade to 17" Monitor w/NEC CinemaClear CRT for \$99
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 2nd Generation DVD-ROM Drive w/MPACT2 Decoding
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-45 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104 Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 Small Business Edition
- Upgrade to Quantex "Ultimate Gaming Bundle" for \$299

QP6/333 SM-2x (with Pentium II processor) . \$1749
QP6/350 SM-2x (with Pentium II processor) . \$1899
QP6/400 SM-2x (with Pentium II processor) . \$2099

QP6/350 SM-3x \$1999
Lease: \$70/Mo.

- Pentium® II Processor 350MHz
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel®40' AGP Graphics with 8MB SDRAM
- 17" Digital Monitor w/NEC CinemaClear CRT (16.0" viewable; 75 dpi, 1600x1200 max. resolution)
- Internal 100MB Zip Drive with one cartridge
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-45 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 Small Business Edition
- Upgrade to Quantex "Ultimate Gaming Bundle" for \$299

QP6/300 SM-3x (with Pentium II processor) . \$1749
QP6/333 SM-3x (with Pentium II processor) . \$1849
QP6/400 SM-3x (with Pentium II processor) . \$2199

QP6/400 SM-4x \$2349
Lease: \$82/Mo.

- Pentium® II Processor 400MHz
- 64MB SDRAM Memory / 512KB Secondary Cache
- 11.5GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel®40' AGP Graphics with 8MB SDRAM
- 19" Digital Monitor (18.1" viewable)
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-45 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104 Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 Small Business Edition
- 3 year limited warranty with 1 year On-Site Service**
- Upgrade to Internal 100MB Zip Drive for \$79
- Upgrade to Quantex "Ultimate Gaming Bundle" for \$299

QP6/300 SM-4x (with Pentium II processor) . \$1899
QP6/333 SM-4x (with Pentium II processor) . \$1999
QP6/350 SM-4x (with Pentium II processor) . \$2149

Super Multimedia

QP6/333 M-4x SE \$1899
Lease: \$67/Mo.

- Pentium® II Processor 333MHz
- 64MB SDRAM Memory / 512KB Secondary Cache
- 11.5GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Toshiba MPACT2 3D Media Accelerator w/8MB VRAM
- 17" Digital Monitor w/NEC CinemaClear CRT (16.0" viewable; 25 dpi, 1600x1200 max. resolution)
- Internal 100MB Zip Drive with one cartridge
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 2nd Generation DVD-ROM Drive w/MPACT2 Decoding
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
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QP6/300 M-4X SE (with Pentium II processor) . \$1799
QP6/350 M-4X SE (with Pentium II processor) . \$2049
QP6/400 M-4X SE (with Pentium II processor) . \$2249

QP6/400 SM-4x SE \$2799
Lease: \$97/Mo.

- Pentium® II Processor 400MHz
- 128MB SDRAM Memory / 512KB Secondary Cache
- 16.8GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel®40' AGP Graphics with 8MB SDRAM
- 19" Digital Monitor (18.1" viewable)
- Internal 100MB Zip Drive with one cartridge
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 2nd Generation DVD-ROM Drive
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-490 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104 Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 Small Business Edition
- 3 year limited warranty with 1 year On-Site Service**
- Upgrade to Quantex "Ultimate Gaming Bundle" for \$299

QP6/300 SM-4x SE (with Pentium II processor) . \$2349
QP6/333 SM-4x SE (with Pentium II processor) . \$2449
QP6/350 SM-4x SE (with Pentium II processor) . \$2599

Best Buy Specials

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Lease: \$81/Mo.

- Pentium® II Processor 400MHz
- 64MB SDRAM Memory / 512KB Secondary Cache
- 11.5GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Toshiba MPACT2 3D Media Accelerator w/8MB VRAM
- 19" Digital Monitor (18.1" viewable)
- Internal 100MB Zip Drive with one cartridge
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 2nd Generation DVD-ROM Drive w/MPACT2 Decoding
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- Upgrade to Quantex "Ultimate Gaming Bundle" for \$299

Ultimate Gaming Bundle
• 3Dfx Voodoo2 based 3D Accelerator w/12MB
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• MS SideWinder 3D Pro Joystick
• 3 Activision Game Titles
Upgrade for \$299

SM-Series Best Buy \$2499
Lease: \$88/Mo.

- Pentium® II Processor 400MHz
- 64MB SDRAM Memory / 512KB Secondary Cache
- 11.5GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel®40' AGP Graphics with 8MB SDRAM
- 19" Digital Monitor (18.1" viewable)
- 100MB Internal Zip Drive with one cartridge
- K56flex PCI Fax/Modem™ w/Voice Mail and Speakerphone
- 2nd Generation DVD-ROM Drive
- Ensoniq 32-Bit PCI Wavetable Sound Card
- Altec Lansing ACS-45 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 Small Business Edition
- Upgrade to Quantex "Ultimate Gaming Bundle" for \$299



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FIRST WE HAD free, advertiser-sponsored e-mail on the Web for people who wanted to handle their correspondence from any Web browser. Now we have WebCal Personal Interactive Calendar, a free, on-line advertiser-sponsored calendar for those who want to manage their schedule from any Web browser. My informal tests suggest the service is well worth the few minutes it takes to sign up.

As a registered user, you log

WebCal Personal Interactive Calendar

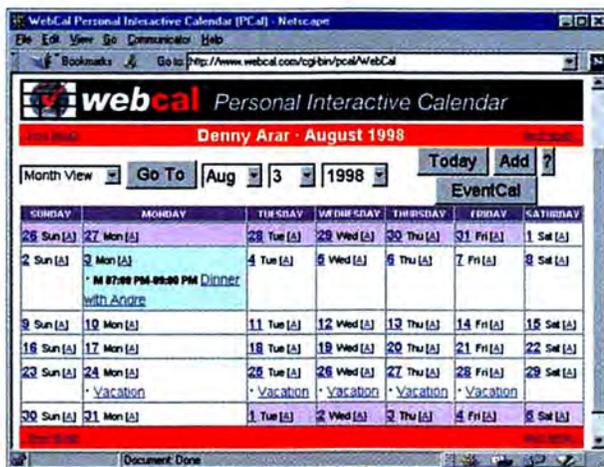
PRO: Free Web-based personal calendar that can be accessed by other people.

CON: Currently lacks two-way synchronization with many organizers, has clunky interface.

VALUE: An easy-to-use calendar that doesn't cost a dime.

WebCal

www.webcal.com



WHAT DO I HAVE TO DO TODAY? WebCal's advertiser-supported personal calendar lets you view your schedule from any Web browser.

in to the WebCal site and view your appointments by day, week, month, or year—a banner ad pays the bills. Click a date or appointment, and you can view, edit, or delete entries using an HTML form. WebCal will even send e-mail reminders to you and to as many people as you wish; simply enter the addresses and when you

want the notices to be sent.

You can also transfer your WebCal appointments to a PalmPilot or to Microsoft Outlook via a free Java applet that you can download from the Web site. (By the time you read this, WebCal says, you'll be able to transfer data to WebCal from your Pilot or Outlook as well.) With a few mouse

clicks, you can also add to your schedule public events—concerts, trade shows, and so on—listed on WebCal's sister site, EventCal (www.eventcal.com). If you want to let others view your calendar—say, to see when you might be free for a meeting—just give them your personal WebCal URL (you can prevent them from seeing particular entries).

Although you can customize backgrounds, fonts, and colors, the layout isn't terrific—buttons and appointment entry forms could hog less space and be laid out better. Two-way synchronization with more personal information managers and organizers would make WebCal even more useful (and is supposed to be added later). But otherwise, WebCal looks like a winner for those who don't always want to carry an appointment book or personal digital assistant, or who want to make their schedules easily available to a friend or colleague.

—Paul Heltzel

Synchrony's BigDisk Spells Big Risk

UTILITY

THE PROBLEM: Your hard drive is divided into multiple partitions (either to keep your data in small, efficient clusters, or because your version of Windows won't recognize a hard drive bigger than 2GB), but you'd like to avoid fiddling with D: or E: drives when you're installing new software or looking for files. The solution: Trick Windows into seeing all of your hard drive partitions as one big C: drive. That's the promising premise

of Synchrony's BigDisk 1.5, which unfortunately fumbles the execution.

With BigDisk 1.5 installed, when you write a file to a full C: drive, it's saved to a hidden folder on another drive or partition (a network drive or a large removable medium like a Zip drive). Meanwhile, Windows believes the file is on C:.

The problem with fooling Windows in this way surfaces when you install Windows programs with files that must be on the real C: drive. As a

rule, BigDisk is smart enough not to redirect these files to another location. But what happens when there's no room on the C: drive—something you may not even notice if you use BigDisk? The result can be disastrous. Twice when I attempted to install Microsoft Office 97 on a crammed hard disk using a shipping version of BigDisk, I crippled Windows to the point where it wouldn't boot.

To be fair, this happened only when I had a very small

(126MB) C: partition. With a 511MB C: drive, Office installed without catastrophe—though even then it was touch and go on one occasion. All in all, the advantages just aren't worth the risks.

—Lincoln Spector

BigDisk 1.5

PRO: Simplifies multiple partitions.

CON: Can do serious damage to Windows.

VALUE: Not worth the risk.

Street price: \$40

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Megapixel Cameras: When More Is More

DIGITAL CAMERAS

WITH DIGITAL imaging, the higher the resolution, the better the picture. If you just want to capture images to post on the Web, or some 3-by-5-inch prints, a camera limited to standard 640 by 480 resolution should do fine. But if you want to print larger photos or need top-quality images, a higher-resolution megapixel camera is the answer, and these units are becoming more affordable. I checked out two of the newest from Canon and Olympus.

Priced at \$699, the compact, 8.1-ounce Canon PowerShot A5 has an autofocus 35mm lens (f2.5) and comes with an 8MB CompactFlash card that stores up to 89 images at 1024 by 768 resolu-

Canon PowerShot A5

PRO: Fits in shirt pocket, stores lots of shots, includes AC power supply.

CON: Not the highest megapixel resolution for the price, more complex to use than the Olympus.

VALUE: Good workhorse for personal use.

Street price: \$699

Canon Computer Systems

800/652-2666

www.ccsi.canon.com

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Olympus D-340L

PRO: High 1280 by 960 resolution, good-quality images, easy to use.

CON: Less storage than the Canon, AC power supply costs extra.

VALUE: Takes good pictures, but not quite as good as the similarly priced Epson PhotoPC 700.

Street price: \$699

Olympus America

800/347-4027

www.olympus.com

READER SERVICE NO. 665



IMAGE IS EVERYTHING: The enlarged detail from a 1280-by-960-pixel image captured by the Olympus D-340L (left) looks better than a similar enlargement from a 640 by 480 image.

tion, or 236 images at 512 by 384 resolution.

For the same price as the Canon, the Olympus D-340L offers higher resolution and is almost as light. It has an autofocus 36mm lens (f2.8) and comes with a 4MB SmartMedia card that captures up to 18 images at 1280 by 960 resolution, or 60 images at standard 640 by 480 resolution.

The Canon and Olympus share many similar features, including 2-inch color LCD screens, built-in flash, macro capability, serial-port connectors, video-out connectors, and software bundles that include image editing and slide show applications. Both cameras also feature two new shooting modes: sequence shooting for capturing a series of action shots, and panorama shooting for stitching multiple images together to create ultra-wide-angle shots.

But judging from a variety of indoor and outdoor shots I

took with preproduction units, then viewed on screen and printed with a photo-quality ink jet, the cameras differ in image quality. I found the Olympus images consistently better looking—sharper, with more detail and better contrast than those from the Canon.

For personal use, the Canon PowerShot A5 is a fine choice, especially if you like to fiddle with lots of settings. Its large storage capability is a big plus. But if image quality is paramount, the Olympus D-340L is a better option.

However, my megapixel camera of choice remains the Epson PhotoPC 700 (reviewed in July's *New Products*). Its photos are of better quality than those produced by the Olympus; it lets you switch lenses; and it comes with a nifty pocket-size, rechargeable battery pack and an AC power adapter (Olympus charges \$50 for an AC adapter).

—Richard Jantz ▶

Sub-\$1000 LCD Monitor

FLAT LCD SCREENS, with their sharp focus and space-saving designs, make a great alternative to bulky CRTs. But until recently, they've cost \$1500 and up. ViewSonic's VPA 138 ViewPanel (13.8-inch diagonal viewable screen) breaks the \$1000 barrier with a street price of \$895. It weighs just 12 pounds, including integrated speakers; the panel is about 1.5 inches thick. At its optimal 1024 by 768 resolution, it impressed a jury of 17-inch CRT users with its terrific graphics and readable text. A portrait driver even lets you swivel the panel and view pages lengthwise. If you've got the cash, the VPA 138 deserves a close look. ViewSonic; 800/888-8583; www.viewsonic.com

READER SERVICE NO. 675

—Rex Farrance

Organizer With Extras

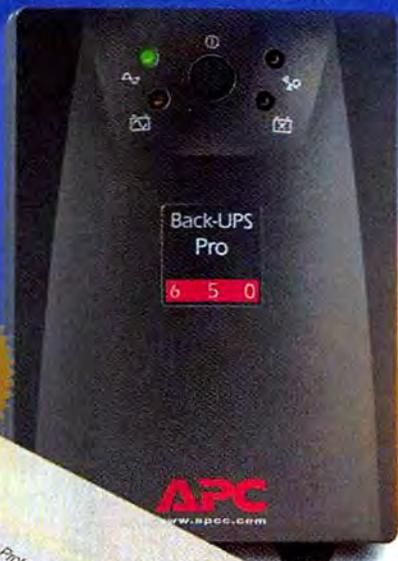
WITH ITS easy-to-master Filo-fax-ish interface, Lotus Organizer for Windows 95 and NT is one of the most popular personal information managers. An upgrade makes it more powerful. For \$79 (\$49 upgrade), **Organizer 4.1 Premium Edition** offers all the functionality of Organizer GS, plus useful data entry and synchronization utilities. CardScan creates records from scanned business cards; EasyClip simplifies generating Organizer entries from Windows Clipboard text; EasySync transfers data to and from the PalmPilot and Avigo; and travel planning software lets you enter bookings directly into Organizer. Best of all, the upgrade is likely cheaper than a separate third-party application. Lotus Development; 800/465-6887; www.lotus.com

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—Yardena Arar

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Pagis Pro Wins Document Manager Face-Off

DOCUMENT MANAGERS

WITH DECENT flatbed scanners going for under \$100, does it make sense to spend just as much on software that makes the scanner easier to use? Absolutely—if that package is ScanSoft's \$99 Pagis Pro 2.0. Although it's the priciest of three new document managers I evaluated, Pagis's Swiss Army Knife-like versatility and slick integration with Windows make it a great deal. Caere's \$39 PageKeeper Standard 3.0 is worth considering if you're on a tight budget, but Thinkstream's \$80 Scan-O-matic 1.1 leaves out some key features.

THE KITCHEN SINK: PAGIS PRO

SCANSOFT CALLS Pagis Pro a scanning suite, an appropriate moniker considering that it incorporates full, integrated versions of the company's TextBridge Pro optical character recognition software (\$79 stand-alone) and MGI's PhotoSuite image editor (\$49 stand-alone). The preproduction version I tested is a document manager that does just about everything well: You can

PageKeeper Standard 3.0

PRO: Low price, performs OCR in the background.

CON: No indexed searching, no image editing, basic OCR features only.

VALUE: Spartan, but easy to use and inexpensive.

List price: \$39

Caere

888/922-2373

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PAGIS PRO SOUPS UP WINDOWS EXPLORER so you can manage photos and text documents using thumbnails right on the desktop.

convert paper documents into editable text, annotate scans, tweak photos, make quick color copies, and scan in a form and fill it out on your PC. The program also creates full-text indexes of the documents in selected folders (or entire drives) for lightning-quick keyword searches.

Just as important, because Pagis works seamlessly with Windows, you perform all of those tasks right on the desktop, using thumbnail images of your documents that show up in Windows Explorer. Another big plus: Pagis's XIF

file format tightly compresses scanned magazine and book pages (one page I scanned went from a sizable 5.8MB to a scant 317KB), with no degradation in quality.

THE PAGEKEEPER COMPROMISE

AT LESS THAN half the price of Pagis Pro, you wouldn't expect PageKeeper Standard 3.0 to match all of Pagis's features—and it doesn't. It lacks image editing capabilities, has fewer sophisticated search tools, and comes with only Caere's basic (though highly

Scan-O-matic 1.1

PRO: Comes equipped with helpful wizards for Web publishing and other tasks.

CON: No OCR, full-text searching, or links to other apps.

VALUE: Not without its virtues, but missing important tools.

List price: \$80

Thinkstream

800/308-3690

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accurate) OCR engine, among other omissions and weaknesses. For \$39 you receive straightforward features for scanning and annotating documents, organizing them into folders, and sending them to another application (such as a word processor or photo editor) with a couple of clicks.

The preproduction version of PageKeeper I tested does beat Pagis Pro in one major respect: It performs OCR on scanned text documents in the background while you work. (Pagis's OCR seizes control of the program until it's done.) Though not for power users, PageKeeper is worth a look if you've got a cheap scanner without a document manager. Caere plans to release a beefier edition later this year.

THE ROUGH-EDGED NEWCOMER: SCAN-O-MATIC

A NEW ENTRY in the document-manager race, Thinkstream's Scan-O-matic 1.1 is a mixed bag; I looked at a shipping copy. On the plus side, it's got wizards for tasks such as turning scanned images into HTML files and posting them to a Web site. It also has nice features for annotating documents and editing images. Unlike the competition, however, Scan-O-matic omits built-in OCR and can't search for text within files.

The user interface could use work, too: It's got some of the most cryptic icons I've seen; and there's no simple way to get pages off the desktop and into a variety of other applications—a crucial feature that makes Pagis Pro and PageKeeper so useful.

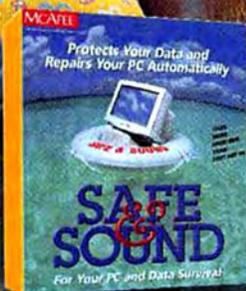
—Harry McCracken ▶



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Visual Page Gains Support for 4.x Browsers

WEB AUTHORING

CREATING WEB pages without coding is easy. The hard part is choosing a good WYSIWYG editor from an abundance of options. Symantec's \$100 Visual Page 2.0 is a solid budget application for novice and intermediate users, especially those designing pages for the latest versions of Internet Explorer and Navigator.

The prerelease version I reviewed retains the previous version's straightforward in-

Visual Page 2.0

PRO: Simple to use, supports pixel-precise layouts.

CON: Some layout tools work only if page is viewed with newer browsers.

VALUE: Decent budget tool for novices and intermediates.

Street price: \$100

Symantec

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www.symantec.com

READER SERVICE NO. 671

terface for editing text and images. Intuitive tools allow you to create and edit tables and frames by clicking and dragging. Plus, new site management utilities let you rearrange pages, check for broken links, and spell-check an entire site. When you're done, you transfer only modified pages—a crucial time-saver.

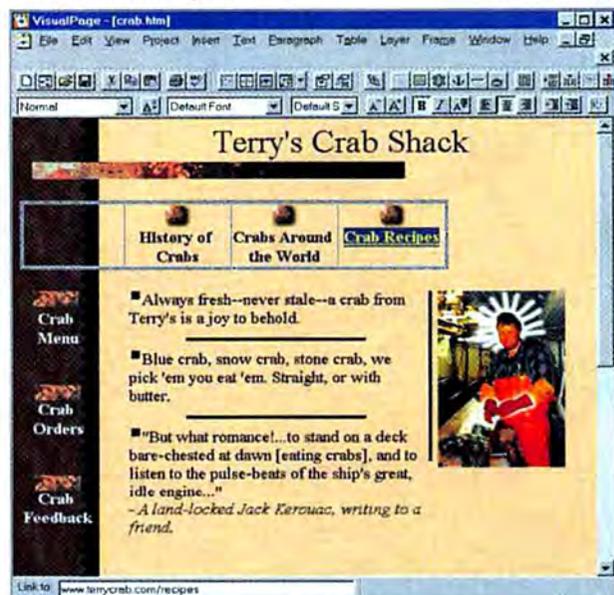
Visual Page supports the Cascading Stylesheets standard, which includes some features (such as overlapping layers and precise positioning of elements) that can be viewed only with Navigator or IE 4.0 or higher. Other attributes of CSS—the ability to set colors or fonts across an entire site, for example—are supported by IE 3.x. Editing these attributes is surprisingly easy.

In lieu of tricky templates, I'd prefer more wizards to help me create complex pages, and a multiple undo capabili-

ty. Also, if you want graphics that will look good to a general audience, you're better off paying up to \$50 more for Microsoft FrontPage 98, which will give a consistent look and feel to your site regardless of

the browser used. But if you're designing pages for viewing with 4.x browsers—say, for a corporate intranet where users are standardized on these versions—Visual Page 2.0 is a solid bet for its speed, reasonable price, and site management features.

—Paul Heltzel



PRECISE LAYOUTS are easy with Visual Page 2.0 but must be viewed with Netscape Navigator 4.x or Microsoft Internet Explorer 4.x.

Hot Lava! Fast PCI Parallel Port

CONNECTIVITY

I LOVE PARALLEL port peripherals. Who wouldn't? You don't have to open your PC to hook them up; moving them to another system is a snap; and if you have a built-in pass-through, you can still use your printer. What I hate is the waiting involved in passing data across a parallel port—5 minutes to transfer 20MB to a Zip disk, and what seems like an eternity to archive half a gigabyte onto a CD-R disc.

Lava Computer's \$50 Parallel-PCI card dramatically

slashes the waiting time associated with file transfers and scanning by letting you flush the data through a high-speed Enhanced Parallel Port over the PCI bus. It took me only minutes to install a shipping version. Then, with a stopwatch in hand, I dragged a 10MB file from a Zip Plus disk to my hard drive. The transfer took only 40 seconds, compared to the 150 seconds it took without the card on the same test machine (a Dell Dimension XPS P90).

Transferring the same file

back from the hard disk to the Zip Plus disk, however, produced mixed results. With the Lava card installed, the return trip took slightly longer—50 seconds. With the EPP alone, the transfer took 65 seconds—15 seconds slower than with the Lava card but still considerably speedier than in the other direction. These wide variations occur because of the way data is stored and transferred on the two media. Regardless of the variations, though, the bottom line is that the combined round-trip took

about 2 minutes less when the Lava card was installed. I can't wait to use the Lava Parallel-PCI card for those interminable 500MB parallel port CD-R recording sessions!

—Rex Farrance ▶

Lava Parallel-PCI

PRO: Speeds up data transfers over the parallel port.

CON: Takes up a PCI slot.

VALUE: First improvement in parallel port performance since the standard Enhanced Parallel Port.

Street price: \$50

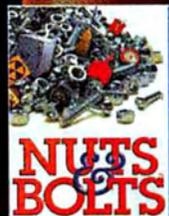
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The Little IntelliMouse That Roars

INPUT DEVICE

INTRODUCED last year as part of the Microsoft Office 97 roll-out, the IntelliMouse added a small wheel to the standard set of buttons. This wheel let you scroll up and down and zoom in and out in applications. However, there was one catch: It worked only with Office 97 and a couple of other select Microsoft products. Competi-

Microsoft IntelliMouse Pro

PRO: Ergonomic, customizable, works with all Windows apps.

CON: Oversized for some users, not for lefties.

VALUE: Price is high, but so is the level of functionality.

Street price: \$70

Microsoft

800/426-9400

www.microsoft.com

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INTELLIMOUSE PRO works with all Windows applications.

tors, most notably Logitech's MouseMan+, quickly stepped in with scroll wheels that functioned with *any* Windows software and also offered an enhanced ergonomic design.

With the IntelliMouse Pro, Microsoft has finally caught up with the pack. The new

device's wheel controls accommodate fast zooming and scrolling in all Windows software. The accompanying IntelliPoint 2.2 driver software adds such useful features as custom button assignments, snap-to highlighted button cursors, and on-screen cursor visibility aids. In Office 97-compatible applications, you can zoom to any magnification quickly by rolling the wheel while holding down the <Ctrl> key. (Owners of the older IntelliMouse can download IntelliPoint 2.2 software free from Microsoft's Web site.)

The Pro's shape is similar to that of Logitech's MouseMan+,

but with a higher arch that is designed to provide greater support (though a shipping version I showed to coworkers felt oversized to some who were accustomed to a smaller mouse). Microsoft has also added a hard rubber base that makes gripping the device easier. Among its drawbacks, the IntelliMouse Pro has only three customizable buttons on the left base, compared to four on the MouseMan+. And lefties need not apply: It's a right-hand mouse only. Nevertheless, if price is not a major issue (the IntelliMouse Pro costs \$70, compared to \$60 for a regular IntelliMouse or \$30 for the new, no-frills Microsoft Wheel Mouse), the benefits of arch support and platformwide functionality make the IntelliMouse Pro a noteworthy improvement over its predecessor.

—Michael S. Lasky

Aviator Wireless LAN: Grounded

NETWORKING

MOST WIRELESS network products require linked computers to be within sight of one another. WebGear's Aviator Wireless Network promises seamless networking—even through walls—for PCs up to 75 feet apart. It's also inexpensive, as wireless LAN hardware goes: For \$299, you get two radio transceivers, each about the size of a deck of playing cards, that attach quickly and easily to the PCs' parallel ports.

But after a good start in my testing, a shipping version of Aviator nosedived, never to recover. At first, the modules installed flawlessly on a Dell

desktop and a WinBook notebook situated 20 feet away. After verifying the connection with the supplied utility, I used Explorer to drag and drop a 1.4MB graphics file from the notebook to the desktop. The transfer took 30 seconds, averaging about 470 kilobits per second, close to the advertised 500-kbps rate.

But then things went awry. Several attempts to transfer a Zip file to the desktop produced 'Network Busy' messages, even though there was no other activity on our connection. A transfer from the notebook to an Okidata printer attached to the desktop also

failed. I tried surfing the Net from the notebook via the desktop's dial-up Internet connection (using included Internet sharing software), but Web pages took too long to appear—over 5 minutes for content that should have loaded in 40 to 50 seconds. Calls to WebGear's tech support failed to solve any of the problems. A 2-hour phone session with the tech support manager proved equally futile, even after I tried using two other notebooks.

WebGear suggested that the problems may be caused by everything from an ECP printer port setup to wavetable-equipped sound systems that

purportedly grab extra IRQs and DMAs. Valid? Maybe. But even if typical users had access to the kind of help we got, trying to solve these problems is well beyond the ken, not to mention the patience, of most of them. Back to the drawing board, WebGear.

—Bryan Hastings ■

Aviator Wireless Network

PRO: One of the least-expensive wireless LAN systems capable of operating through walls.

CON: Didn't work as advertised.

VALUE: None, until setup problems are worked out.

Street price: \$299

WebGear

www.webgear.com

408/271-9888

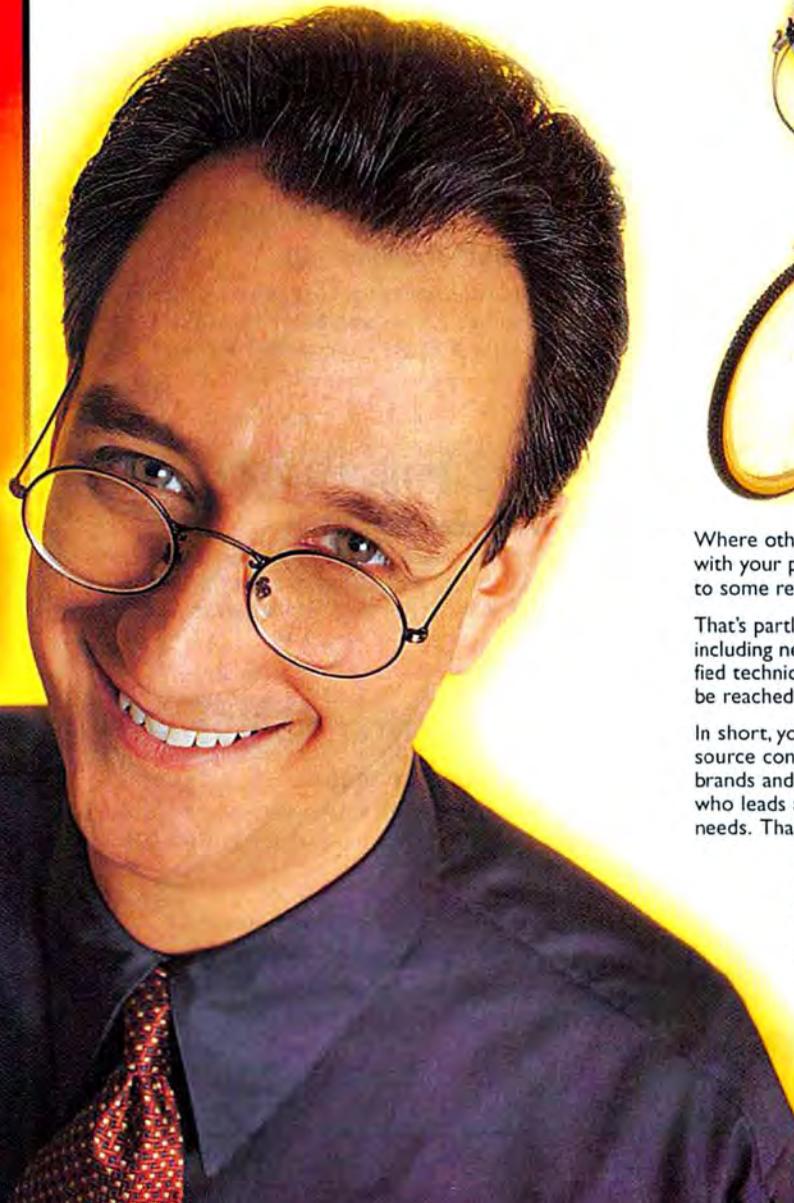
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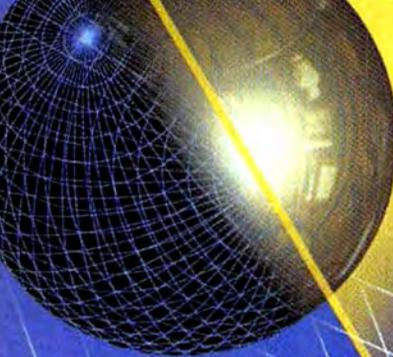
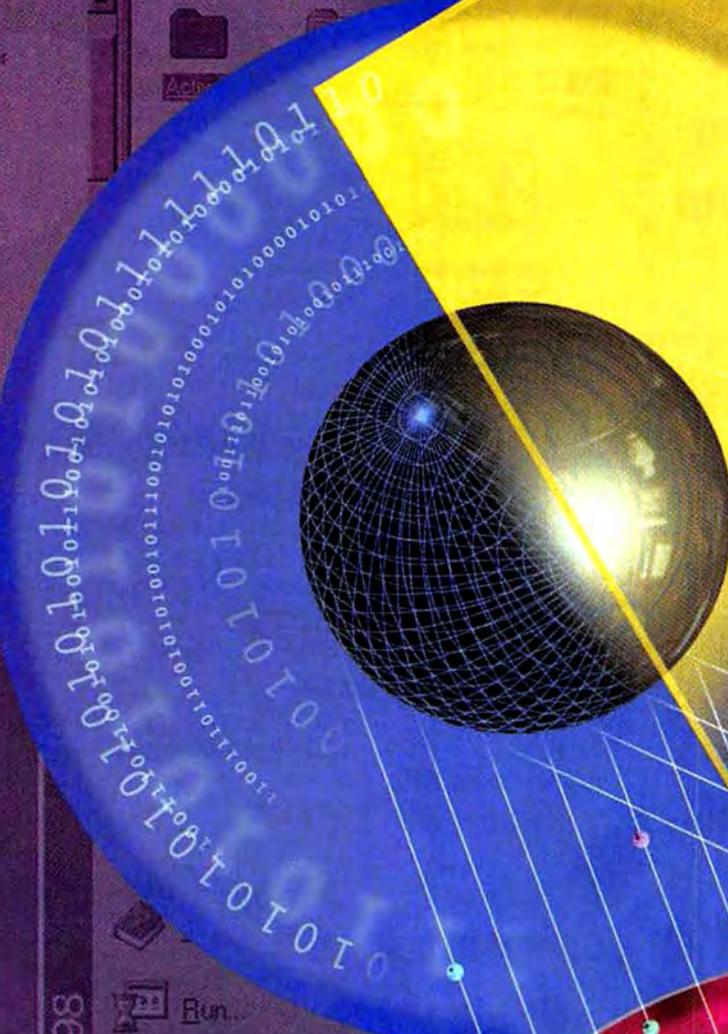
(C:) Explorer window showing file system:

- Acrobat3
- Reader
- ad30
- ad30A
- Cdrom
- Dell
- Dos
- Download
- Drivers
- Ma
- mic
- Mainput
- MSOffice
- My Docum
- network e
- notes
- Program
- Acce
- Chat
- Comm

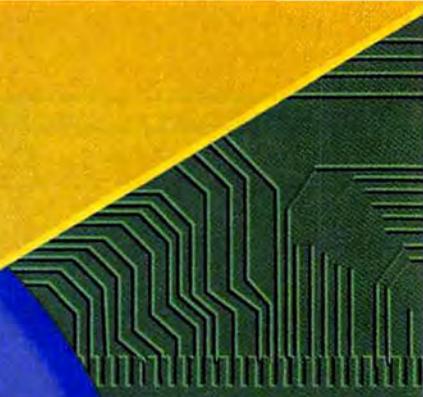
Windows98 taskbar:

- Start
- Run...
- Log Off BGRIMES...
- Shut Down...

Reader



5 9 8 =
 5 % 3 9 4 5 8 9 6 5 3 2 5 4 1
 Δ 1 2 8 1 5 % + 1 5 8 3 # 1 6 8 5
 5 9 8 = 4 5 8 9 % 3 2 2 Δ 8 8 % 2
 5 % 3 9 4 5 8 9 6 5 + 9 2 5 4 1 1 5
 Δ 1 2 8 1 5 % + 1 5 8 3 # 1 6 8 5 4 Δ 1



Windows 98: *Making* the Upgrade Work

IT MAY LOOK LIKE WINDOWS 95, BUT DEEP DOWN WINDOWS 98 IS ITS OWN OPERATING SYSTEM. HERE'S HOW TO UNLEASH THE OS WITHIN.

OPERATING SYSTEM UPGRADES are never easy, even when the new OS differs little from its predecessor. Take Windows 98, for example. Sure, we've been telling you that it's hardly a revolutionary advance over Windows 95 (see our July issue's "Windows 98: Now or Never?"). And it's not. But anytime you change your PC's underlying software, issues surface. You're upgrading your software, and maybe even your hardware. But you're also upgrading the way you work—and Windows 98 offers plenty of opportunities to overhaul your work style. Many of its benefits, though, are hidden—buried deep in the Start menu or tucked away in obscure dialog boxes. If you don't know where to look, you might miss them.

Our aim is to help you make the most of the new OS (and avoid some of its pitfalls). Along the way, we'll answer basic questions ►

ILLUSTRATIONS BY MATSU

about Windows 98, tell you how to keep your utilities working, and vent our spleen about some Windows proclivities that still drive us crazy. The Department of Justice may not want you to see this, but here's a look at the inner workings of Windows 98.

Making the Upgrade

Look Before You Leap

We don't mean to nag, but back up your data before you upgrade to Windows 98. At the very least, copy irreplaceable personal files to floppies or a Zip disk. And when you're ready to install Windows 98, have a blank floppy handy—the setup program will ask you for one to create the

installation disk to your hard drive. You'll need almost 120MB of free space (and that's before you actually install the OS), but at least you'll always have the source files on a high-speed device if you ever need to change your setup.

How Fat is FAT?

Once Windows 98 (all 200 to 250MB of it) occupies your hard disk, consider giving it a little extra room by converting to the new FAT32 file system. In case you haven't heard, FAT32 supports a smaller cluster size than the older FAT16 system, resulting in less wasted disk space. To decide whether it's worth your while to convert to FAT32, use the FAT32 utility to calculate exactly how much hard disk space you'd regain by converting. Point your Web browser to www.microsoft.com/windows98/info/fat32.htm and download the FAT32 utility. Once it's downloaded, double-click the *Fat32.exe* file to extract its contents, then double-click *Fat32win.exe*. Select a drive, click *Scan*, and check out

Converter (FAT32), and click *Details* to read the "no turning back" warnings. Then follow along as the Drive Converter wizard walks you through the conversion.

Clean Out Win 3.1 StartUp Groups

If you're upgrading from Windows 3.1 to Windows 98, be aware that everything in your old StartUp group will automatically end up in Windows 98's Startup folder. Since some of these Win 3.1 programs might not work with Windows 98, you should remove all of them before upgrading to the new operating system.

Get the Fax

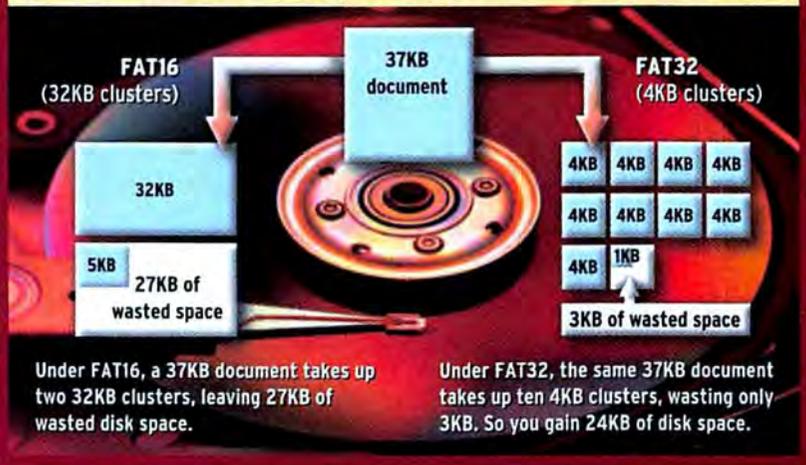
If you send faxes from your PC, you should know that Windows 95's Microsoft Fax add-on is not a part of Windows 98's setup. That's not a problem if you already have the Windows 95 fax program installed—it will still work. But if you're upgrading from Windows 3.1, installing the OS on a blank hard drive, or buying a new computer, you'll have to hunt for the fax software on the Windows 98 CD-ROM and install it separately. Look in the Tools/OldWin95/Fax folder and run *setup.exe*. Your computer needs to be running Exchange, Windows Messaging, or Outlook (but not Outlook Express) for Microsoft Fax to function. If all this sounds confusing, you're probably better off investing a C-note in Symantec's friendlier, more powerful WinFax Pro.

• WinFax Pro; \$99 list; Symantec; 800/441-7234; www.symantec.com

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THE SKINNY ON FAT32

YOUR PC STORES data in clusters, each of which can contain data from only one file (as a page in a book holds text from only one chapter). If the file doesn't fill the last cluster, disk space is wasted. By using smaller clusters, FAT32 lessens waste and frees up unused disk space—often 200MB or more on a 2GB hard drive. The figure below compares how a 37KB file is stored in the old FAT16 arrangement versus the new FAT32.



Under FAT16, a 37KB document takes up two 32KB clusters, leaving 27KB of wasted disk space.

Under FAT32, the same 37KB document takes up ten 4KB clusters, wasting only 3KB. So you gain 24KB of disk space.

emergency start-up disk. Make sure you have plenty of free hard disk space, too—at least 150MB if you're upgrading to the new OS from Windows 95, and 170MB if you're making the leap from Windows 3.1.

Install From Your Hard Disk

If you have extra room or an empty partition, consider copying the Windows 98

the facts. We ran the utility on a 1GB drive and learned that we'd regain a whopping 226MB after converting!

Lose Bulk, Add FAT32

You've run the FAT32 utility (see previous tip) and you're ready to convert your hard drive to FAT32. No sweat. Select *Start-Programs-Accessories-System Tools-Drive*

Making It Streamlined

Cure the Start-Up Blues

Windows 98 does a good job of accelerating start-up, but you can speed it up even more. Use the new Maintenance Wizard to turn off all programs in your StartUp group that don't have to run continuously.

Select *Start-Programs-Accessories-System Tools-Maintenance Wizard*. Choose the *Custom* option and, in the Start Windows More Quickly dialog box, deselect the start-up items you don't expect you'll need. From then on, Windows will load faster. And because this utility disables

start-up items, rather than deleting them, you can always reenable an item (also using the Maintenance Wizard).

■ Root Out Hidden Start-Up Programs

Certain programs that start when Windows 98 starts don't appear in the Maintenance Wizard's 'Start Windows More Quickly' dialog box. But you can still turn them off to accelerate your start-up. Select *Start•Programs•Accessories•System Tools•System Information*. Within the Microsoft System Information dialog box, pull down the *Tools* menu and select *System Configuration Utility*. Click the *Startup* tab, disable the speed thieves by unchecking their boxes (if you're not absolutely sure what something is, don't touch it), and then click *OK*. Like Maintenance Wizard, this utility lets you reenable items you only occasionally need.

■ Cut Back on Special Effects

Windows 98 is packed with visual effects. Right-click a desktop icon, for instance, and the resulting menu doesn't just pop out—it grows out of the icon. But every time your system does something fancy like this, its overall performance declines (by exactly how much depends on your hardware). So when you're done oohing and aahing over these new features and you're ready to get down to business, turn them off. Right-click the desktop, select *Properties*, and click the *Effects* tab. Deselect the options under visual effects you can live without, and then click *OK*.

■ Deactivate Your Desktop

Windows 98's Active Desktop lets you to add Web content (such as a weather map) to your desktop. But this luxury can drain your system's resources. If you experience performance problems, remove the digital anvils from your desktop or turn the Active Desktop off altogether.

To disable individual Active Desktop items, right-click the desktop and select *Properties*. Click the *Web* tab and deselect any or all items in the white box (including *Internet Explorer Channel Bar*), and click *OK*. You can turn these items back on later if you wish.

To turn off the entire Active Desktop, right-click the desktop, select *Active Desk-*

SURPRISE! WINDOWS 98 ISN'T PERFECT

YOU CAN'T HAVE everything, especially when it comes to Windows. Though Windows 98 fills many of its predecessor's gaps, it misses a few—and in some cases opens new cracks. Here are our picks for the Top Windows 98 blemishes and what you can do to vanquish them.

Wafer-Thin Security.

Win 98 carries on Win 95's tradition of lax security. Even your 5-year-old can (and probably does) bypass Windows 98's guard puppy by simply hitting <Esc> at the log-on screen. Anyone with access to your PC can read and delete files, send e-mail as you, and commit other barbaric acts. Third-party add-ons offer some security (look for a review of these in next month's issue), or you can upgrade to Windows NT Workstation and get real security.

We Hate Windows Explorer.

Well, not really—we've adjusted to it. But unlike Windows 3.1's File Manager, Windows 98's Explorer interface doesn't let you copy or move files using a classic side-by-side view of subdirectories.

You can employ a third-party file manager (see June's "Windows Utilities: Rx for Your PC" for our favorites), or you can learn to do things Explorer's way. To drag a file from one directory to another, first open the source directory in Explorer's right pane. Next, without selecting another directory, expand the directory tree in the left pane so that the target directory is visible; then drag the file or folder from the right pane into the folder in the left pane. If you really must see both the source and target directories in their full glory before copying, open a second Explorer window.

May I Share Your Modem? For years, Windows has let you share your hard disk, printer, and CD-ROM drive with your coworkers on the network. So why not your modem? If you know Shemp two cubicles over is out for the day, why not use his phone line to search the Web, keeping yours free for incoming calls? Though Windows lets you share the fax portion of your modem, you'll need a third-party product like Artisoft's I-Share 3.0 or ModemShare 32 to permit others to share your data connection. • **I-Share 3.0 and ModemShare 32**; prices vary; Artisoft; 800/846-9726; www.artisoft.com; READER SERVICE NOS. 649, 650

I'm Working on a Script. Windows 98's new Windows Scripting Host allows you to automate user-interface actions with a Javascript or Visual Basic script. Anyone conversant in Javascript or Visual Basic can stop reading here. From the rest of us, here's a big "Hello?" to Microsoft: Windows 3.x's Recorder applet watched your mouse and keyboard actions and turned them into a macro script. Mere humans could use it. If you installed Windows 95 over Windows 3.1, and then Windows 98 over Windows 95, Recorder may still be at large on your hard disk (look for recorder.exe). If it is, you can still use it—with limited success—under Windows 98 (stick to keystrokes for best results).

—Scott Spanbauer

top, and deselect *View As Web Page* (or select *Start•Settings•Active Desktop*, and deselect *View As Web Page*). Again, you can always turn it back on later.

■ Defrag Your Hard Drive

One good way to make your applications run faster is to defragment your hard drive so files stay together. Windows 98's defrag utility includes an option that further optimizes application loading.

You can run the Disk Defragmenter manually by selecting *Start•Programs•*

Accessories•System Tools•Disk Defragmenter. But if you tend to forget about defragmenting, you're the perfect candidate for using the automatic Maintenance Wizard. (See "Maintain Windows 98 While You Sleep," page 114.) Either way, click the *Settings* button and select *Rearrange program files so my files start faster*. Windows 98 also lets you defragment multiple hard drives with a single command. Choose *All Hard Drives* at the bottom of the *Select Drive* dialog box's drop-down list. ▶



■ Manage Your Power Management, Part 1

Every time you step away from Windows 98 for more than 15 minutes, you'll return to find a blank screen on your PC. After 30 minutes, your hard drive powers off, too. That's because Windows 98's Power Management features are hard at work. But if the settings don't match your work style (for example, if you frequently have lengthy chats with coworkers), they can be a hindrance, because waking up your hardware takes time.

To remedy the problem, increase the time these power-saving features wait before kicking in—or shut them off completely. Open the Control Panel and select *Power Management*. On the *Power Schemes* tab, change the 'Turn off monitor' and 'Turn off hard disk' settings to larger numbers. Then select *Save As* and name your power scheme something like **My Settings**. To turn off Power Management altogether, select *Always On* from among the Power schemes and change both of the 'Turn off' settings to *Never*.

■ Manage Your Power Management, Part 2

If you want to use Windows 98's Power Management settings only some of the time, it's not necessary to open the Power Management utility each time your needs change—you can easily switch from one power scheme to another from your taskbar. Just open the Power Management tool as described in the previous tip and click the *Advanced* tab. Select *Show power meter on taskbar*, and then click *OK*. From that point on, whenever you want to change your power scheme, simply click the little plug icon on the taskbar.

Making It Work Your Way

■ Cut Your Clicks in Half

Is your wrist sore from constant double-clicking? With Windows 98, you can make this traditional mode of opening files and folders a thing of the past. You can set up all your desktop folders and shortcuts to act like Web links—click them once and they launch. Open Win-



dows Explorer or My Computer and, from the *View* menu, select *Folder Options*. Choose *Web style* to enable single-clicking.

■ Learn Toolbars 101



To the right of Windows 98's Start button, you'll find icons for performing Win 98 functions like launching Internet Explorer or Outlook Express with a single click. These icons are part of Win 98's nifty new Toolbars feature. You also get three other convenient toolbars: Links (which duplicates IE 4.0's Links bar), Desktop (which shows all of your desktop icons), and Address (which lets you type in a URL that will load in your default Web browser, or the name of a drive or folder that will load in a folder window). To place any of these toolbars on your taskbar, right-click an unoccupied area of the taskbar, choose *Toolbars*, and select the desired toolbar.

You can move a toolbar off the taskbar and onto your desktop by clicking the handle to its left and dragging it to the desired location. Move it to the far left, right, or top of the screen and it will "dock" there.

■ Graduate to Advanced

Toolbars

Once you've played with Windows 98's ready-made toolbars, try customizing them. You can create a single-click shortcut to almost anything by dragging and dropping it onto a toolbar (but not the Address toolbar). Delete an unwanted toolbar icon by right-clicking it and choosing *Delete* from the pop-up menu. You can also create a new toolbar that includes all the items in a folder, or even an entire drive: Right-click an unoccupied section of the taskbar and choose *Toolbars > New Toolbar*. This will get you a dialog box that lets you select any folder or drive.

■ Customize All Folders

If you like to fiddle with a folder's look and feel, you'll love Windows 98's *View* menu options (be sure to check out both *View > Folder Options* and *View > Customize this Folder*). The settings are "sticky"—meaning that they stay active until you change them again—but they affect only the current folder. Here's how to apply a uniform look to all your folders once you've tailored one folder to your liking: From the *View*



menu, first select *Folder Options* and click on the *View* tab; then click *Like Current Folder* in the Folder views section, and finally click *Yes* when prompted. Once you've done this, all your folders will default to the current one's settings.

■ Make a Fresh Start Menu

"Drag and drop" has been a Windows mantra for years, but Windows 95's Start menu was just a drag, period. Fortunately, Windows 98's Start menu is better: To add an item to its top level, simply drag it onto the Start button from Windows Explorer, My Computer, the desktop, or even your Web browser. Once it's there, you can drag and drop it to any level of the Start menu. And on Win 98's Start menu, you can use the right mouse button: Right-click an item to get a pop-up menu that will let you delete it, create a desktop shortcut, or perform other useful actions.

■ Go Out for a Scroll

Is your program list stuffed to the gills? You may have noticed that, instead of unfurling lengthy lists of programs and folders across the screen, Win 98's Start menu displays a single-column list that scrolls—rather slowly—when the mouse pointer hovers over the on-screen arrows. To zip instantly to the top or bottom of the list, hold the **<Ctrl>** key and click the appropriate arrow. This tip also works in Internet Explorer 4.0's Favorites menu.

■ Hit the Thumbnail Right on the Head

One of the best reasons to try Windows Explorer's new Web View option is its built-in thumbnail image viewer for graphics files (see **FIGURE 1**). First, enable Web View by selecting *View as Web Page* in Windows Explorer or a folder window such as My Computer. Then select an image file on your hard drive. (If you've enabled Windows 98's single-clicking feature, you can select a file by hovering the mouse over it; if not, click the image file.) If the file uses one of the many formats this feature understands, you'll see a small thumbnail version of the image. It's a quick way to browse through picture files without actually opening them. ▶

THE FAQs OF LIFE WITH WINDOWS 98

❓ Can I really run Windows 98 on a 66-MHz PC with 16MB of RAM, like Microsoft says?

Ⓐ If you're a glutton for punishment. We've found that low-end systems perform about as glacially with Windows 98 as with Windows 95. If you value your sanity, don't take on Win 98 unless you have at least a midlevel Pentium system (say, 120 MHz) with 32MB of RAM.

❓ Will my peripherals still work with Windows 98?

Ⓐ Probably. The new OS is compatible with old drivers and automatically upgrades many drivers with the most recent versions. But in some instances you may need an updated driver for full compatibility. For example, users of Wacom graphics tablets may need to install a patch from the company's Web site to enable pressure sensitivity.

❓ How about my software?

Ⓐ The good news is that the vast majority of Windows 95 applications are fully compatible with Windows 98. The bad news is that some aren't, including older Windows 95 utilities that don't support the FAT32 file system (see "Will Your Old Utilities Work?" page 110). If you're just now leaving Windows 3.1 behind, massive upgrading may be in order: Most of your utilities will not work at all, and other applications won't provide Windows 95/98 benefits such as support for long file names.

❓ I'm a diehard Netscape Navigator user from way back. Since Internet Explorer 4.0 is built into Windows 98, am I out of luck, or can I still use Navigator effectively?

Ⓐ Everyone from Bill Gates to Janet Reno thinks that the integration between Internet Explorer and Windows is a big deal, but guess what? Navigator blends seamlessly into new Windows 98 desktop features such as the Address toolbar. The one major instance where the OS insists on turning to IE 4.0 is when you type a URL into Windows Explorer.

❓ I've tried Windows 98's Web-style interface and browser-desktop integration, and they don't do it for me. Can they be disabled?

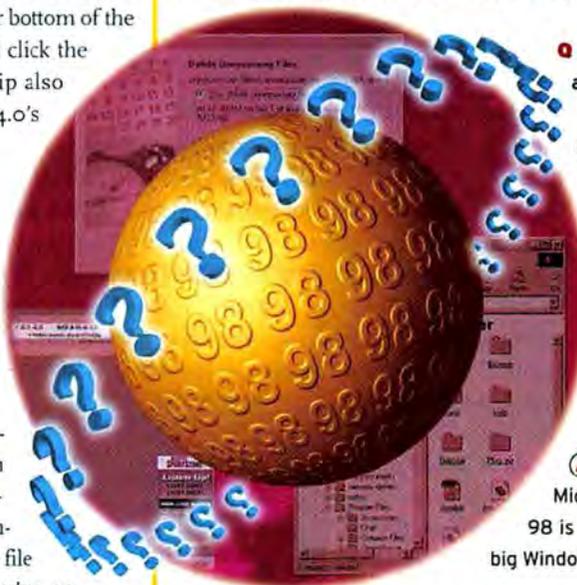
Ⓐ You can't decline to add IE 4.0 when you upgrade, and it can't be uninstalled. But you can disable IE 4.0 and Active Desktop using the Tweak UI utility from the Windows 98 CD-ROM (see "Tweak Windows Even More," next page, for setup directions). This will also help rev up your PC.

❓ What's this I hear about Windows 98 being a dead-end operating system?

Ⓐ Nudging us toward Windows NT is part of Microsoft's master plan: The company says Win 98 is the last major upgrade to the OS. The next big Windows upgrade will be NT 5.0, due in early 1999.

❓ In that case, will I be sorry that I upgraded to Windows 98 if I decide to move to NT 5.0 when that operating system becomes available?

Ⓐ You might be sorry you shelled out a wad of cash for two upgrades within a relatively short time span, but Microsoft claims that the upgrade from either Windows 95 or Windows 98 to NT 5.0 will be smoother than upgrading from Windows 95 to NT 4.0 (which, strictly speaking, you aren't allowed to do—you have to install NT 4.0 in a separate directory and reinstall all your applications).



Take a Shortcut to Shortcuts

Sometimes dragging and dropping isn't the quickest way to accomplish a task. For example, dragging a shortcut onto the Windows desktop can be tricky if the desktop is cluttered with windows. Try this quick alternative: Right-click the desired item in Windows Explorer, a folder window, or even Internet Explorer 4.0's Favorites menu, and select *Send To•Desktop as Shortcut* in the pop-up menu. Windows 98 will then place a shortcut to the item on the desktop.

View Windows on the Big Screen

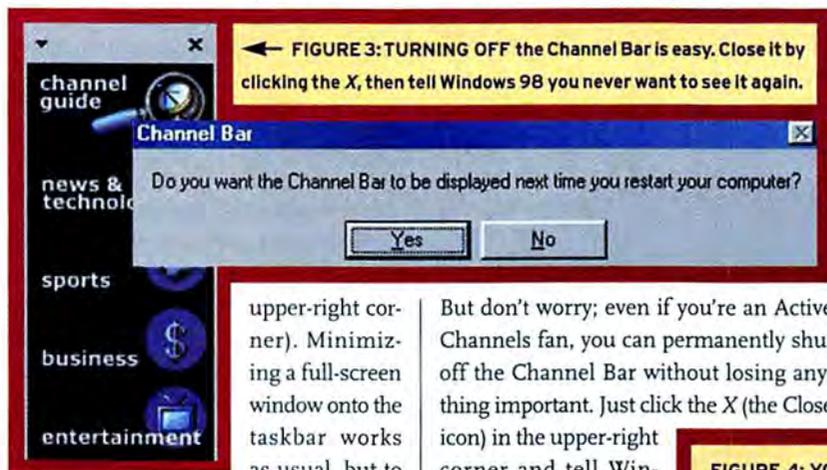
Internet Explorer 4.0 introduces a full-screen view that maximizes the amount of info you can see at once. What's less obvious (because there's no menu item or toolbar icon for it) is that you can do the same thing with Windows Explorer and with folder windows like My Computer. To put Windows Explorer or a folder in full-screen mode, hold the **<Ctrl>** key and click the *Maximize* icon (located in the

screen (the one that reminds you which OS you're using during start-up), automatically flush IE's cache, and precisely adjust your mouse's sensitivity. If you're already using the Windows 95 version of Tweak UI, you'll want to upgrade—Microsoft doesn't recommend using the older version with Win 98, and the new edition has lots more features.

Making It Net-Friendly

Go Ahead, Change the Channel

It's big, it's ugly, it's festooned with corporate logos—it's Windows 98's Channel Bar (see **FIGURE 3**), which provides access to Active Channels (autoupdating, Web-based news and entertainment services).



upper-right corner). Minimizing a full-screen window onto the taskbar works as usual, but to go back to a standard maximized or floating view of the window, right-click the window's taskbar icon and select *Restore*.

Tweak Windows Even More

Right out of the box, Windows 98 is a far more customizable operating system than Windows 95. Still not satisfied? Try Tweak UI, a utility that provides many additional ways to tinker with Windows 98 (see **FIGURE 2**). To install it, use Windows Explorer to go to the tools\reskit\powertoy folder on the Win 98 CD-ROM. When you get there, right-click *tweakui.inf*, and choose *Install*. Once it's installed, Tweak UI appears as an applet in the Windows 98 Control Panel. Among its dozens of tricks, it lets you turn off the Windows 98 splash

screen (the one that reminds you which OS you're using during start-up), automatically flush IE's cache, and precisely adjust your mouse's sensitivity. If you're already using the Windows 95 version of Tweak UI, you'll want to upgrade—Microsoft doesn't recommend using the older version with Win 98, and the new edition has lots more features.

But don't worry; even if you're an Active Channels fan, you can permanently shut off the Channel Bar without losing anything important. Just click the **X** (the Close icon) in the upper-right corner and tell Windows 98 not to open it again. First, however, drag the symbols for any channels that you regularly use off of the bar and onto the Windows desktop; they'll turn into smaller, less obtrusive icons that are just as convenient. Alternatively, select *View•Explorer Bar•Channels* in Windows Explorer or a folder window in order to get buttons that let you browse and view channels. Or you can simply click on the *Channels* icon in Internet Explorer 4.0.

Tame the (Over-) Active Desktop

At best, Windows 98's Active Desktop is an acquired taste. But if you decide to give it a try, keep these tips in mind:

Windows plops the items you add to the Active Desktop down anywhere, sometimes on top of other items. To move one to a better spot, hover the pointer near its top border until a gray frame appears, then click on the top border and drag.

Oddly, right-clicking on an Active Desktop item and choosing *Properties* doesn't let you change its properties. Instead, hover the mouse pointer near the item's top border until a gray frame appears; then click on the triangle in the frame's upper-left corner and choose *Properties*.

If the shortcuts on your desktop interfere with your view of Active Desktop items, you can hide them. Right-click the desktop, choose *Properties*, and click *Effects*. Select *Hide icons when the desktop is viewed as a Web page* and click *OK*.

See What's New on the Web

Here's a handy way to get a quick update on Web pages that have added new material since you last visited them. Whenever you add a new page to your list of Favorites, Internet Explorer will ask whether you want to subscribe to the page; make sure you pick *Yes*, but only tell me when this page is updated. (To select this option for an existing Favorite, right-click the site in the Favorites menu, choose *Subscribe*, and then select *Only tell me when this page is updated*.) Then, whenever you want to check for updates, select



Favorites•Update All Subscriptions. Then take another look at the Favorites menu—the icon of any page that has changed will sport a red asterisk (see **FIGURE 4**). ▶

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■ Jump to Your Favorite Favorites

Immediately below Internet Explorer 4.0's address window, you'll find Links—a strip of buttons that provide single-click access to Microsoft's Web site, an ad for HotMail, and a few other spots. Obviously, such prime real estate would be better occupied by links to the handful of sites that you consider the most vital. To add sites to the Links bar, simply drag them off the Favorites menu and drop them between existing buttons; you can also drag any link from the current page. To delete an unwanted item from Links, right-click it and select *Delete* from the pop-up menu. You can add as many items as you want to Links, but if they won't all fit on your screen at the same time, you'll have to click

on arrows in order to scroll through them.

■ Put Your Trust in IE 4.0

You don't have to be paranoid to appreciate Internet Explorer's warnings when a Web site tries something that could present a security threat. But you may be

lect *Require server verification (https:)* for all sites in this zone, and enter the URLs of the sites, including the <http://> prefix.

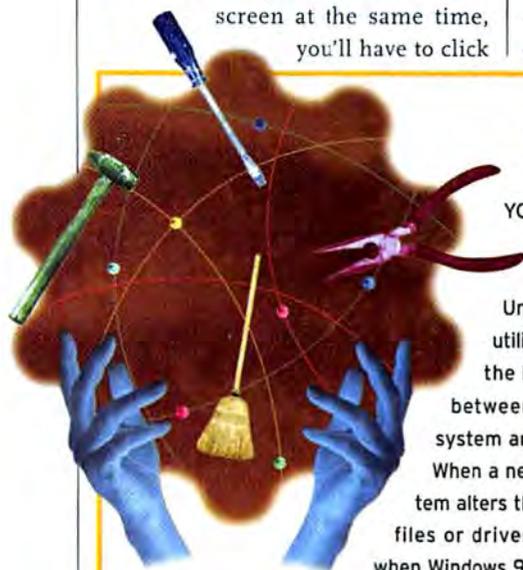
■ Skip the Pictures

All Internet users know that the Web can be mind-numbingly slow, especially when

The Channel Bar is big, ugly, and festooned with corporate logos.

comfortable visiting some sites—major shopping sites like Amazon.com, for example—without receiving security warnings. To give them the go-ahead, start by selecting *View•Internet Options*, then choose *Trusted Sites zone* in the Zone drop-down menu. Next, click *Add Sites...*, dese-

you visit a site with fancy graphics and moving pictures. To pick up the pace, you can run Internet Explorer 4.0 in text-only mode—but only if you install Internet Explorer 4.0 PowerToys, a cool collection of browser add-ons that's free to download from Microsoft's Web site at ▶



WILL YOUR OLD UTILITIES WORK?

YOU CAN'T USE THE MAJORITY of Windows 3.x utilities in Windows 95, nor most Windows 95 utilities in NT. But generally speaking, Win 95 utilities such as Norton Utilities, Nuts & Bolts, and First Aid will work in Win 98, usually with only a few minor problems.

Unlike applications, utilities work close to the bone, slipping in between the operating system and the hardware. When a new operating system alters the way it handles files or drivers—for instance, when Windows 95 added long file names—utility programs become obsolete.

If you're using a Win 95 utility that's more than a year old, you should be concerned about Win 98's optional FAT32 file system. Any program that addresses the drive directly, such as a virus scanner or defragmenter, will simply fail to work if it doesn't understand the new file system. But computer vendors have been shipping new PCs with FAT32 since early 1997, and every major utility now supports it. If any of the utilities you're using are becoming long in the tooth, you'll have to decide whether to eschew FAT32 or upgrade the utilities.

Aside from FAT32, Windows 98 doesn't change things all that much. Most Windows 95 utilities that have been upgraded within the past year or so will work without risk of data-threatening disasters, and the small incompatibilities that do exist at the moment will probably be fixable via free downloadable updates by the time you read this. Users who are making the move to Windows 98 all the way from Windows 3.x, however, may have to replace all their utilities.

Check this table to see which (if any) of your utilities you'll need to upgrade for Windows 98.

—Lincoln Spector

PRODUCT	Current version	Earliest version recommended for Windows 98
ANTIVIRUS		
Dr Solomon's Anti-Virus	7.9	7.69
Symantec Norton AntiVirus	4.0	2.0 ¹
BACKUP		
HP Colorado Backup for Windows 95	3.21	3.2
Iomega One-Step Backup	3.1	3.0
Seagate Backup Exec	2.0 ²	98 ²
DIAGNOSTICS		
CyberMedia First Aid 98	5.03	5.03
Quarterdeck RealHelp	1.0	1.0
TouchStone CheckIt	5.0	4.0 ³
FILE MANAGER		
Mijenix PowerDesk Utilities 98	3.0	3.0
PARTITIONING		
Power Quest PartitionMagic	3.05	3.0
Quarterdeck Partition-It	1.1	1.1
UNINSTALL		
CyberMedia Uninstaller	5.0	5.0
Quarterdeck CleanSweep Deluxe	4.0	3.08
Symantec Norton Uninstall Deluxe	1.0	1.0
UTILITY SUITES		
Network Associates Nuts & Bolts	1.04	1.04
Symantec Norton Utilities	3.05	3.0

¹ After updating with free online fix.

² Desktop 98 version should be available by the time you read this.

³ Version 5.0 recommended for use with FAT32.

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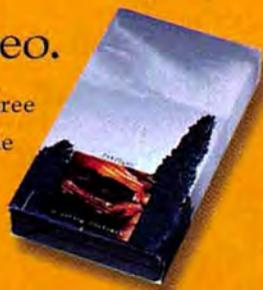
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www.microsoft.com/ie/ie40/powertoys. Once you've installed it, IE 4.0's Links bar will include a button marked Toggle Images.exe. Click this button and IE will greatly accelerate your browsing by displaying only text, ignoring all images. If you want to return to text-and-graphics mode, simply click the button again.

■ Search the Web Your Way

Type **Find** and one or more keywords into IE 4.0's Address bar, and it'll search for those keywords using a customized version of Yahoo. Sounds handy, but what if you're an Excite enthusiast or a HotBot habitué? Quick Search, another add-on in IE PowerToys (see "Skip the Pictures," previous page), lets you use the major search engine of your choice from the Address bar. After downloading and install-

ing PowerToys, click the *Quick Search.exe* button in IE's Links bar. You'll get instructions for using any search engine from the Address bar. (For example, you would type "av recipe gazpacho" to search AltaVista for gazpacho recipes.)

■ Keep Track of All Your Correspondents

With any e-mail package, the task of making sure your Address Book contains up-to-date information on all your correspondents is tedious at best. Fortunately, though, Internet Explorer 4.0's Outlook Express e-mail program can do part of the job for you. Choose *Tools•Options*, make sure the *General* tab is selected, and then select *Automatically put people I reply to in my Address Book*. Subsequently, whenever you reply to a message, Outlook Express will create an Address Book entry that contains the original sender's name and e-mail address.

■ **Fix Lousy Spelling**

If you use e-mail all day but your spelling is shaky, tell Outlook Express to perform a

spell check automatically each time you click the *Send* button. Select *Tools•Options*, click the *Spelling* tab, and choose *Always check spelling before sending*. (For more Outlook Express tips, refer to "You've Got E-Mail" in the June issue.)

Making It Healthy

■ Maintain Windows 98 While You Sleep

Tired of cleaning out unnecessary files, scanning your hard disks for errors, and defragmenting your hard drive? Use the Maintenance Wizard to schedule and initiate these tasks for you. Select *Start•Pro-*

grams•Accessories•System Tools•Maintenance Wizard and follow along as the wizard walks you through scheduling the Disk Defragmenter, ScanDisk, and Disk Cleanup. Select *Express* for one-click

98 support technician, call Dr. Watson, Windows 98's troubleshooting utility. It takes "snapshots" of your system setup to help analyze and solve problems. Select *Start•Programs•Accessories•System Tools•System Information*. Next, select *Tools•Dr. Watson*, and a Dr. Watson icon will appear in the taskbar tray. Double-click this icon to generate a system snapshot that includes (hopefully) a diagnosis of the problem you're experiencing. Choose *Save as* to preserve a copy of your log file, and you'll have a reference resource for that support technician you're about to dial up.

■ Keep the Doctor On Call

How can you ensure that Dr. Watson will be on the case next time you experience a system fault? Elementary: Keep it running all the time. That way, it will automatically create a system snapshot whenever a fault occurs. To have Dr. Watson load on start-up, place a shortcut to *Windows\Dr Watson.exe* in your StartUp folder.

■ Keep Windows 98 Up-to-Date

Use the new Windows Update to check whether all your system files, device drivers, and other add-ons are current (see **FIGURE 5**). This online extension of Win 98 uses your Web connection to check your current installation and identify any missing (and installed) updates. Keep in mind that Windows Update can take awhile. Select *Start•Windows Update*,

FIGURE 5: WHEN YOU SELECT Windows Update from the Start menu, Internet Explorer takes you to a Web page where you can check for the latest updates, plug-ins, and drivers.

Component	Size / Est. Time	Status
<input type="checkbox"/> Microsoft VM for Java	2957 KB / 25 min	Already Installed
<input type="checkbox"/> Microsoft NetMeeting	2178 KB / 19 min	Already Installed
<input type="checkbox"/> Microsoft Outlook Express	1011 KB / 15 min	Already Installed
<input type="checkbox"/> Microsoft Chat 2.1	1154 KB / 10 min	Not Installed
<input type="checkbox"/> Microsoft NetShow	1919 KB / 16 min	Not Installed

scheduling, or choose *Custom...* for maximum control over these routines.

■ See the Doctor

System faults can translate into serious downtime. But before you call a Windows

and on the resulting Web page, select *Product Updates*. Click *Yes* to confirm that you want to install and run the Microsoft Windows 98 Update Wizard Directory Finder; then follow the instructions. ▶

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■ Make Your Own Updates

Impatient types may want to avoid Windows Update and download updates the old-fashioned way. Go to www.microsoft.com/windows/Windows98/default.asp,

New technology like dual-monitor support isn't without its gotchas.

click the *Downloads* link, and select an update to download. Keep a list of your updates and check back periodically.

■ Check Your Drivers

Don't know if you have the latest driver for a particular device? Let the Update Device Driver Wizard do the research for you. Right-click *My Computer* and select *Properties* (or select *Control Panel\System*). Click the *Device Manager* tab, and navigate your way to the device you suspect may need a new driver. Then select *Properties Drivers* and click the *Update Drivers* button. Follow the wizard as it locates new drivers and offers to install them.

■ Create a Safety Net

A big complaint about the Windows 95 start-up disk was that if you used it to boot your system, you couldn't access the CD-ROM drive unless you had installed real-mode CD-ROM drivers. But Win 98's start-up disk includes generic drivers that allow you to access most CD-ROM drives.

If you skipped creating a start-up disk when you installed Windows 98, you should make one now. Open the Control Panel, select *Add/Remove Programs*, select the *Startup Disk* tab, and click *Create Disk*. Then follow the instructions.

Making It Cool

■ Display Win 98 on Two Monitors

You don't have to be a graphic artist or financial analyst to be intrigued by Windows 98's ability to extend the desktop across multiple monitors. Just keeping your e-mail program up on one display while you toil away in a word processor on another is awfully handy. But the new technology isn't without its gotchas.

You can add a second display by installing an additional graphics card in your PC, but *both* cards must use graphics chips that support multiple-monitor display. (Many common chips don't.) For

a list of compatible chips, launch Windows 98 Help and read the troubleshooting section under *Multiple Display Support*. Or consider buying a card designed specifically for dual-monitor display, such as the Duet from Appian Graphics. • *Duet*; \$490 list; Appian Graphics; 800/727-7426; www.appiangraphics.com

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If both of your graphics cards support multiple display, setup is relatively easy. Install the second card in your PC and attach a monitor. When you turn the PC on, Windows should notice the new card and steer you through installing the driver. Once that's done, open the *Display* applet in Control Panel and click the *Settings* tab. Choose the new monitor-and-adapter combo in the *Display* drop-down list (see FIGURE 6), and then select *Extend my Windows desktop onto this monitor*.

Some applications act strangely if you drag them onto a second monitor. Most notably, they may display some dialog boxes on the first monitor—a nonfatal quirk, but confusing nonetheless.

■ Watch TV on Your PC

If you want to watch midmorning reruns of *Bewitched* at work, don't bother with Windows 98's television features; go buy a \$50 black-and-white TV instead. Still, some of the new TV tools for the PC offer pretty interesting options, such as the ability to download stock-ticker information that's embedded in broadcast signals. If you're considering investing in a TV tuner card, keep the following points in mind.

Many office buildings get terrible TV

reception. (Even with an antenna, PC World's Boston office receives exactly one station's signal clearly—a shopping channel.) Don't set your heart on watching the tube on your work computer until you've witnessed what kind of reception an ordinary TV gets in your building (unless, of course, your office has cable).

Many TV tuner cards that work fine with Windows 95 won't work with Windows 98's TV features, which require Windows Driver Model drivers. The Win 98 CD-ROM includes such drivers for only two cards: ATI's All-in-Wonder and All-in-Wonder Pro. Before buying any other card, verify that a WDM driver is available.

FIGURE 6: WIN 98's dual-display settings look simple enough, but be sure to check the compatibility list to see if both of your graphics cards support the feature.



The TV features aren't part of the default Windows 98 installation. To add them, put the Win 98 CD-ROM in the drive, open the *Add/Remove Programs* applet in Control Panel, and click the *Windows Setup* tab. Select *WebTV for Windows* and click *OK* to install both it and WaveTop (the data broadcasting feature). WaveTop will appear in the *Program Accessories* folder, while WebTV will show up in *Program Accessories Entertainment*.

Harry McCracken is a senior writer for PC World. Valerie Ryan is a frequent contributor. Scott Spanbauer is a senior associate editor and Lincoln Spector is a contributing editor for PC World.

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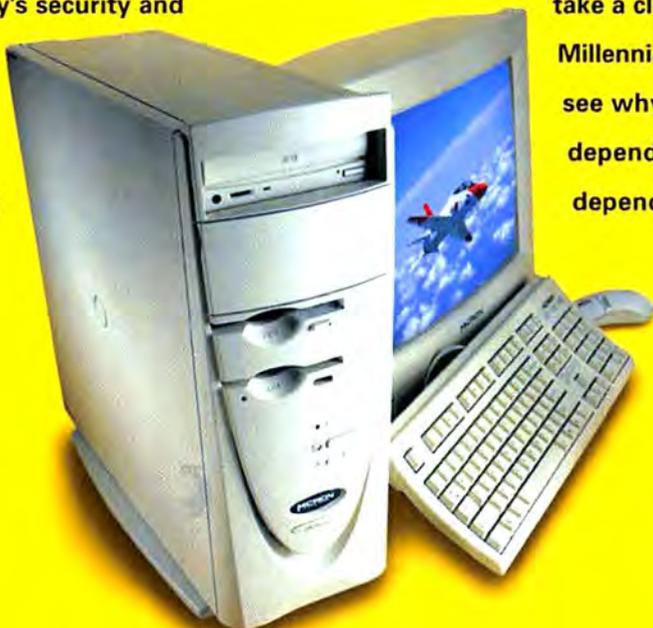
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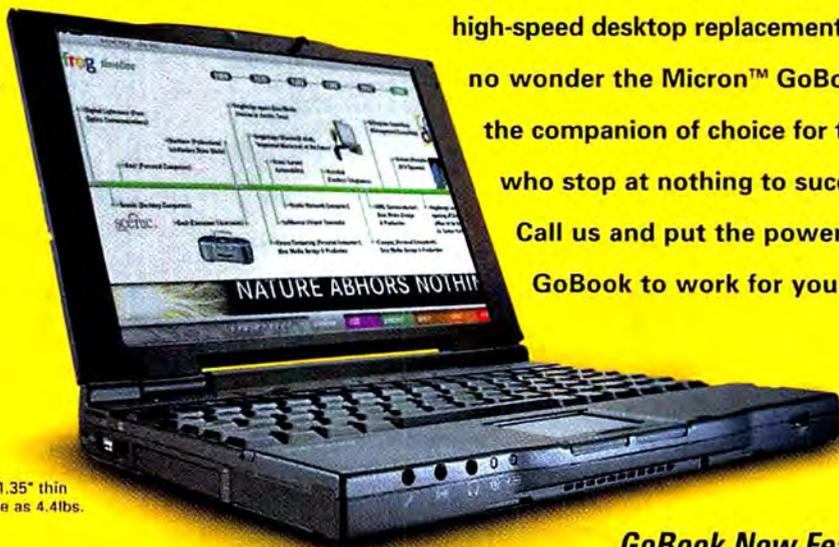
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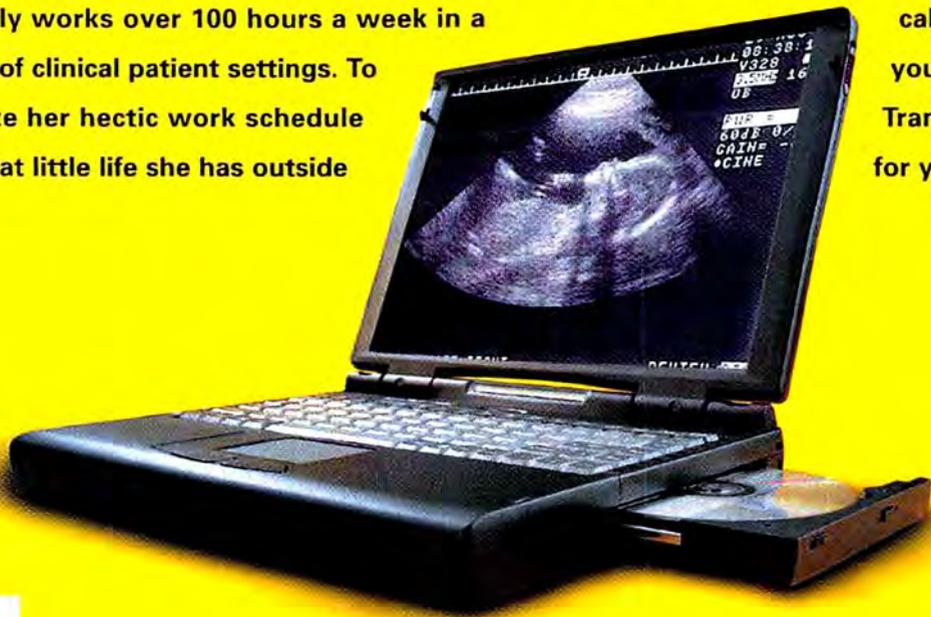
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BY MATT LAKE

ONLINE SERVICES ARE BACK. No, not the ones that thrived for years before the Web came along: With the towering exception of America Online, those have become shadows of their former selves. But a new breed of Web site offers the same appealing and convenient array of features that makes AOL so popular—news services, message boards, reference tools, e-mail, shopping, and scads more. Except they do it all for free. Often referred to as *portals*, since they serve as entry-

ways to the Internet, most of the sites aren't all that new. In their earlier incarnations, they functioned strictly as search sites—hot spots such as AltaVista, Excite, Lycos, and Yahoo—that brought organization to the Web's chaos. But now all the search engines, and a few other ambitious sites, are piling on new features at breakneck speed. They're jockeying to be the site you set as your browser's default home page, use as an entry point to other Web destinations, and return to day after day. That's the best way to catch Web denizens' eyeballs, and attracting hordes is what any site must do to sell a lot of advertising banners.

From a business standpoint, the major portals make sense. But are they really a better way to tap the riches of the Web than simply maintaining a well-chosen array of bookmarks? And AOL members (especially disgruntled ones) face another question: Is the combination of an Internet service



provider and one or more of the portal sites a legitimate alternative to shelling out \$21.95 a month for AOL?

To find out, we explored eight major portal contenders: AltaVista, Excite, Infoseek, Lycos, Microsoft's Internet Start, Netscape's Netcenter, Snap, and Yahoo. When all was said and done, Excite and Yahoo stood out from the crowd, delivering the best mix of useful features, crisp presentation, and clever customization options. Either site would even be worth paying real money for.

This race is far from over, though. When we visited the portals in early June, all of them were adding new features almost daily. See "Portals Into the Future: What's Up Next?" for a look at features in the works for several major sites.

EVERYTHING BUT THE KITCHEN SINK

ALL OF THESE SITES offer at least five core features: Web searching, news, reference tools, access to online shopping venues, and some communications capabilities (like a free e-mail box, chat rooms, and downloadable software for exchanging instant messages). There are no hard-and-fast rules about what constitutes a portal, though. The highly trafficked GeoCities (www.geocities.com), for instance, is a popular entry point to the Web. But because it focuses on original content created by folks who have taken advantage of

TOP PICKS

EVERY PORTAL SITE REVIEWED HERE IS EVOLVING at a dizzying pace, but as we went to press, Excite and Yahoo stood at the top of the food chain. Both sites pack loads of elements into a well-organized and customizable interface, and make the key task of finding other Web resources easy. Having trouble choosing? Excite is prettier, offers more graphics, and includes richer content such as personal reminders on your home page. But go with Yahoo if you'd prefer a lean, mean site that won't bog down a dial-up connection.



its offer of free Web space, GeoCities isn't comparable to the sites we discuss here.

Though their specifics differ, the portals we review here look and feel strikingly similar. And except for the relatively sparse AltaVista and Netcenter, they're bursting at the seams with features. None are quite as dense in content as AOL just yet, but most of them already maintain enough levels and sublevels of offerings to keep anyone occupied for months.

Web searching remains the portals' single biggest attraction, and most of these sites do a respectable job of it. We were particularly impressed by Yahoo's mammoth guide to sites and by how Excite rolls corporate profiles, news, and links into one set of results. AltaVista's powerful search engine is another standout.

But increasingly, portals aren't just launching pads to content at other sites. They also provide topical information,

including local, national, and worldwide newswires; industry-specific alerts; stock tickers and trackers; and sports, weather, and entertainment coverage. Also available at most of the sites is a panoply of reference tools such as maps, yellow and white pages, and e-mail directories, as well as virtual shopping malls organized into sections for computer products, books, food, and more.

Few of these features are unique to a particular portal. In fact, the sites maintain their furious pace of expansion by striking partnerships with existing service providers. Excite and Snap, for instance, use the same e-mail address finder, also available à la carte at www.whowhere.com. Snap and Yahoo offer the same mapping feature, which is licensed from Vicinity (www.vicinity.com). And big-name online merchants like Amazon.com and Travelocity have set up shop on multiple portals.

EXCITE AND YAHOO DO IT ALL

HOW THEY RATE

PORTAL	In short	Overall	Searching	Reference	News	Community/ communications	Interface/ personalization	Shopping
TOP PICKS Excite www.excite.com	First-rate personalization and message boards; covers all the bases from finance to fun; busy page designs.	★★★★	★★★★	★★★	★★★	★★★★	★★★★	★★★
Yahoo www.yahoo.com	Expansive Web directory; well-rounded features including fine news and shopping areas; content of message areas is weak.	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★
BEST OF THE REST Lycos www.lycos.com	Free space for personal Web site; good search and reference tools; personalization could be more flexible.	★★★	★★★	★★★★	★★★	★★★★	★★★	★★★★
Infoseek www.infoseek.com	Excellent search and news options; business-oriented flavor; uneven user interface.	★★★	★★★★	★★★	★★★★	★★★	★★★	★★
Snap www.snap.com	Informative and simple to use; weak on community and personalization features.	★★★	★★★★	★★★	★★★	★★	★★★	★★★★
BACK OF THE PACK Internet Start home.microsoft.com	No search engine of its own; shallow shopping options; slick and easy to personalize if you're an IE user.	★★	★★	★★	★★★	★★	★★★★	★★★
AltaVista altavista.digital.com	Spartan content in most areas; minimal personalization; search engine remains top-notch.	★★	★★★★	★★★	★★	★★	★★	★★
Netscape Netcenter home.netscape.com	Still thin on content; confusing search features; respectable news and business sections.	★★	★★	★★	★★★	★★	★★	★★

All sites are rated on a scale of one star (poor) to five stars (excellent) in the following categories, based on our visits in late May and early June 1998. Overall: Our ultimate rating of how each site succeeds as a well-rounded, easy-to-use portal to the Web. Searching: Search engines, Web directories, and other features that help you locate information elsewhere on the Internet. Reference: Business directories, people finders, maps, and other reference tools. News: Topical information such as newswires, stock tickers, sports, and weather. Community/communications: E-mail services, chat rooms, message boards, instant-messaging software, and related features. Interface/personalization: Navigation controls, organization, and tools for customizing information to fit your interests. Shopping: E-commerce features, including links to external sites, comparison-shopping tools, and consumer advice.

Which raises the question: Since the same basic free services are available all over the Web, why go to a portal? In a word, convenience. Unless you have the time and energy to collect and sort through dozens of bookmarks, it's considerably easier to find the services you need at a portal. Borrowing a page from the online services, most portals are organized into *channels* (also known as *zones* or *Web guides*) on general topics like Careers, Health, Finance, and Travel. A channel collates a range of elements, both on and off the portal site, in a single location. Yahoo's Autos section, for instance, packs dozens of features—including detailed information on new car models, a side-by-side comparison-shopping feature, lists of financing rates, message boards, and classified advertisements for used cars—into one accessible area.

Portals are also making increasingly inventive use of personalization techniques to deliver precisely the information you need, just the way you want it. On the simplest level, a portal can provide conveniences such as local weather reports, movie listings, and so on by remembering your zip code. And at press time, Excite, Internet Start, Lycos, and Yahoo were offering personalized default (or home) pages that take customization to a new level; similar efforts are in the works at virtually every other portal site. Want to be greeted with ticker information on stocks you own, news about your company's industry, the day's *Dilbert* cartoon, and reminders about friends' and relatives' birthdays each time you launch your browser? With Excite, you can.

WHERE EVERYBODY KNOWS YOUR NAME

OF COURSE, a good online service provides a virtual community. And while there's certainly no lack of community members at the portal sites—10,000 souls were crammed into Excite's chat rooms one recent afternoon—even the best portals we visited are experiencing growing pains in this area.

It's not a matter of technology. Lycos and Yahoo, for instance, both offer ele-

gantly designed message boards broken down into a wide range of topics. Too often, however, the boards are practically deserted—not the best places to spark lively conversation or to get a definitive answer to a pressing question. Excite's message area is more active, but the discussions on AOL are much more free-wheeling (if not necessarily more cogent) than on any portal. CompuServe, still

trudging forward as a separate service under AOL's ownership, remains the best place to go for high-quality discussions. Then there's e-mail, an online-service staple that all the portal sites reviewed here offer or are planning to add soon.

Don't discount the usefulness of these free accounts, even if you already have an e-mail account through your ISP, at work, or both. You can check a portal's e-mail inbox from any PC equipped with an Internet connection and a Web browser; when traveling, just beg a few minutes of time on another person's system and pick up your latest messages. AltaVista, Lycos, and Snap provide essentially identical e-mail services and can forward mail to any other account automatically—a particularly valuable option if you move or switch jobs and need a temporary account until you resettle.

AOL LIVES!

DON'T COUNT ON portal sites to kill off America Online anytime soon. Love it or hate it, AOL's packaged service, simple software, and easy-to-use e-mail will continue to attract newbies, while retaining veterans hooked on its robust chat areas and well-organized content. And using even the best portals is a poor substitute for tracking down and bookmarking some sites on your own; the Web is just too far-flung and fast-changing for any one site to keep up with everything that's available. Some of the best resources in such major areas as news and reference are likely to continue as stand-alone sites rather than becoming components within a portal (see "Build Your Own Portal").

But even if portals aren't perfect, they're very useful. Our advice? Pick one, personalize it to fit your needs, and make it your browser's home page. If it's missing

a particular feature, just wait. All of these sites are cloning their competitors' best elements and trying to one-up each other with more goodies. New contenders will launch sites as well, though they'll have to work double-time to catch up with those that have already been in the game for a while. The competition is likely to be savage, with Web surfers the real winners.

Here are our takes on the eight portal sites we looked at, rated from best to worst.

EXCITE ★★★

www.excite.com

WHAT'S HOT: Highly customizable, rich content includes news-clipping service and strong finance area, active message boards.
WHAT'S NOT: User interface is busy and slow-loading, search engine's suggestions are sometimes off the mark.

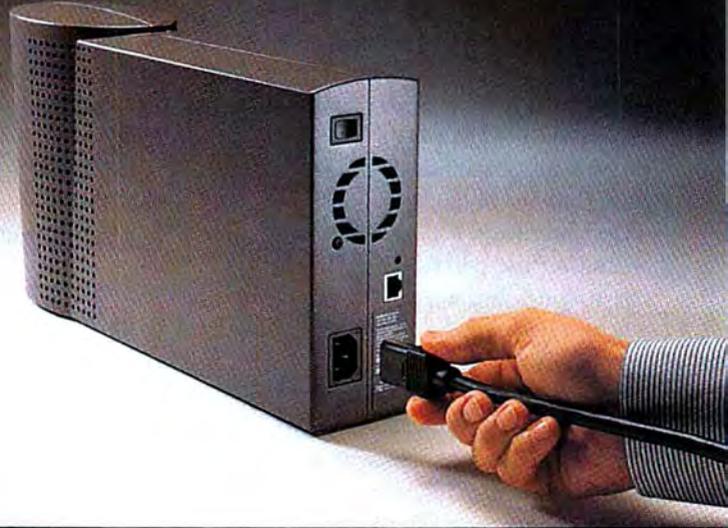
EXCITE IS A FIRST-RATE PORTAL to the Net. If you're connecting over a slow line, its busy, graphics-laden pages may take a while to load, but your patience will pay off: Excite provides enough information to get you where you need to go, especially if you use its extensive customization options. Its business, news, research, and entertainment areas merit repeated visits, and its chat and message boards are frequented by one of the strongest general-interest communities outside the traditional online services.

Besides the typical Reuters and UPI headlines, Excite provides ongoing topical news coverage under titles like "Microsoft fights DOJ" and "Showdown with Iraq." There's also a sound finance section, ▶

The screenshot shows the Excite homepage layout. At the top, there's a search bar and navigation links. Below that, a 'Welcome back Harry' message is displayed. The main content area is divided into several sections: 'Today on Excite' with a list of featured links, 'My Weather' for Boston, MA, 'My News' with a list of news items, 'My Cartoons', and 'My Reminders'. There are also links for 'Search and Channels', 'My NewsTracker Topics', and 'More News...'. The interface is colorful and densely packed with information.

YOU CAN ADD A PERSONAL TOUCH to Excite's home page with industry-specific news, local weather, links to your favorite comics, and much more.

Plug it in, turn it on.



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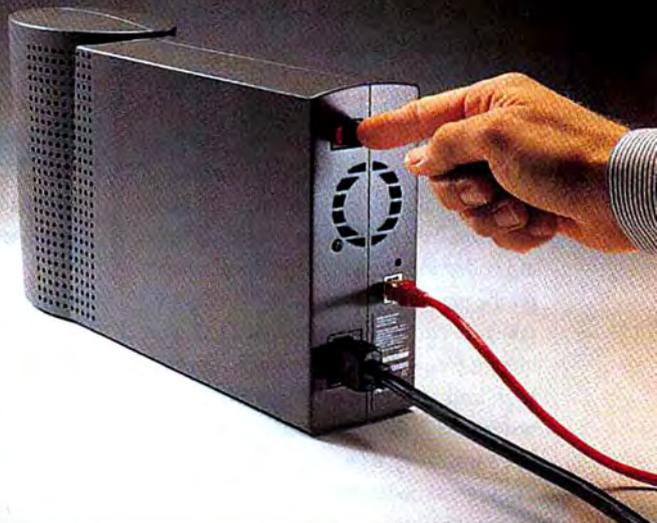


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with easy access to valuable data such as comparative rates for six-month certificates of deposit. And once you've stepped through Excite's straightforward customization process, you get a virtual clipping service called NewsTracker. You specify topics and use keywords to filter out irrelevancies; from then on, you can jump quickly to all the stories that match the profile you created.

Excite's personalized home page is hard to beat. You can pick and choose among dozens of features, customize them by entering data such as your birthday and zip code, and then arrange the elements on the page just the way you like. The site takes its community seriously, too, providing free e-mail, an instant-message tool, and an active online chatting and posting area. Excite's message boards, unlike those at Lycos and Yahoo, are staffed by diligent moderators, so you'll generally encounter high-quality exchanges and answers to questions.

Then again, Excite's quirky search features raise questions of their own. The site uses an inference system that frequently makes misguided suggestions for keywords to help narrow your search. When we searched for "Indian elephants," for instance, it recommended "villagers," "princely," and "descended" as additional search terms. As we were completing our evaluation, however, Excite added some useful and (for now) unique search features: Type the name of a company, sports team, or famous person, and—in addition to citations in Web sites—you may get relevant news headlines, stock prices, and the official site of your search subject.

At press time, Excite also added a full slate of online auctions, allowing Web surfers to bid for computers, consumer electronics, toys, and the like. It's the little extras like these—and there are lots of them—that make Excite a winner.

Y A H O O ★★★★★

www.yahoo.com

WHAT'S HOT: Gargantuan card file of other Web sites, many useful features of its own, high level of customization.

WHAT'S NOT: Message boards aren't bustling with activity, some entries in Web directory could use more detail.



YAHOO'S PAGES DON'T LOOK FANCY, but they load quickly and provide lots of highly customizable information.

FOR ALMOST AS LONG as there's been a World Wide Web, Yahoo has provided an orderly introduction to its riches. And as the Web has exploded, Yahoo has grown into a portal with a remarkably broad range of features and few obvious weaknesses. Despite its wealth of elements, Yahoo retains a streamlined look and feel that don't demand buckets of bandwidth to display quickly—which may make it a better choice than Excite if you're stuck with a sluggish dial-up connection.

Yahoo's mammoth, well-classified directory of Web sites is unmatched by other portals, though some of its site write-ups are sketchy; at press time, Yahoo was about to supplement the directory with the fine Inktomi search engine. But Yahoo is also strong in the information it puts at your fingertips. Its news section gleans headlines from all over, including CNN, MSNBC, Reuters, UPI, and specialized sources. Casual visitors can get a quick hit of local news, weather, and sports by entering their zip code; and My Yahoo, the site's personalization feature, lets you easily fine-tune the content of almost any category and even tinker with color schemes and fonts. You can also get to other Yahoo features quickly, including the capable Yahoo Mail e-mail service.

If you're in the mood to buy online, Yahoo provides more than just links to other sites—it offers plenty of solid buying advice and price-comparison tools from respected sources like Edmund's, for automobiles, and BizRate, for office equipment. Tracking down online vendors in the shopping area is easy, and the site's Yellow Pages, which list national and local sources, maps, and driving direc-

tions, are equally useful.

As far as community features go, Yahoo's chat rooms and message forums are well designed, although the quality of conversation is uneven compared to Excite's thriving discussion areas. On the plus side, Yahoo's moderated chats include business-related events such as interviews with financial experts. With Yahoo's instant-messaging tool,

users of Windows 95 and NT can hook up with anyone who's online and running the same software. You can also get Yahoo ISP service (provided by MCI) and even apply for a Yahoo Visa card. We'll pass on both of those, but Yahoo itself remains one of the Web's greatest assets.

L Y C O S ★★ 1/2

www.lycos.com

WHAT'S HOT: Comprehensive site, free Web space, strong search tools.

WHAT'S NOT: Message areas aren't as busy as Excite's, comparison-shopping feature includes only certain vendors.

LYCOS TAKES THE AOL model seriously, replicating nearly every feature found in a traditional online service. Like Yahoo and Excite, it provides a seemingly endless supply of content, from breaking news to online games. And thanks to its recent acquisition of Tripod (www.tripod.com), a GeoCities competitor, it provides one notable extra that the other portals don't: up to 11MB of Web server space for anyone who wants to build a personal Web site. Overall, though, Lycos's personalization features aren't quite as sophisticated as those of Yahoo and Excite, leaving it a step or two behind the leaders.

Lycos's capable search engine lets you narrow inquiries to include just certain elements, such as images, sounds, or even recipes. If quality means more to you than quantity, you can choose a mode that covers only Lycos's choice of the best Web sites, with detailed reviews of each. Its people-and-business finder, licensed from InfoSpace, is also high-caliber; it lets you speedily retrieve e-mail and physical ▶

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PORTALS INTO THE FUTURE: What's Up Next?

TELEVISION MAY BE AWASH in reruns at the moment, but portal sites, unlike TV networks, don't take it easy over the summer. All of the sites we looked at are continuing to add features nonstop. Here's what to expect over the next few months.

In many ways, America Online is still the largest and most successful portal in history. But its Web site (www.aol.com), vastly thinner in content than the fee-based parent service, has been a modest effort at best, and AOL is in the process of beefing it up. Already in beta testing is a feature that lets AOL members retrieve their mail from the Web site; visitors to the site can also download software for exchanging instant messages with users on the "closed" AOL system. Personalized news should also be available at the free site by the time you read this.

Microsoft and Netscape hold an advantage over other portal competitors: Their sites are the default home pages for their respective browsers. Still, neither Microsoft's Internet Start

nor Netscape's Netcenter is a standout in its present incarnation. Oddly, Microsoft spreads elements of the portal concept across several different sites. It plans to consolidate them by the year's end and add Inktomi's search engine, which Yahoo and Snap also use.

Netscape, meantime, finds itself right in the midst of a major effort to overhaul its Netcenter hub. Over the summer, you can look for the site to offer free e-mail, tighter integration with the Navigator browser, a smart-search feature that optimizes search results, better personalization tools, and additional content from third-party providers.

Infoseek Bulks Up

INFOSEEK IS planning a sweeping makeover, parts of which should be in place by the time you read this. Recently the service acquired WBS (www.wbs.net), a GeoCities competitor, and it plans to offer free Web pages and other WBS features.

Also on the way are free e-mail and a unified personal home page similar to those offered by Excite, Lycos, and Yahoo.

AltaVista, a latecomer to the portals race, is still scurrying to catch up

speculate about how this might affect the portal's future.

Mouse and Peacock

IF THERE'S MONEY to be made in portals, it's a safe bet that the major media companies will try to get a piece of the action. In June, the Walt Disney Company and NBC—two of the biggest

of these behemoths—made investments in existing sites. Disney (which, according to its chief executive officer Michael Eisner, will be "aggressively competing on the Internet, and...aggressively competing as you enter the Internet") agreed to purchase 43 percent of Infoseek. The Web gateway could end up as a home for Disney's formidable portfolio of media properties—from ABC News and the ESPN cable channel to *The Lion King* and *The Little Mermaid*.

NBC, meanwhile, bought a stake in Snap, CNet's portal. Details of the deal are sketchy, but NBC intends to heavily promote the site to TV viewers. "Must-See Web," anyone? —Yael Li-Ron



with its rivals.

Over the remainder of this year, the site plans to offer additional content zones, personalization tools, and community features (including message boards). Its core search engine will receive refinements such as a built-in spelling checker and the ability to process search requests expressed in the form of questions.

At press time, Digital Equipment, the site's parent company, had just been acquired by Compaq; AltaVista officials wouldn't

addresses, telephone numbers, maps, and even customized driving directions.

While Lycos's so-called Ultimate Prod-

uct Search doesn't cover as many online shopping resources as it might (it quotes CD prices from Spree.com and CDnow,

for example, but not from the popular Music Boulevard), it still offers a great way to comparison-shop. Lycos's community spirit is strong, too: The site carries an excellent free e-mail service from IName that lets users set up an account in a number of different domains, like technologist.com or cyberdude.com. Unlike most free e-mail services, this one can automatically forward messages to another account, making it a good option for people who are likely to change jobs or ISPs. Although we found Lycos's chat

rooms and message boards fairly barren, the site does offer a service called Planet-All that effectively combines online contact management, scheduling, and old-fashioned social networking.

Like Excite and Yahoo, Lycos lets you create a personalized home page with a stock ticker, news headlines on topics you choose, and an oft-updated list of top-rated sites in areas that interest you. Unfortunately, Lycos's page lacks flexibility—you can't choose the order of elements on the page or track news stories by keyword, for instance. If you decide to opt for Yahoo's or Excite's slightly more customizable package but still want free space for a personal site, no problem: Lycos's free-Web-space offer is available in stand-alone form at www.tripod.com.



LYCOS'S FREE WEB-BASED E-MAIL handles multiple folders and can forward your mail to another account.

INFOSEEK ★★★

www.infoseek.com

WHAT'S HOT: Well-integrated search tools, great news features, good Web site reviews.
WHAT'S NOT: No custom home page, no free e-mail, weak shopping section.

IF YOU'RE LESS INTERESTED in *Seinfeld* trivia and *X-Files* chats than in solid news and business information, try Infoseek. Generally speaking, it has a more sober feel than the jazzier Excite and Yahoo—and that could be its greatest virtue for many Web surfers. What Infoseek does, it does well. But a few weaknesses (such as limited personalization options) prevent it from ranking near the top.

From a single search box, Infoseek lets you uncover not just the standard Web page links but also news stories from a variety of sources, as well as company profiles from ace business publisher Hoover's. The search engine's new ESP (Extra Search Precision) feature noticeably

improved the relevancy of the first few links it provided in response to our searches, and results often include a convenient sidebar of relevant links from Infoseek's Web directory. Do a search on "apartments," for example, and Infoseek presents you with an encapsulated version of its Real Estate channel. Better yet, reviewed sites are not only evaluated, they're described concisely and clearly—something Yahoo doesn't always do.

Infoseek's strongest channels are devoted to practical subjects like Personal Finance and Business, and its chat rooms are full of serious talk about news stories, business topics, and real estate. Even its reference section looks like a starchy professor's bookshelves, with no-frills search forms for a *Webster's* dictionary, a *Roget's Thesaurus*, and *Bartlett's Quotations*. The bare-bones design extends to Infoseek's directories of toll-free phone numbers, zip

MARKETING AND REAL ESTATE CHATS are among the business-oriented highlights surfers will find on the Infoseek site.

codes, and other useful information.

At present, however, Infoseek stumbles with its navigation, communications, and online commerce features. While you can personalize your news and local weather content, keep track of ticker symbols, and filter news stories using saved keywords, you can't create a unified personal home page—making the site a tad unwieldy to explore. Also, Infoseek offers no free ▶

Build Your Own Portal

SURE, A PORTAL SITE OFFERS an easy, one-stop embarkation point for your daily Web-surfing sessions. But for every feature a portal offers, you can also turn to stand-alone sites that are just as good—and often better. So if you would rather construct your own portal site, add these URLs to your bookmark list. Or if you're really ambitious, sign up for your own free Web page (available at GeoCities, www.geocities.com; Tripod, www.tripod.com; and elsewhere) and create a personal home page containing links to the following sites.

Searching

Deja News (www.dejanews.com): Here's the best way to quickly tap those information free-for-alls known as Usenet newsgroups.
HotBot (www.hotbot.com): This easy-to-use Web site, developed around Inktomi's high-powered

technology, is our favorite all-purpose search engine.
Northern Light (www.northernlight.com): This no-nonsense, ad-free search site has a handy feature that sorts its results into well-organized folders.

Reference

Britannica Internet Guide (www.ebig.com): This selective reference to sites whose information you can genuinely trust comes courtesy of the folks at *Encyclopaedia Britannica*.
WWW Virtual Library (vlib.stanford.edu/Overview.html): The Net's academic roots still show at this authoritative collection of links to pages covering subjects from philosophy to gardening.
News and Current Events
AccuWeather (www.accuweather.com/wx): This weather site offers quick local forecasts for the next

five days, plus neat maps for weather nerds, too.

ABC News (www.abcnews.com), **CNN Interactive** (www.cnn.com), and **MSNBC** (www.msnbc.com): Get top-of-the-line professional news coverage and tons of video and sound clips from these three leaders in the television news biz.

Newsbot (www.newsbot.com): Enter your keywords, and Newsbot will search dozens of news sites for relevant stories.
The Wire (www.wire.ap.org): This site provides up-to-the-minute news coverage from the venerable Associated Press, as well as links to dozens of sites run by local newspapers.

Communications

Hotmail (www.hotmail.com): Hotmail is part of Microsoft's Internet Start site, but you can also go right to the source for this excellent (and free) e-mail service.
ICQ (www.mirabilis.com): This



popular chat software, recently purchased by America Online, lets you exchange instant messages with your buddies.

Fun Stuff

A#1 Horoscopes (members.amaonline.com/liz/horo.htm): You want horoscopes? Here are dozens of daily, weekly, and monthly readings from around the Web.
Total Entertainment Network (www.ten.net): Revel in a vast arcade of online fun, from classic card games to the latest, greatest 3D shoot-'em-ups. —Dan Miller

Step into

Our CareFree Night Life



Are nights and weekends off hard to come by? Is it because the amount of personal vigilance your server requires makes it difficult to get away?

Then look at this.

This is the Everex StepServer™ DS, the newest departmental server from Everex Systems. Not only does it have dual, hot-swappable power supplies, and RAID capabilities, but there's something really special under the hood. Each Everex StepServer™ DS comes equipped with ESMPRO™ software and the Everex EV2701™ Server Management Board. With it you can status temperature, reset the server, check the hard drive capacity, or even see if the CPU cooling fan is operating. The best part is you can do this from home.

That's right.....from home.

But we don't want you to sit around at home watching your server all night either! If there's a problem we'll page you. Actually we won't page you, your server will. You got it! The server will page you. At home. On the golf course. In the night-club...well...you get the idea..

With all the burden of worry lifted from your shoulders, you'll have lots time for lots of new ideas. Ideas that will take advantage of the dual Intel® Pentium® II processors 333 MHz, giving you more productive time at work.

And less work time at home.

Call: **1-800-EVEREX-1**
or 510-498-1111

Visit our web site at
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Circle 86 on reader service card

All The Training You Need To Buy Interactive Training

Technology keeps changing. Your people have to keep up with it. And self-paced training via computer seems the logical choice because it:

- Works around individual time schedules
- Provides training in remote locations
- Offers “just in time” refresher training
- And lets people learn at their own pace.

But how do you choose the right training?

Know what you're looking for

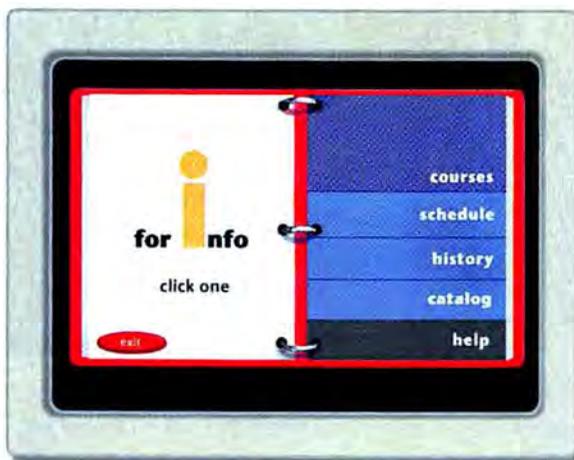
Interactive training. Computer-based training. Multimedia training. Internet-based training.

Confusing, isn't it?

But don't lose sight of what you are ultimately looking for...

1. Effective training
2. Delivered by computer
3. That's easy to use
4. And cost effective.

Your best choice will be the product that best satisfies these basic criteria.



Choose truly interactive training that's well organized and easy for people to use at their own desktop.

Choose what people will use

You can't bore people into learning. So don't be afraid to test drive and compare courses from different companies. You'll instinctively gravitate to those with:

- Menus and features that make navigating the course easy
- Animation, sound and other multimedia to spark interest
- Information that's simple to understand
- Return and review capabilities.

All this gives students the freedom to skip features they already know. Go back and review something they're not clear on. And quickly gain the skills they need in an exciting multimedia environment.

Look for learning geared toward adults

Interactive courses need to present material in ways people in the workplace learn best.

The best training is based on a proven adult learning methodology that involves three distinct elements:

1. *Meet it.*
2. *Learn it.*
3. *Try it.*

First, students are introduced to the subject, and find out what they will be learning.

Next, an automated demonstration shows exactly how to perform the task.

Finally, students are asked to try what they've just learned and are given immediate feedback. Simple...and highly effective.

*In fact, students learn up to 60% faster and retain more with interactive training than with traditional classroom training.**

*Source: Multimedia Monitor, July, 1995

*Flexible delivery should include
CD-ROM, LAN or corporate Intranet.*



Insist on true multimedia

Not everyone learns the same way. Some people rely on visual information.

Others learn more from sound or hands-on interaction.

So the courses you choose should be extremely interactive. They should have high resolution text, graphics and animation for visual appeal. Narration and sound effects to grab attention. And authentic software simulations for "hands-on" experience.

That training should also offer flexible delivery via CD-ROM, LAN or corporate Intranet.

Make sure you can measure results

Want to know what you're getting for your training dollar? Then choose interactive training that truly tests each student's ability to use their software. And also provides tracking software you can use to manage your training program.

Today's Most Popular Desktop Software

**WORD
EXCEL
POWERPOINT
OUTLOOK
ACCESS**

SPIRE's Most Popular Training Courses

**WORD
EXCEL
POWERPOINT
OUTLOOK
ACCESS**

Pay for only what you need

Why buy access to an entire library when, realistically, you will only use a limited number of titles? Look at your company's IT training needs. Then choose a training supplier that will provide exactly the right courses to meet them — without an expensive all-inclusive contract.

Work with the experts

Some companies simply take existing text or video courses and shoe horn them into a computerized format.

But Spire Inc. designs their courses from the ground up to take full advantage of the multimedia environment. For years, Spire has developed interactive multimedia courses for one of the largest classroom training companies in the world.

So we have more experience in the field than just about anyone. And we'll be glad to answer any questions you may have.

Assess computer skills — FREE

Before you make your training decision, call for a free Spire interactive training demonstration — and keep this free assessment software on CD as our gift.

This valuable tool lets you assess current skills and efficiently place people at the right training level.

For your free demo and assessment software, call us at **800-422-0590**.

Or visit our Web site at **www.spire-inc.com**.



e-mail and is woefully short on consumer advice for its shoppers. Fixes for at least some of these shortcomings are due soon. At press time, Disney agreed to buy 43 percent of Infoseek, an investment that could have a big effect on the site's personality. Stay tuned.

SNAP ★★★

www.snap.com

WHAT'S HOT: Well-organized Web directory, fine search engine, good selection of news sources.

WHAT'S NOT: Limited personalization, communications, and community features.

CNET'S SNAP IS THE youngest portal covered here; it currently lacks the extensive customization abilities offered by older sites such as Excite, and it's still working on developing its communica-

Fast answers. Fast answers. Fast answers. Try it now! Snap!

Home Shopping Music Deal Finder Search Results

You have selected: **Black Out** Artist: Bert Beberich

Click on underlined column title to sort results by that column, and a product name to see more details

Title	Artist	Merchant	Format	Shipping info	Price	Rating
<u>Black Out</u>	Bert Beberich	Cloone	CD	\$2.99 online	\$4.49	★☆☆
<u>Black Out</u>	Bert Beberich	Cloone	Top	\$2.99 online	\$1.49	★☆☆
<u>Black Out</u>	Bert Beberich	MusicMall	CD	\$2.99 online	\$7.99	★☆☆
<u>Black Out</u>	Bert Beberich	Amazon.com	CD	\$2.99	\$4.34	★☆☆
<u>Black Out</u>	Bert Beberich	Amazon.com	CD	\$2.99	\$1.99	★☆☆

[Back to search page](#)

SNAP HAS SOME SHARP consumer tools including a feature that enables you to comparison-shop at multiple online venues.

tions and community-related features. But otherwise, it's a reasonably well-rounded portal that's made all the more useful by its top-flight Inktomi search engine. Snap's searches can root out pictures and sounds as well as whole Web pages—and you can restrict your search by domain, to locate items at a specific site that doesn't have decent search tools of its own.

Snap does a thoughtful job of sifting through online resources and presenting them intelligently to window-shopping Web surfers. The way it handles such subjects as small business—with useful articles up top, copious presorted links under no-nonsense topic names, and relevant organizations listed down the side—makes good stuff quickly accessible.

There's a lot to like in Snap's approach to news, too, most notably in its neatly grouped items from sources such as CNN, Fox News, *U.S. News*, *Forbes*, and the *Motley Fool*. Online shoppers get sensible buying guides and links to articles on subjects such as online commerce.

While Snap does make use of personalization in some areas, it lags behind the best sites. Yes, it can track share prices for your stock portfolio and automatically show you local weather forecasts and movie listings based on your zip code. But it doesn't let you create a truly customized home page, and you can't filter the news in a virtual clipping service, as several of Snap's competitors allow.

At press time, Snap was about to add free e-mail, based on the same impressive IName service used by Lycos and AltaVista. A chat service is already in place, although the serious news and business rooms are pretty much deserted. Snap offers no dedicated instant-messaging software or message boards. But the site will likely benefit from a recent deal that gives NBC a minority interest in the portal and active involvement in its management. With a big-media force like NBC in its corner, Snap could quickly become a contender. Right now, it's worth bookmarking but not worth setting as your browser's home page.

MICROSOFT INTERNET START ★★ 1/2

home.microsoft.com

WHAT'S HOT: Easy personalization for Internet Explorer users, excellent e-mail service, wide range of news sources.

WHAT'S NOT: No built-in search engine, no message boards or chat rooms, skimpy shopping choices.

SOMETIME THIS YEAR, Microsoft plans to launch a big-league portal site. For now, the company's Internet Start—the default home page for Internet Explorer users—feels more like a portal to Microsoft sites (such as the Microsoft Network, MSNBC, Expedia, and Slate) than a gateway to the

e-mail
hotmail
Login Name: Password: enter
Click here to sign up for a free Hotmail account.

search
infoseek
White pages Yellow pages
move... to top of page
move... down one slot to bottom of page

news
msnbc news
Justices likely to act on Starr request
Victims still buried in German crash
'Big 3' confer ahead of Geneva nuclear summit

SLICK DROP-DOWN MENUS allows you to customize Internet Start on the fly—but only if you're an Internet Explorer user.

entire Web. This slick, good-looking site has its virtues, but it lacks depth.

For IE users, Internet Start's strong suit is simplicity: It's easy to personalize with news and weather, stock updates, favorite links, and other items; and you can add or remove items and shuffle them on the page. By contrast, Netscape Navigator users—still the majority of Web surfers—must jump to a different page to choose elements, and can't rearrange them. (Even this hobbled level of personalization rates as better than average, however.)

Since Microsoft is in the news business, you'd expect Internet Start to offer a decent selection of news items. And sure enough, you can add news to your personal page from MSNBC, the *New York Times*, Bloomberg, and other sources, though you get only a parsimonious three headlines per news section.

The shopping service is nicely designed, but its choice of venues is limited: Only the vendors in MSN's shopping plaza are included. It omits obvious choices like Amazon.com and CDnow, and offers little in the way of consumer advice.

Like Netscape's Netcenter, Internet Start provides a rotating selection of external search engines—Infoseek, Lycos, and others—and serves up a different one as the default each time you visit. If you find this irritating, you can specify a single engine by using Internet Start's convenient personalization feature. Hotmail, the site's free e-mail service, is much better, with filters and a built-in dictionary and thesaurus. Internet Start makes little attempt to provide a community feel, but if you follow links far enough into other Microsoft Web locales, such as MSN, Expedia, and Slate, you'll find message boards, ▶



TOP DOG.



TOP BANANA.



TOP DRAWER.



TOP THIS.

Circle 138 on reader service card

For a decade, MAG InnoVision has revolutionized the display industry by bringing you top-performance CRT-monitors. Now, we're proud to introduce the best in LCD monitors, with the LT500C (Active-Matrix) and LS500C (DSTN) pivoting displays.



TOP SAVINGS. These 15.1" digital monitors deliver the performance and viewing area comparable to today's conventional 17" monitors. And, their sleek, ergonomic design occupies less than half the space, while utilizing one-third the power. These displays save room on your desk and in your budget. The Estimated Street Price is \$2435 for the LT500C and \$1715 for the LS500C.

TOP-OF-THE-LINE INNOVATION. With both the LT500C and the LS500C, MAG InnoVision brings you portrait and landscape viewing capabilities. You can easily switch from full view of your favorite web page, to displaying full width of an elaborate spreadsheet.

TOP-NOTCH SERVICE. Both monitors are backed by our award-winning customer service, featuring free, 24-hour Expert System technical support (via phone and internet). And, both are covered by our standard one-year limited warranty with 48-hour MAGic Advance Replacement Service* that minimizes downtime in the event that repair is ever needed.

So, now that you know the top benefits of the LT500C and the LS500C . . . you'll always come out on top with MAG InnoVision.

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chat, and the like. As those other Microsoft venues show, the company knows how to put together a top-quality Web site. But Internet Start isn't one of them yet.

ALTAVISTA ★★ 1/2

www.altavista.digital.com

WHAT'S HOT: Robust searching and e-mail, excellent Health section.

WHAT'S NOT: Spotty content, jumbled interface, no personalization features.

ALTAVISTA, which Compaq just acquired along with the rest of Digital Equipment, has been a top search engine for years, but it's only recently evolved into a full-blown portal site—and its inexperience shows. As before, it boasts many unique and useful search capabilities. For instance, you can narrow a search to a particular domain by typing a "host argument" (such as *host: pcworld.com*), and you can get Web pages translated to and from English, French, German, Italian, Portuguese, and Spanish. However, many of the supporting features that can turn a great search site into a great portal site simply aren't there yet.

On the plus side, AltaVista boasts some sound original content on Internet business topics, and Johns Hopkins University helped develop its fine Health section. The Finance section offers one search box from which you can get stock quotes, profiles, news, and reports about public companies. It has white-page listings and a business finder, and its free e-mail service, like Lycos's, is provided by IName, with the same appealing features.

At press time, however, we found AltaVista short on content. For example, the site's specialty sections consist of only four "zones"—the aforementioned Health

and Finance, plus Travel and Entertainment—compared, for instance, to Lycos's 22 channels. Among other elements AltaVista lacks are message boards, chat, maps, and a real shopping area with buying advice. And because its zones were developed by outside content providers, they take varying approaches to navigation, so getting around the site is a bit confusing.

AltaVista also lags in personalization options, and many of the features that would benefit from customization weren't available at press time. Two new zones—News and Careers—may be ready by the time you read this, but until AltaVista gets up to speed, it will remain primarily a stop for serious Web-searching junkies.

NETSCAPE NETCENTER ★★ 1/2

home.netscape.com

WHAT'S HOT: Decent news section, business message boards.

WHAT'S NOT: Limited content, clunky search feature, overly commercial feel.

NETSCAPE'S NETCENTER has about the highest profile of any portal site: It's the default home page for the millions of folks who use Netscape Navigator as their Web browser. Mindful of this opportunity, the company is reworking the site to make sure that users keep it as their home page, despite the encroaching competition. Even though it showed improvement during our visits in early June, it still misses the mark. That may not be so surprising—after all, Netcenter was first designed to promote Netscape's products, not to be a guide to the Web. And its transition to portalhood is proving awkward.

Case in point: Netscape sells portions of the search requests made by Netcenter to competing search sites, so from the site's front page you can use any of five services, including AltaVista, Excite, Infoseek, LookSmart, Lycos, and Netscape's own engine. But the Netscape engine is itself a relabeled version of



NETCENTER UNACCOUNTABLY provides a choice of two search engines that are essentially the same: its own and Excite's.

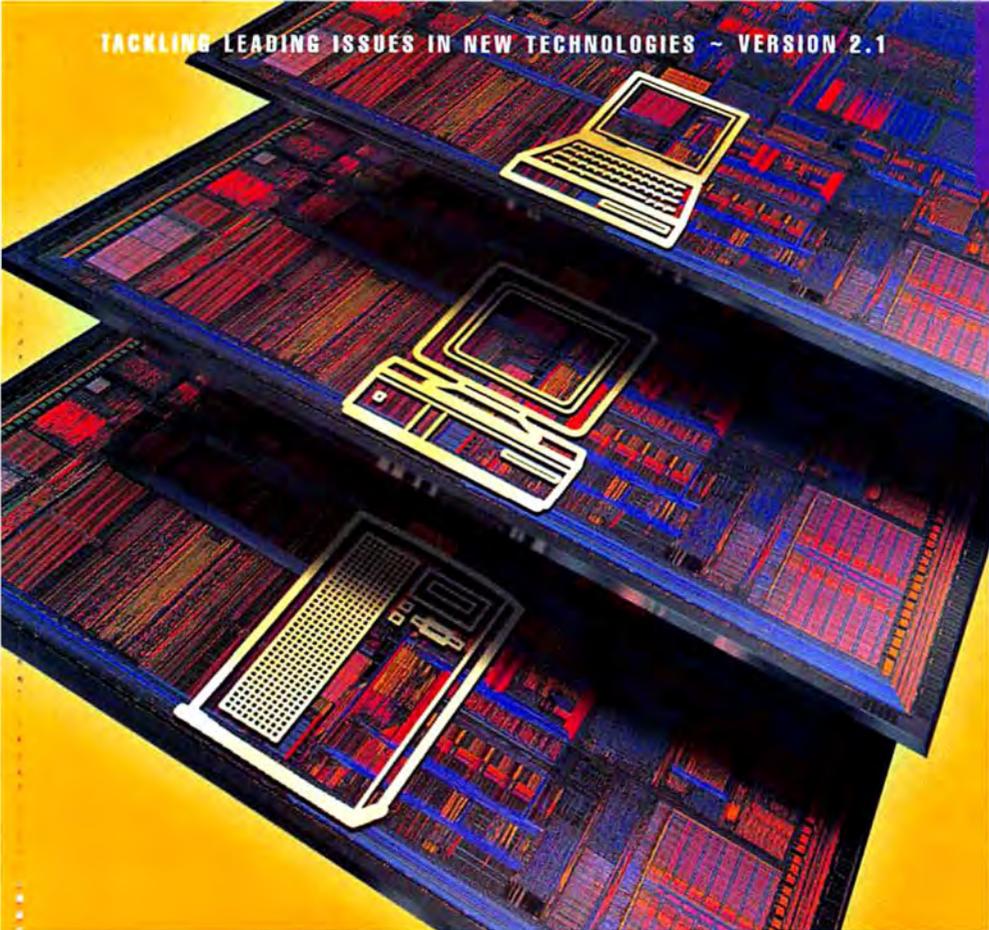
Excite, which means that Netcenter confusingly offers Excite searches under two different names. For a better-designed interface, you must dig your way down to the Net Search feature, where you will also find content channels and can select a favorite search service to come up every time you visit the page.

The site's navigation system is clumsy and heavily commercial. It's easy to confuse ads with links to on-site content, and ambiguous text sometimes leads you down blind alleys. The prominent Netscape News link, for example, takes you to company updates about Netscape, not to a news service. And if you follow a link promising information about Web hosting, you get a promo page for a single ISP.

That said, Netcenter does do some things right. In addition to a respectable news service that culls information from a large number of sources, the site also provides In-Box Direct—an e-mail-based news delivery feature that serves up your choice of topics from such luminaries as CNNfn and ABC News. The site provides a cobranded version of AOL's Instant Messaging for impromptu chatting, a message board with moderated discussions about doing business on the Web, and a series of useful business articles. And Netscape isn't done yet: It promises to add free e-mail and other features in the next few weeks, suggesting that Netcenter is worth keeping tabs on despite its currently lackluster state.

Matt Lake is editor of the Computer Press Association's Web-based newsletter and is a small-business owner in the Philadelphia area. Dan Miller is a senior editor for PC World, and Yael Li-Ron is an executive editor for PC World Online.

POWERFUL SEARCH TOOLS ARE STILL the main attraction of AltaVista, which lags behind most competitors in other features.



Intel Tech BUZZ

P6 Microarchitecture: Intel's Foundation for the Enterprise

Intel introduced the P6 microarchitecture in 1995 to build on the already impressive performance of its Pentium® processor. Since then, the company has not only added new performance features to the microarchitecture, but in a series of product introductions this year, has adapted the P6 microarchitecture to create new processors custom-designed for specific segments of the computing marketplace. These processors deliver superior performance and features for their targeted segments, and because of their common core, they also provide businesses with the consistency of a unified architecture for all their business clients and servers.

At the Core: The P6 Microarchitecture

The P6 microarchitecture is made up of three innovative technologies combined to deliver higher levels of performance. All of these key technologies are included in today's Intel® Pentium® II and Pentium® II Xeon™ processors. And many of these technologies are also found in the Intel® Celeron™ processor.

3 Vectors of Performance

When evaluating processor performance, Intel has determined there are three important vectors: integer, floating point and multimedia.

- **Integer performance** affects a PC's ability to handle number-intensive data like that found in productivity applications such as spreadsheets.
- **Floating-point performance** governs a PC's ability to process complex data, such as 3D graphics and full-color images. It's critical for complex images used in Web sites or presentations.
- **Multimedia performance** covers a wide range of capabilities, including the ability to process repetitive instructions efficiently, boosting compression and decompression speeds, and smoothing audio and video reproduction.

The Intel® Pentium® II processor delivers the highest performance of any Intel® processor for the desktop on critical capabilities like multi-tasking, data compression and imaging. And the Pentium® II Xeon™ processor offers even higher performance for servers and workstations.

Dual Independent Bus (DIB) Architecture. This high-performance technology combines a dedicated, high-speed L2 cache bus with an advanced system bus. Having two (dual) independent buses means the processor can use both buses and thus get two times more data in and out of the processor than in a single bus architecture. In addition, the L2 cache bus is integrated into the processor package, so it isn't limited in speed by the constraints of motherboard routing. This means the L2 cache bus can run at half the processor core frequency on the Pentium II processor. On the new Pentium II Xeon processor, Intel improves this performance even further by allowing the L2 cache bus to run at the full speed of the processor core.

Dynamic Execution. This innovative combination of three processing techniques—multiple branch prediction, data flow analysis and speculative execution—was first used in the Pentium® Pro processor. Together, these features enable the processor to be more efficient by streamlining and predicting the order of instructions rather than simply processing a list of instructions.

- **Multiple branch prediction** predicts program execution through several branches, accelerating the flow of work to the processor.
- **Data flow analysis** analyzes and schedules instructions so that they are executed in an optimal sequence, independent of the original program order.
- **Speculative execution** increases the rate of execution by looking ahead of the program counter and executing instructions that are likely to be needed.

Intel® MMX™ Technology. Intel developed this set of 57 powerful instructions to manipulate and process video, audio and graphical data more efficiently. These instructions also take full advantage of the efficient processing techniques of Dynamic Execution.

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Intel® Pentium® II processor  <ul style="list-style-type: none">• Performance for mainstream desktop and mobile PCs• Headroom for tomorrow's applications	<ul style="list-style-type: none">• Built-in L2 cache• P6 microarchitecture• Wired for Management compliant• MMX technology
Intel® Celeron™ processor  <ul style="list-style-type: none">• Basic PC• Meets the core needs of today's applications	<ul style="list-style-type: none">• P6 microarchitecture• Wired for Management compliant• MMX technology

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BY JOANNE ROBB

Graphics

Top AGP and PCI Boards

POP QUIZ: Which of the following is not a good reason to upgrade your graphics board? 1) You're not sure which is shaking—you or the image on that big new monitor. 2) The video clips you just downloaded look like something off a fifties TV screen. 3) Someone said you can't get great graphics without an Accelerated Graphics Port board. 4) Your 3D game scenes seem to be made of Legos.

If you chose number 3, congratulations! You may have saved yourself the expense of buying a whole new Pentium II system that supports AGP. Because unless you outright want a new PC, there's little reason right now to buy one just for better graphics. PCI video boards are as fast as their AGP counterparts, and the chips they use are nearly as advanced.

For this graphics board roundup, we tested ten PCI boards and ten AGP boards and ranked the five best in each category. Topping the list of PCI boards is Real3D's StarFighter PCI, with great 3D, lots of video RAM for better gaming, and a nice software bundle. It's based on the new Intel740 chip, which brings good overall performance and great-looking graphics to the desktop.

Why shop for an AGP card? After all, if you own a Pentium II, you probably already have one. But if your PII system has an early, slow AGP board, you might find an upgrade worthwhile. Alternatively, if you plan to buy a new Pentium II soon, you'll want to make sure that it has a good AGP board. Of the ten AGP boards we tested, the Diamond Stealth II G460 leads the pack. Like the top PCI board (and four other top AGP cards), the Stealth II uses the Intel740 chip. ►

PHOTOGRAPHS BY ROBERT CARDIN

Why upgrade your graphics card at all? Gamers clamor the loudest for graphics power, but that muscle is also useful for more productive tasks—like photo editing and desktop publishing, which often demand higher screen resolutions. And whether you work with AGP or PCI, newer video technologies such as DVD demand additional graphics power. The DVD capability in ATI's Xpert 98 means you won't need a separate decoder card to play DVD movies.

Finally, you may want a little extra graphics oomph to handle upcoming (but slow-to-arrive) 3D business applications. The few such pioneer applications we've seen so far include Viewpoint Data Labs' LiveArt98, which enables users to add 3D plug-ins to OLE-compliant apps, and Portola's Fremont, a data visualization program. We incorporated LiveArt98 into our testing, but Fremont wasn't final at press time.

If gaming qualifies as a borderline obsession at your house, opt for a 3D-only card. In our gaming performance tests, 3D-only cards were almost 50 percent faster than their 2D/3D counterparts, and in general their image quality was much

Best Buys



WANT KNOCKOUT 3D without having to upgrade to a Pentium II?

Replace your PCI graphics card with Real3D's StarFighter PCI. Based on the new Intel740 chip, the StarFighter posted the best overall performance scores on our tests. It displays impressive graphics and comes with lots of extras. If you're planning to buy a Pentium II anyway, or if you're unhappy with your current AGP card, take a close look at the Dia-



mond Stealth II G460. Another Intel740 card, it combines excellent 3D image quality, fast 3D speed, and above-average business performance.

better. We tested five 3D-only cards (see "Gamer's Delight") and found that boards with the Voodoo2 chip performed best.

ONE SIZE FITS NEARLY ALL

LOOKING FOR a single board that does it all? One that can blaze through a PowerPoint presentation *and* give you the thrill of your life as you hunt aliens in foreign terrain? None of the boards we tested produced outstanding results in both 2D and 3D, but the new Intel740 boards came

close. Their 3D performance was stellar, with one shortcoming: All the Intel740-based boards made game graphics look a bit too dark. The Intel740 chip also performs more than adequately for the office.

Even though the Intel740 chip was designed specifically for the AGP bus, one PCI board, Real3D's StarFighter, uses it. The StarFighter enjoys the 3D advantages of the Intel740 by hoodwinking the chip into thinking it's running on an AGP bus.

Several other new chips debut here. The

PCI AND AGP GRAPHICS BOARDS FEATURES COMPARISON

		BASICS						VIDEO/3D	
	PCI GRAPHICS BOARD	Street price (6/1/98)	Chip	Total RAM/ dedicated texture RAM ¹	Video RAM (type)	RAMDAC speed (MHz)	Maximum refresh rate at 1024 by 768 (Hz)	TV out	AGP version/ texture
1	Real3D StarFighter PCI	\$290	Intel740	24/16	SGRAM	220	85	○	n/a
2	STB Velocity 128	\$129	NVidia Riva 128	4/0	SGRAM	230	120	●	n/a
3	Diamond Viper V330	\$120	NVidia Riva 128	4/0	SGRAM	230	120	●	n/a
4	Intergraph Intense 3D Voodoo	\$200	3Dfx Voodoo Rush ⁴	6/2	EDO DRAM	220	85	●	n/a
5	Hercules Thriller 3D	\$99	Rendition Verite V2200	4/0	SGRAM	230	120	○	n/a
AGP GRAPHICS BOARD									
1	Diamond Stealth II G460	\$130	Intel740	8/0	SDRAM	203	85	○	2X/●
2	Real3D StarFighter AGP	\$130	Intel740	8/0	SGRAM	220	85	○	2X/●
3	STB Velocity 128zx	\$150	NVidia Riva 128zx	8/0	SGRAM	250	120	●	2X/●
4	Intel Express 3D	\$119	Intel740	4/0	SGRAM	203	85	○	2X/●
5	Hercules Dynamite 3D/GL	\$109	3Dlabs Permedia 2	4/0	SGRAM	250	120	○	1X/●

Best Buy

Yes No

n/a = not applicable

¹ Texture RAM is a portion of the board's overall RAM.

² Windows Hardware Quality Labs testing is a Microsoft certification.

³ Not toll-free.

⁴ Voodoo Rush is a 3D-only chip; board also includes Alliance Promotion chip for 2D.



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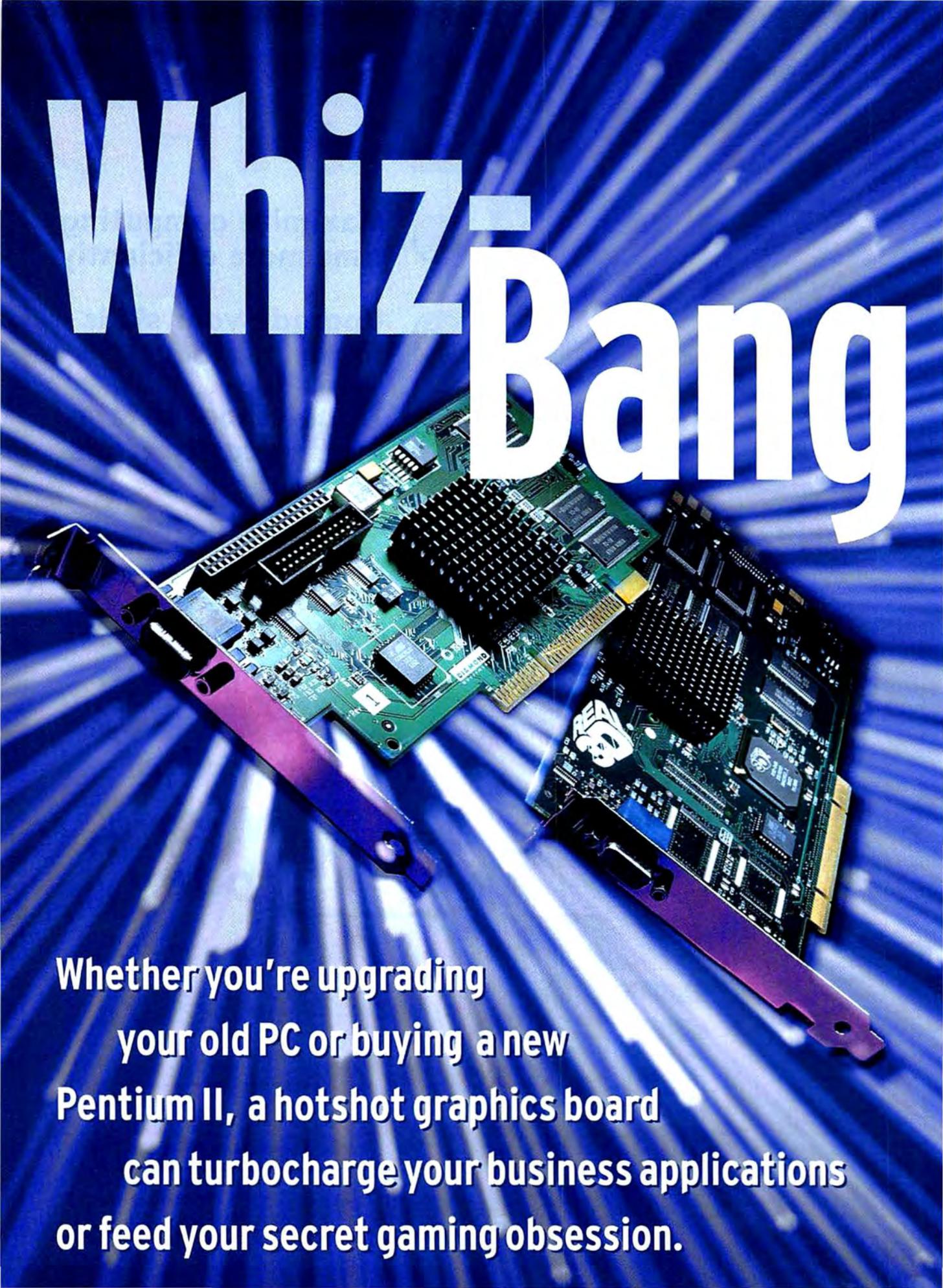
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Whiz- Bang



Whether you're upgrading
your old PC or buying a new
Pentium II, a hotshot graphics board
can turbocharge your business applications
or feed your secret gaming obsession.

Riva 128zx, successor to NVidia's Riva 128, is designed to compete against the Intel 740. Though not quite as impressive, it did well. With this chip, the STB Velocity 128zx nabs third place on the AGP chart. This board was very fast in games and in AGP textures, but its image quality was rated poor in two of our four test games.

After a long fallow period, Matrox has introduced the Productiva G100, an AGP card based on the company's new MGA-G100 chip. The Productiva missed the chart (because its 3D-image quality wasn't up to snuff), but its strong performance in our business tests brought it close.

Curiously, ATI's boards dropped off the charts this month. Though ATI held several spots on July's Top 10 chart, other boards outgunned its entrants in our new tests. The PCI version of ATI's Xpert@Play and the AGP version of its Xpert 98 both dragged a bit in our business tests. (As this story went to press, ATI sent us updated drivers, which seem to improve the performance of these boards; official results will be included in next month's Top 10 chart.)

WANTED! AGP SOFTWARE

IF AGP ISN'T FASTER than PCI, what's it good for? Mainly, for making games look more realistic. Most 3D games and other

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...play games but still need strong business performance

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You need...

...almost any of the boards we tested.

...a board tailored to the office, like Number Nine's Revolution 3D for AGP or PCI.

...a board that can do it all, like Diamond's Stealth II G460 for AGP or Real3D's StarFighter for PCI.

...a 3D-only board to supplement your current 2D board, like the Diamond Monster II or Creative Labs' 3D Blaster Voodoo2 (these PCI cards will run in AGP machines).

applications that create 3D images use texture maps to put a more lifelike "skin" on objects. The larger or more detailed the texture map, the less blocky an object looks. In a virtual museum, for example, large texture maps would enhance the detail of paintings. But all this clarity comes at a cost. Like most digital images, large texture maps take up lots of video RAM. In producing an image, PCI cards depend exclusively on their on-board memory, which limits the amount of texturing that they can support. AGP boards, in contrast, can handle huge texture maps by borrowing RAM from your PC's main memory.

That's great in theory. Unfortunately, software that takes advantage of AGP is still extremely rare. When will we see more of this software? The latest forecast from Intel: More heavily textured games should be available by year's end.

If you want to prepare for AGP applications but don't want to pay for an Intel machine, consider holding out for a clone. Intel competitors AMD and Cyrix are using chip sets built to the AGP specification. Some machines—from companies like Unicent—that have these non-Intel AGP chips could cost less than \$1000.

TEST FLIGHTS

WITH 3D BUSINESS APPS looming, today's graphics boards need to do more than tear through a Word document. To see how well PCI and AGP graphics boards handle the latest business software,

we ran them all through a set of mixed-media tests, including our standard business application benchmark, PC World-Bench 98; a multitasking test using Macromedia Director and Active Movie; and a PowerPoint presentation with a LiveArt98 3D plug-in. To make the going even tougher, we folded a video clip and an Excel spreadsheet into the presentation.

Because 3D games are so popular, we also tested each board with four popular titles: Acclaim's Turok Dinosaur Hunter, Criterion's Redline Racer, Eidos's Flight Unlimited II, and Id's Quake II. We scored games on both speed and image quality. For AGP boards we added Caligari's TrueSpace3, a modeling program that uses AGP texturing. Interestingly, we found that 2X AGP, which purports to move data twice as fast as the original 1X AGP standard, is only about 29 percent faster in this test.

Because AGP and PCI cards appear in different classes of machines, we tested AGP boards in a Pentium II system, and PCI cards in a Pentium MMX. The PII system was a 333-MHz NEC Direction 333 with 64MB of RAM and a 512KB secondary cache. The PMMX was a 233-MHz Micron Millennium Mme with 32MB of RAM and a 512KB cache. (For more details, see "How We Test" at www.pcworld.com/aug98/graphics/.)

Our findings? If you do only standard business work, any graphics board we

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12/○	5 years	○	726
14/● ⁵	5 years	●	727
16/●	3 years	●	728
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none/○ ⁵	5 years	○	730
12/○	5 years	○	731

⁵ Support handled by dealers.

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tested will give you effectively identical performance, with one exception: The ATI boards were especially slow in our PC WorldBench 98 tests.

The best performers overall in our mixed-media business tests were Number Nine's Revolution 3D boards, which did not make the chart. The PCI version of the Revolution 3D ran about 22 percent faster than other PCI boards in our business tests, and the AGP version scored about 12 percent above average for its class. The Revolution 3D cards, along with the Hercules Dynamite 3D/GL, have chips that support on-board 3D acceleration when running 16 million colors (also known as true color). These boards blazed through our PowerPoint test. Unfortunately, all three achieved their excellent business application performance by sacrificing gaming ability. Only the Hercules Dynamite 3D/GL did well enough overall to earn a spot—but it wouldn't be our first choice for gaming.

As a group, the Intel740-based boards work best for games—images were clear, and the boards ran 3D quickly. Another gaming option is Intergraph's Intense 3D

Voodoo, which contains a separate 3D chip. Overall, the Intense 3D garnered good scores, and if you play games with drivers written directly for the Voodoo Rush chip, you'll get top-shelf performance. For AGP, go with our Best Buy, the Diamond Stealth II G460. It sped through our Caligari test, so when those AGP textured games and business applications finally appear, the Stealth II should be ready to take them on. Overall image quality is also tops with this board.

No single card ran every application and game smoothly—testimony to the continuing flakiness of graphics board drivers. For example, neither the Diamond Viper V330 nor the STB Velocity 128zx completed our PowerPoint test; both boards froze when they got to the 3D plug-ins from LiveArt98. Diamond Multimedia

promises a driver fix to deal with the problem: as this story was going to press, STB sent us a driver that corrects it. Another example: The Hercules Dynamite 3D/GL couldn't run Turok—a deficiency the company hopes to remedy with its next driver.

UP AND COMING

SOME TANTALIZING CHIPS are due out soon, making it even harder to decide when to upgrade. One familiar player in the 3D-only market, NEC, has two promising products in the works: a new version of its PowerVR chip (see "Gamer's Delight," below), and the company's first combo 2D/3D chip. Look for a review of a board equipped with the latter chip in November. Similarly, 3Dfx, maker of the powerful Voodoo2 chip, promises a combination chip. S3, developer of the almost obsolete Virge family, ▶



The image quality of the Voodoo-based boards we tested was about equivalent to that of the Voodoo2 cards, but game play was much slower. The \$130 Diamond Monster 3D and the \$149 Canopus Pure3D use the older Voodoo chip.

Priced at \$129, the Apocalypse 3D from NEC/Videologic uses a Power VR chip. Unfortunately, this card wasn't able to keep up with the Voodoo contingent. Although image quality was stellar in Quake II, all the Direct 3D games looked abysmal, and the game play was slow. NEC's second-generation

Power VR chip should be in stores by the time you read this. It promises to outdo its predecessor in

GAMER'S DELIGHT

The Voodoo2 CHIP Works MAGIC

YOUR PROFILE:
You explained the plot of Quake II

(such as it is) to your mother, and one of your goals in life is complete cosmic power—virtual, of course. Yup, you're a gamer. That said, no board on our charts has your name on it. You need to add a fast and furious 3D-only card to your PC. We took five of them for a test drive.

Without a doubt, your best bet is a board containing the Voodoo2 chip—like the \$250 Diamond Monster 3D II, or the \$300 Creative Labs 3D Blaster Voodoo2. The Voodoo2 cards produced truly gorgeous images in our tests: Ambient lighting in Quake II was perfect; water and explosions in Turok had just the right translucency; and textures in Red-

line Racer were realistic shades of green.

We did have one problem with the Monster 3D II when we tried to play Redline Racer using Direct 3D drivers. The board drew the scene as we sped through it, so we had the eerie sensation that we might fall off the edge of the earth at any moment. When we played the game with the 3Dfx drivers, however, the ride was picture perfect.

Though the Monster 3D II and the 3D Blaster Voodoo2 had different amounts of on-board RAM (8MB versus 12MB), they delivered virtually identical performance. Future games are likely to take advantage of all the memory they can get, so you might want to invest in the 12MB board.

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• **Canopus Pure3D** \$149 street; Canopus; 888/868-2533; www.canopuscorp.com

READER SERVICE NO. 737

• **Creative Labs 3D Blaster Voodoo2** \$300 street; Creative Labs; 800/998-5227; www.soundblaster.com

READER SERVICE NO. 738

• **Diamond Monster 3D II** \$250 street, **Diamond Monster 3D** \$150 street; Diamond Multimedia Systems; 800/468-5846; www.diamondmm.com

READER SERVICE NO. 739

• **NEC/Videologic Apocalypse 3D** \$129 street; NEC/Videologic; 800/366-9782; www.powervr.com

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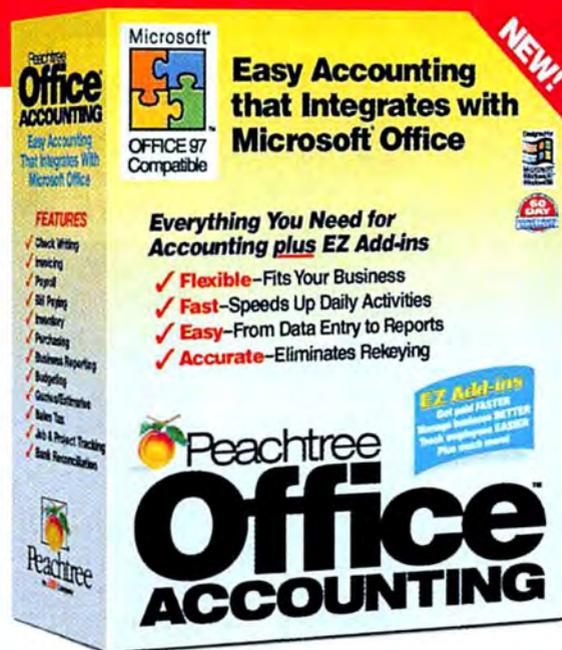
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JAZZ MULTIMEDIA'S two-timing Bonnie & Clyde is the only card we tested that has both AGP and PCI connectors. But paltry features kept it off our chart.

is designing a new chip, the Savage 3D, that it says will compete with the Intel740. Boards based on the Savage 3D—from Hercules and other vendors—should arrive in late summer.

Hot on the heels of Matrox's MGA-G100 comes the company's G200 chip, which promises better 3D performance. Though

we couldn't obtain a final board and drivers in time for this roundup, we did review a beta version of the Millennium G200 in last month's *New Products*. We should be able to test the final version of the Millennium G200 in time for our October Top 10 Graphics Boards chart.

Should you wait for these new chips before you upgrade? Our preliminary tests of the Millennium G200 suggest that it might hold its own against Intel740-based cards. If you do wait, you'll have more boards to choose from, but

you probably won't get significantly better graphics. Bottom line: With high-quality 3D performance and the ability to handle complicated business applications with aplomb, the latest crop of graphics cards is the most powerful ever.

PCI Cards

1 Real3D StarFighter PCI

PRO: Best mixed-media PCI performance, terrific 3D, 24MB of on-board RAM

CON: Most expensive board here



AT \$290, REAL3D'S StarFighter PCI is the costliest board on the chart, but it delivers powerful all-around performance. Like its AGP sibling (in second place on our AGP chart), the StarFighter PCI uses the Intel740 chip. Though the chip was designed for the AGP bus, Real3D has cleverly tricked it into running on PCI, so you get the stellar performance of the Intel740 without having to upgrade to a Pentium II PC.

In most of our 3D games, the StarFighter performed impressively. Compared to all PCI boards we tested, it had above-average frame rates in both Turok and Redline Racer, and its scene quality scores straddled the line between good and excel-

TEST REPORT

Almost Any Graphics Card Is Fine for Business

For gaming, go with Intergraph Intense 3D Voodoo or Diamond Stealth II G460.

GRAPHICS BOARD	3D tests					Mixed-media business tests				
	Redline Racer image quality	Redline Racer (frames per second)	Quake II image quality	Quake II (frames per second)	AGP texturing (frames per second)	PC WorldBench 98 score	Director (frames per second)	PowerPoint test time		
PCI	Real3D StarFighter PCI*	excellent	27.9	fair	14	n/a	121	42	3	6
	STB Velocity 128	good	27.7	poor	11.6	n/a	120	39	3	6
	Diamond Viper V330	good	27.8	fair	20	n/a	121	40	n/a ¹	6
	Intergraph Intense 3D Voodoo	excellent	24.8	excellent	17	n/a	119	55	3	6
	Hercules Thriller 3D	excellent	27.4	excellent	21.4	n/a	120	28	3	6
AGP	Diamond Stealth II G460*	excellent	38	good	24.4	30	171	86	3	6
	Real3D StarFighter AGP	good	40.7	fair	25.4	30.3	170	85	3	6
	STB Velocity 128zx	good	37.2	poor	22	29	168	77	n/a ¹	6
	Intel Express 3D	good	35.6	fair	21.6	22	169	85	3	6
	Hercules Dynamite 3D/GL	fair	26.6	poor	19.1	24	170	88	3	6

*Best Buy n/a = not applicable

TEST HOW WE TEST Our 3D tests use four games (results for Turok and Flight Unlimited are not shown), each scored on average frame rate and image quality. For AGP cards we add an AGP texturing test that uses Caligari TrueSpace3. PCI boards are tested in a Micron Millennia Mmc Pentium MMX-233 with 32MB of RAM. AGP boards are tested in an NEC Direction 333 PII-333 with 64MB of RAM. We tested all boards under Windows 95. Our mixed-media business tests include PC WorldBench 98 (run at 800 by 600 resolution with 16.8 million colors, at 1024 by 768 resolution with 65,536 colors—reported here—and at 1280 by 1024 resolution with 65,536 colors); a PowerPoint multimedia presentation (also run at 1024 by 768 resolution); and a Macromedia Director script. Data based on tests designed and conducted by the PC World Test Center. All rights reserved. ¹Couldn't complete test because of driver problems with 3D plug-in.

lent except in Quake II. Like every other board that uses the Intel740 chip, this StarFighter rendered Quake II slightly too dark for optimum enjoyment.

Several attractive extras accompany this board. The bundled software includes scaled-down versions of such titles as Rage's Incoming and Caligari's TrueSpace SE. The company offers toll-free technical support 16 hours each weekday, and its reps are also reachable on weekends.

• **Real3D**, 800/393-7730, www.real3d.com

2 STB Velocity 128

PRO: Great price, solid overall performance

CON: Mixed bag on 3D-image quality

A HEFTY SOFTWARE bundle and modest \$129 price make the STB Velocity 128 a good upgrade option, even though it turns in only average performance.

The Velocity 128's track record on every one of our mixed-media business tests was middle of the pack. In our 3D game tests, however, it was a little faster than most PCI cards, except in Quake II. Because STB had not released a Quake II driver by the time we did our testing, the game couldn't take advantage of the board's hardware acceleration. No surprise, then, that all our judges rated the Velocity 128 poor in Quake. In our other test games, image quality was generally good.

STB backs the Velocity 128 with a lifetime warranty and toll-free phone support 10 hours each weekday. The company also throws in a solid software bundle, including three games and Simply 3D, a basic modeling program. • **STB**, 800/234-8750, www.stb.com

3 Diamond Viper V330

PRO: Above-average 3D performance

CON: Can't run PowerPoint with 3D add-ons

BASED ON the same chip as the STB Velocity 128, the \$120 Diamond Viper V330 either matches or surpasses our number-two board in most ways but one: Running on Diamond's new Turbo driver, the Viper wasn't able to play the flashy



ADDING 3D elements, like this pound sign, to a PowerPoint presentation made it harder for boards to slog through our test.

LiveArt 3D plug-in in our PowerPoint tests. The board didn't have trouble handling any other PowerPoint extras, though. Diamond anticipates that a driver fix will be available by the time you read this.

The problem with 3D plug-ins does not mean you should brush off the Viper. The card offers solid business performance and was a bit faster than the Velocity in 3D. And unlike the Velocity 128, the Viper provided a working OpenGL Quake II driver.

Diamond includes a bucketload of software with a few games and some photo editing tools. It's no slouch with support, either. You have to make a toll call, but reps are available 14 hours each weekday, and on weekends. • **Diamond Multimedia**, 800/468-5846, www.diamondmm.com

4 Intergraph Intense 3D Voodoo

PRO: Sharp images and fast 3D, best performance in Director test

CON: Pricey, pop-ups don't look good in Turok

ONE LOOK AT the configuration of the \$200 Intergraph Intense 3D Voodoo confirms that this is a board for gamers. Instead of a combination 2D/3D chip, the Intense 3D contains two separate chips—the Alliance Promotion for 2D and the 3Dfx Voodoo Rush for 3D.

Unfortunately, the Alliance Promotion chip doesn't deliver top-shelf 2D performance—it supports only EDO DRAM, the slowest kind—but you can't get a better 3D chip on a combination board than the Voodoo Rush.

Not surprisingly, in our mixed-media business tests, the Intense 3D performed unimpressively, though it did supply smooth AVI video playback. But this board produces beautiful 3D image quality. Our judges rated it as excellent in Quake II and Redline Racer and good in Flight Unlimited II. The board fell short in Turok only because cliffs and rocks appear suddenly as you move through the fog instead of coming into view gradually.

The Intense 3D offers one particularly nice bonus: You can use your TV as a big-screen monitor—especially handy if you like larger-than-life games. Also, you get some free games, to take advantage of Intense 3D's outstanding game play.

Intergraph provides support for 12 hours each weekday, and on weekends, though you have to pay for the call. • **Intergraph**, 800/730-2000, www.ingr.com

5 Hercules Thriller 3D

PRO: Strong 3D performance, adequate for average business applications, very good price

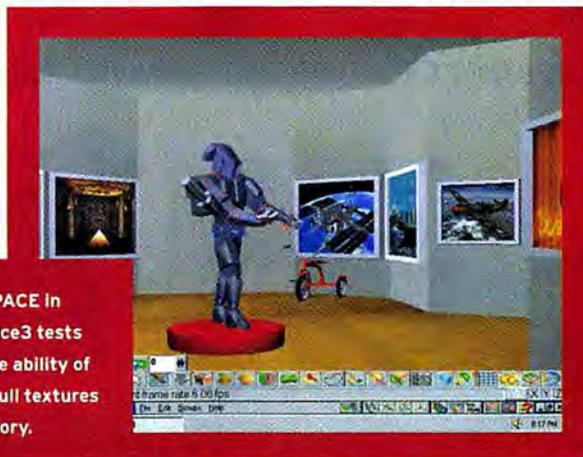
CON: Didn't play video properly in Director test, no software bundle, difficult installation

THE HERCULES THRILLER 3D delivers impressive 3D performance at a bargain-basement \$99 price. But it landed in fifth place because it's thin on features—lacking bundled software, for example.

If you plan to do only normal office work with your graphics card, the Thriller 3D is up to the task. If your needs include video playback, however, look elsewhere—this board sometimes didn't even play our video clip. It couldn't run PC WorldBench 98 at 1024 by 768 resolution, either.

When it comes to 3D performance, the Thriller 3D drives its way past much of the competition. Producing crisp images and great lighting effects, it got an overall score of excellent in our Redline Racer and Quake II tests.

Hercules maintains a good support policy. Tech staff is available on toll-free lines for 12 hours a day, and you're covered by a five-year warranty. • **Hercules**, 800/532-0600, www.hercules.com



THIS MUSEUM SPACE in Caligari's TrueSpace3 tests AGP texturing—the ability of an AGP board to pull textures from system memory.

4PEAT

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PC COMPUTING'S TORTURE TEST WINNER 1998: DELL LATITUDE CP M233ST

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AGP Cards

1 Diamond Stealth II G460

PRO: Best 3D quality and speed; great value

CON: Limited features

DIAMOND'S \$130 STEALTH II G460 earns top position on our AGP chart by combining great 3D performance and a reasonable price. In two of the three resolutions we used for testing PowerPoint, it ran the fastest. It also posted the second-fastest frame rate in the Director test.

The Stealth II's image quality in 3D games was among the best we encountered. Our only complaint: Images were a little dark. When clomping through alien sewers in *Quake II*, for example, we couldn't see the fans in the ceiling or the grating under our feet. Increasing the brightness of the monitor corrected most of this problem. The Stealth II produced images in a hurry—it was about 18 percent faster than an average AGP card in our game tests and about 24 percent faster in the Caligari modeling test, which measures AGP texturing performance.

The Stealth II does not include an extensive array of features—no zoom or virtual desktop, for instance—but everything it has is top quality. The generous software bundle is highlighted by a snappy 3D game (*Rage's Incoming*) as well as by 3D animation and photo editing tools. Finally, Diamond provides you with technical support seven days a week (on a toll line). • **Diamond Multimedia**, 800/468-5846, www.diamondmm.com



YOUR GRAPHICS card may create incredibly beautiful

images, but you won't be able to see them on a mediocre monitor. Here's a quick review of the two critical factors you should check out on both your monitor and your graphics card:

◆ **REFRESH RATE** measures how quickly the graphics card/monitor combo redraws a scene on your screen. Make sure that the refresh is set to at least 75 Hz to prevent eyestrain and headaches. (A small

The EYES Have It

number of people can detect flicker on screen at this refresh rate. If you're one of them, pump it up to 85 Hz.)

◆ **SCREEN RESOLUTION** is the number of pixels displayed on your monitor. The more pixels there are, the higher the resolution and the more details you'll see. Though all the cards we tested support resolutions of up to 1600 by 1200, some can't support such high resolution at a flicker-free refresh rate. The refresh rate on Intense 3D Voodoo, for example, drops to 70 Hz if you sharpen the resolution to 1600 by 1200. Most cards can handle the baseline refresh rates you need, but if you're running high-res images on a big monitor, make sure that the card and the monitor support high refresh rates and high resolutions.

2 Real3D StarFighter AGP

PRO: Good 3D performance overall, longest support hours here

CON: Business performance only average
USING THE SAME Intel740 chip that powers the first-place Stealth II G460, the

StarFighter AGP is almost as speedy.

Overall, the StarFighter churned out 3D games only a tad slower than the Stealth II did. It also had the same slightly dark pictures that we saw with our number one board. (We were able to improve image brightness a bit by adjusting the monitor and by using the gamma correction utility that comes with the card.)

The StarFighter AGP handles the average office job with complete command, but it's not the best choice if you plan to run a lot of video clips or create fancy presentations. It did outperform the Stealth II in one test—our Caligari modeling task, which stresses AGP texturing.

Like the StarFighter PCI board, this card comes with a pile of software, including ramped-down versions of games like *Wing Commander* and *Redline Racer*.

Real3D is fairly new to the consumer market, but the company is starting off on the right foot—especially when it comes to support. It's the only graphics board company in this review that offers toll-free technical help on weekends, and its representatives are available 16 hours a day.

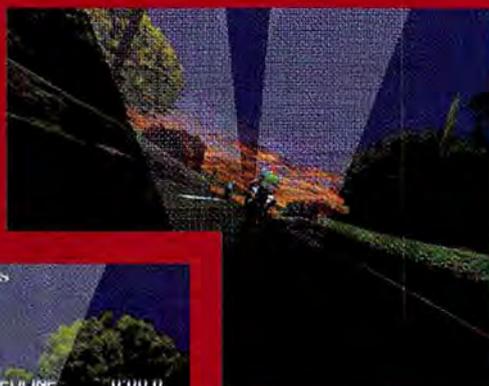
• **Real3D**, 800/393 7730, www.real3d.com

3 STB Velocity 128zx

PRO: Fast in 3D and AGP texturing

CON: Poor image quality in some games

IN MANY WAYS, the \$150 STB Velocity 128zx is just a souped-up version of ▶



WITH THE MATROX PRODUCTIVA G100 (above), motorcycle headlights in *Redline Racer* look dithered.

With the Real3D StarFighter AGP (left), they look clear and much more realistic.



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98

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the Velocity 128, which earns second place on our PCI chart. Instead of using the Riva 128 chip from NVidia (which powers the PCI card), it works with the next-generation Riva 128zx. Like its PCI counterpart, the Velocity 128zx doesn't lead the pack in any single area but performs most tasks fairly well.

One regrettable exception: Like the Diamond Viper V330, the Velocity 128zx couldn't run the 3D add-ons we used to animate our PowerPoint presentation. STB expects a driver fix for the problem

an excellent board for playing games.

Since the Express 3D has 2X AGP capabilities, we expected it to ace our Caligari test, which measures how well the board does AGP texturing. But its performance, while above average for the AGP boards we

use, consider the \$109 Hercules Dynamite 3D/GL. A fast finisher in our mixed-media business tests, the Dynamite 3D/GL is also the only card on our chart that can run 3D in true color with hardware acceleration. In our 3D-enhanced PowerPoint test at 16.8 million colors, this board outran the competition.

Our 3D-only tests indicate that the Dynamite 3D/GL is a poor choice for games. A driver problem prevented it from running Turok at all, and it earned a poor score in Quake II because of washed-out image quality. In Redline Racer, the 3D/GL produced fair image quality, but it was quite slow—an undesirable trait in a racing game. Finally, in Flight Unlimited II, image quality was good and the card ran a little faster than average.

Hercules technicians are available toll-free 12 hours a day on weekdays. The Dynamite's software bundle includes photo editing titles and modeling programs, but only one game. • Hercules, 800/532-0600, www.hercules.com

JoAnne Robb is an associate editor for PC World. Testing by Ulrike Diehlmann and Mike Salayko of the PC World Test Center. Tracey Capen, executive editor for PC World, contributed to this review.

For more information about all products in this article, circle reader service no. 910. ■

BEYOND THE TOP 10



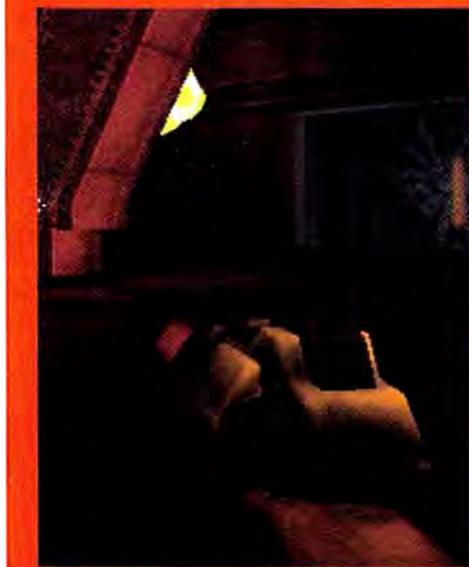
We evaluated these graphics boards along with the ones reviewed in this article, but they didn't make our Top 10 chart. For more details, see PC World Online (www.pcworld.com/t10graphics).

PCI

- ◆ ATI Xpert@Play
- ◆ Diamond Stealth II
- ◆ Hercules Stingray 128/3D
- ◆ Jazz Bonnie & Clyde PCI
- ◆ Number Nine Revolution 3D PCI

AGP

- ◆ ATI Xpert 98
- ◆ Jazz Multimedia Bonnie & Clyde AGP
- ◆ Matrox Productiva G100
- ◆ Number Nine Revolution 3D AGP
- ◆ STB Nitro DVD



WITHOUT A DRIVER for Quake II, images with the STB Velocity 128 (above) look pixelated. With the StarFighter board and a good driver, images look smoother.



tested, was nowhere near what we expected, putting it on a par with boards like the Hercules Dynamite 3D/GL that have 1X AGP support.

The Express 3D whizzed through Turok and posted speedy times in the other three games as well. Image quality was admirable—excellent for Turok and good for Redline Racer and Flight Unlimited II. As with the other Intel740 boards, the Express 3D picture was a little too dark in Quake II, making it hard to see clearly.

A decent software bundle—including one 3D game and several 3D business titles—accompanies the card, but support is iffy. Since Intel doesn't support end users directly, buyers must rely on the retail dealer or distributor for help. • Intel, 800/628-8686, www.intel.com/graphics

5 Hercules Dynamite 3D/GL

PRO: On-board acceleration of true-color 3D
 CON: Slow in games; 3D images could be better
 IF YOU WANT a board strictly for office

to be available by the time you read this.

3D images move quickly with the Velocity 128zx. In our Caligari modeling test and our 3D game tests, it nearly kept pace with the two Intel740 boards above it on the chart. Image quality, however, ranged from good (in Turok and Redline Racer) to poor (in Flight Unlimited II and Quake).

The Velocity 128zx comes with a small software bundle. STB offers 10-hour toll-free support on weekdays. • STB, 800/234-8750, www.stb.com

4 Intel Express 3D

PRO: Fast in 3D

CON: No direct support

SINCE INTEL DESIGNED the 740 chip, you might expect its own board to blow past the rest of the Intel740 contenders. *Au contraire.* The \$119 Express 3D was the least impressive of the three Intel740-based boards we tested. That said, it's still

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- 8.4GB 8.5ms Ultra ATA Hard Drive
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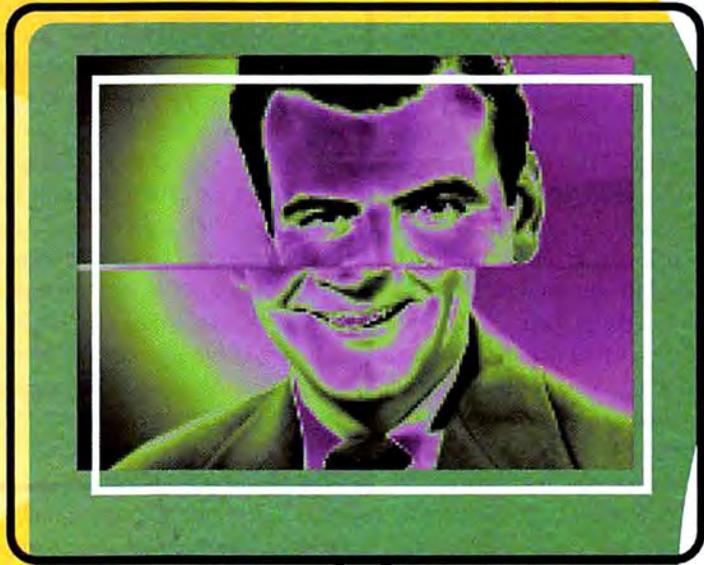
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We tested half a dozen kits to find out if **videoconferencing** is finally ready for professional use.

By Robert Lauriston



What's Wrong With This Picture?

VIDEOPHONES HAVE BEEN a futuristic technology since, well, the coining of the word *futuristic*. They've appeared in sci-fi novels, world fairs, AT&T's arrogant "You Will" ads, James Bond movies, James Bond parodies—almost everywhere but on retail shelves.

Over the last few years, that's been quietly changing. Stand-alone high-end videoconferencing systems for the meeting room, with large screens (31 inches and up) and hefty price tags (\$40,000 and up), are now fairly common in major corporations. The latest buzz, however, comes from PC-based videoconferencing systems that sell for as little as \$199. Their prices keep dropping, their quality keeps improving, and most significant, standards have evolved over the past year so that similar products from different vendors can communicate with each other.

To catch up with the state of the art, we tested a half-dozen videoconferencing kits, ranging in price from \$199 to \$1349 per user. All include a camera, an ISA or PCI video capture board to install in your PC, and the requisite software (Boxtop's IVisit, Intel's VideoPhone, Microsoft's NetMeeting, PictureTel's LiveWare, VDOnet's VDOPhone, or White Pine CU-SeeMe). Some kits have a built-in modem or ISDN adapter. All provide a *whiteboard utility*—a shared window in which both parties can make notes or paste graphics. And all except White Pine's CU-SeeMe Videum VO kit allow application sharing, where you and the person at the other end work on the same document. Using a pair of identical 300-MHz Pentium II desktop PCs with 64MB of RAM running Windows 95 as our test bed, we compared products within each price range (under \$350 and over \$1000) for ease of setup and image quality. Quality varied as much as price; more often than not, we were disappointed. (See "Our Picks" for details.)

We tested the products by installing a pair of each into our two

Our Picks

IF YOU'RE LOOKING for TV quality, forget it. But if we had to buy a PC-based videoconferencing system today, we'd choose one of the Intel kits. The picture quality of the **Intel Create & Share Camera Pack** (PCI Modem version) blew away the other low-end products, and the package includes the most extras. If you want a family video-telephone network so parents can chat with their kids, this is the kit to buy. At the high end, the **Intel Business Video Conferencing 4.0** kit's good picture quality offsets its quirky software. It works for direct ISDN-to-ISDN connections and over the Internet, so you can use the same product to communicate with telecommuters as well as people in the main and branch office.



PCs and connecting over the different lines each kit supported, including standard phone service, ISDN, and LAN connections. For each setup, we sat still for the camera (to allow the most image clarity), then waved our hands to see how

much image degradation the motion caused.

The best products produced adequate video at 352 by 288 pixels—a format known as CIF (Common Interchange Format)—running about 15 frames per second. But even at that rate, the video was pretty jerky. The worst were glorified toys—fun to play with but too awful to endure regularly; the images they created looked like smeary slide shows projected on a postage stamp. Current technology forces buyers to choose between resolution and frame rate—between a clear picture that hardly moves and lots of motion with little detail. Because of that limitation, the kits we tested couldn't replace most face-to-face meetings, even over a LAN. The best might appeal to those who need to show faraway clients 3D objects like mechanical or packaging prototypes, but even those products can only marginally convey such crucial

VIDEOCONFERENCING KITS

FEATURES COMPARISON

PACKAGE	Street price per user (5/4/98)	Direct connections	Internet/LAN connections ¹	Captures still images/AVI video	Conferencing software	Camera model
3Com Bigpicture Video Phone 800/342-5877 www.3com.com	\$199	none	●/●	●/●	VDOPhone, NetMeeting, IVisit	Philips E-71335
Intel Business Video Conferencing 4.0 800/538-3373 www.intel.com	\$1349	ISDN	●/●	●/○	NetMeeting enhanced with Intel ProShare compression technology	Intel YC64
Intel Create & Share Camera Pack (PCI Modem version) 800/538-3373 www.intel.com	\$329 ²	modem	●/● ³	●/●	VideoPhone, NetMeeting	Intel YC66
PictureTel Live200 800/716-6000 www.picturetel.com	\$1100	ISDN	○/○ ⁴	●/○	LiveWare	Sharp YH-7B57M
PictureTel LiveLAN 800/716-6000 www.picturetel.com	\$1100	none	●/●	●/○	LiveWare	Sharp YH-7B57M
White Pine CU-SeeMe Videum VO 800/241-7463 www.wpine.com	\$250	none	●/●	●/●	White Pine CU-SeeMe	Winnov UW10

● Yes ○ No

¹ Any product that supports H.323 can be used over any TCP/IP connection such as Internet dial-up (e.g., modem and ISDN), cable modem, and LAN.

² \$30 rebate through 8/31/98.

³ Manufacturer does not recommend use over a LAN.

details of human interaction as gestures and facial expressions.

Setup is another can of worms. We'd originally planned to test three other products, but we couldn't get them to work at all. One used a Universal Serial Bus camera that was incompatible with the PCI controllers in our test systems. The video capture card on another refused to recognize our test bed's video card. A third kit promised convenience—it's just a camera that connects to the printer port—but nothing the company's support staff suggested would inveigle it into working. Even the six products we managed to get up and running didn't distinguish themselves for ease of installation. Setup was often balky, and sometimes we had trouble figuring out how to make a connection. For example, establishing direct 128-kilobits-per-second ISDN connections using the Intel Business Video Conferencing 4.0 kit was a major chore.

FOUR PATHS TO VIDEOCONFERENCING

THERE ARE SEVERAL WAYS to videoconference from your desktop: directly over the phone line, directly over an ISDN connection, over a LAN, and through the Internet. Each product we tested handles two or three of these connection types; none supports all four. The more bandwidth you have to send the video and audio from one desktop to another, the better the image quality. Phone lines provide the least bandwidth whereas LAN connections offer the most.

The cheapest way to videoconference from your desktop is over the Internet. Get an account with an ISP, buy a camera (\$150 and up, with an ISA or PCI capture card), download some conferencing software (such as NetMeeting), and you're ready to go—and without the long-distance charges. The standard for sending and receiving video over the Internet is called H.323. Unfortunately, conferencing over the Net via the phone lines limits you to a 176-by-144-pixel image (also known as Quarter CIF,



**Even over a LAN,
these products can't replace
most face-to-face meetings.**

or QCIF) and only several frames per second—very jerky. We had to make the image as small as the tiniest Post-it note before it started to become clear. Internet traffic jams can degrade that frame rate to zero and garble the audio beyond recognition, too.

One step up in cost and quality is a direct connection between two modems. Because you don't share the line with everyone else on the Net, video quality is often significantly better: We obtained much sharper images that appeared at rates of up to (a still-jerky) 8 fps. A second protocol—H.324—governs modem-to-modem video, and any two devices supporting that standard should be able to talk to each other. The advantage here? Many stand-alone, non-PC-based videophones and videophone attachments for your TV set (such as 8x8's ViaTV Phone) also use H.324, enhancing your chances of being able to directly connect with them. The disadvantage? You may have to pay long-distance charges. Moreover, a conference between two 56-kbps modems tops out at 33.6 kbps; you can achieve the higher rate only when connecting to an ISP.

The third type of connection—a direct link between two ISDN adapters—offers almost four times the bandwidth of a modem-to-modem connection and improves video quality substantially. In the products we tested over ISDN, we got up to 10 fps with a CIF image and up to 15 fps with a QCIF image. Unfortunately, ISDN is a relatively costly option. ISDN videoconferencing kits will set you back more than \$1350 per node, including the NT1 adapter needed for many ISDN setups. (NT1 is a box that sits between the ISDN adapter and phone jack.) You'll also have to pay double per-minute phone charges, since a 128-kbps ISDN

connection uses two lines; and depending on your phone company, you may pay an extra service premium. Getting ISDN installed can be expensive, too, assuming it's even available in your area. And because the H.320 protocol that ISDN systems use is

incompatible with H.324, an ISDN system can't connect directly with a PC using a modem. At least you can connect with some high-end, stand-alone videoconferencing systems—in theory. If your company already bought one of those pricey beasts, ISDN systems might be an economical way to leverage the investment.

Finally, you can videoconference over a LAN. Though ethernet networks transmit a whopping 10 to 100 megabits per second, this rate is divided up among the dozens or even hundreds of people on the LAN. The highest video bit rate we observed in our testing was around 300 kbps (your mileage may be lower depending on how accommodating your IS department is about this video stuff). But that's still fast enough for CIF images to appear with just a hint of jaggedness. However, if you want to talk to someone on the company network at a remote location, your videoconference will have to travel over a wide area network connection, which may not be fast enough. If your firm's WAN uses 64-kbps leased lines, forget about it. If it has 1.5-mbps T1 lines, you might get acceptable results. LAN videoconferencing uses the H.323 protocol, so if your LAN is hooked up to the Internet, you can communicate with telecommuters, clients, and suppliers over the Net—as long as IS lets you push video through the firewall. ▶

Pros	Cons	Reader service number
Inexpensive	Poor quality, no phone support for VDOPhone	743
Best picture quality, includes ISDN adapter	Expensive, software is buggy	744
Easy setup, includes modem	Slow frame rates	745
Includes ISDN adapter	No Internet support	746
Good picture quality	Pricey, no direct connections	747
Supports multiuser conferences	Slow frame rate, no application sharing	748

*\$150 software upgrade converts product to LiveLAN but disables ISDN.

For more information about all products in this table, circle reader service no. 906.

THE LOW END

Videoconferencing at Home

THE SIX PRODUCTS WE TESTED fall neatly into two categories: Three cost over \$1000 and are good enough to consider for business use; the other three are priced under \$350 and provide hobby-quality performance.

At the low end, we reviewed the 3Com Bigpicture Video Phone (\$199 per user). It comes with one of those ubiquitous ball-shaped cameras (Philips E-71335) with a built-in microphone, plus a PCI capture card; it's not to be confused with similarly named Bigpicture products that include a modem or work with your TV set rather than your PC. We also looked at White Pine's CU-SeeMe Videum VO kit (\$250 per user). It uses the same camera as the 3Com (Philips is the original equipment maker for the Winnov camera) but is bundled with an ISA capture card that, oddly, doesn't use the camera's built-in microphone. Finally, we looked at the Intel Create & Share Camera Pack, which comes in three versions; we tested the top-of-the-line PCI Modem model (\$329, or \$299 with a current \$30 rebate), which matches a com-

bination video capture/56-kbps modem card with an Intel YC66 camera and a microphone. All three low-end products work over Internet dial-up or LAN connections; the Intel Create & Share Camera Pack also supports direct connections between two modems.

LIGHTS, CAMERA, NOT MUCH ACTION

SETTING UP INTEL'S CREATE & SHARE was easy. Its manual has well-illustrated step-by-step instructions for installing the board, and the software installed itself from the bundled CD-ROM. Connected over the Internet, the Create & Share unit managed to display only a 176-by-144-pixel QCIF image at just 2 to 3 fps, and the image quality was poor. We got much better results when we connected directly from one modem to another. In this case, Create & Share displayed 7 to 8 fps, and the picture quality was less wretched: We could make out faces and get a fair idea of what was going on at the other end, though facial expressions and gestures were indistinct.

Our setup experience with White Pine's CU-SeeMe Videum VO kit was a bit bumpier. Instructions are split between two manuals—one for the CU-SeeMe videoconferencing utility and the other for the bundled video capture board and its software—so you have to piece together the setup process on your own. When we connected over the Internet by modem, the White ▶

DESKTOP VIDEOCONFERENCING

A Tale of Two Users

WHILE OTHERS PINE FOR DSL, cable modems, and infinite bandwidth, **Abel Rivera** gets his video needs met over a regular phone line. As a mechanical engineer in Sugar Grove, Illinois (50 miles west of Chicago), Rivera uses 3Com's Bigpicture Video Phone system to conduct video calls with clients. The biggest benefit? He gets instant feedback about prototypes of automotive or electronic parts intended for mass production.

"I'd call the client and hold up a model to show it to him," explains Rivera. "That way he would have an idea of what the thing looks like before I send it out to his company in England. We just saved two days right there."

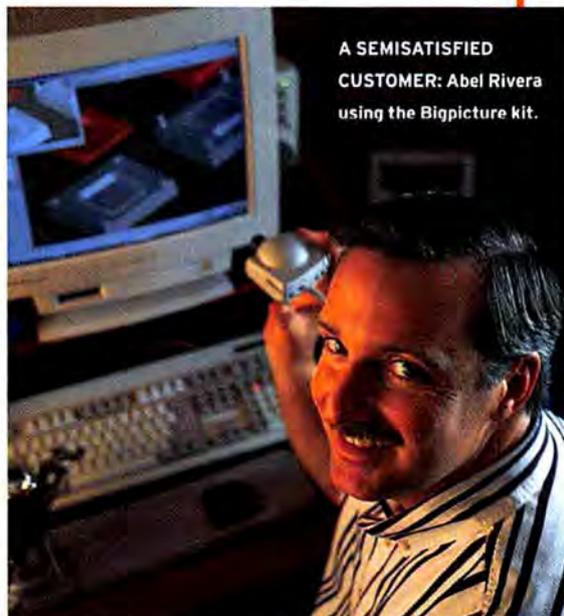
Bigpicture also acts as a makeshift digital camera. Rivera often uses the monitor-top camera to take photos of his products and uses a video camera to capture the manufacturing process, which he then imports into documentation for his clients. Rivera also points his video camera at the monitor and runs PowerPoint presenta-

tions while online, which allows customers to see the presentations directly off his PC. Yet despite his success working with the technology, he admits to being frustrated at times by its limitations, such as the need to wait for images to refresh. "I'm generally happy," says Rivera. "But I want one that's faster and won't cost \$2000."

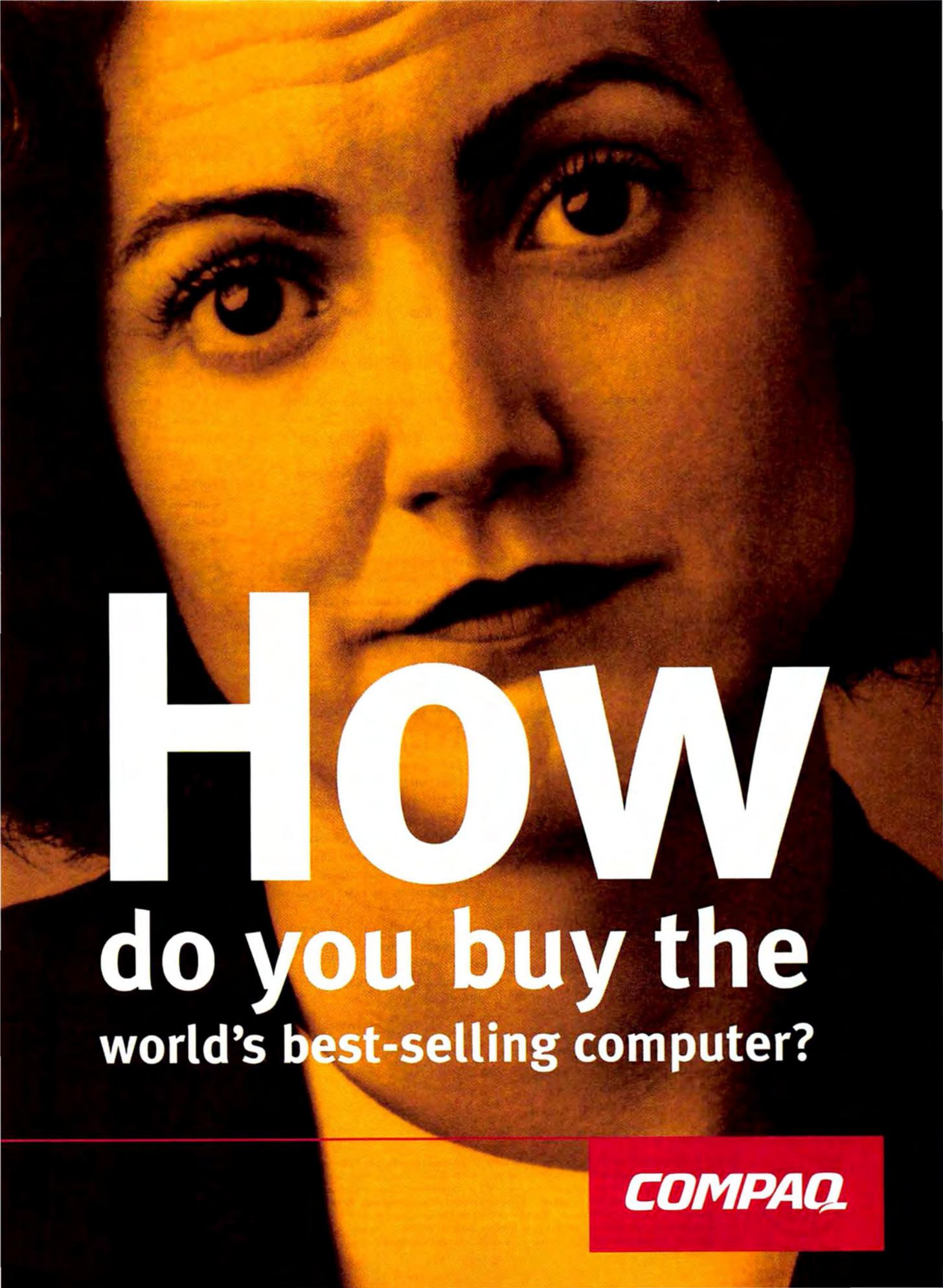
Multimedia consultant **Jon Peddie**, on the other hand, has nothing polite to say about desktop videoconferencing systems. "My experience has been that (PC-based) videoconferencing is a total waste of time," complains the president of Jon Peddie Associates.

"You'd think, since we're consultants with clients all over the world, that our clients would be eager to videoconference," says Peddie. But low frame rates, poor resolution, and distracting audio delays, he says, impede effective desktop video communications: "Many of our

clients try it, and they usually don't like it. Even with the extra time and expense, they would rather get on a plane." Peddie particularly dislikes consumer-oriented videoconferencing products that use analog modems to make a video connection. The only systems he finds tolerable are those based on LANs, which work over the ethernet. "Everything else is just a frustrating compromise."
—Michael Desmond



A SEMISATISFIED CUSTOMER: Abel Rivera using the Bigpicture kit.



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- Compaq Briefcase: **\$99'**

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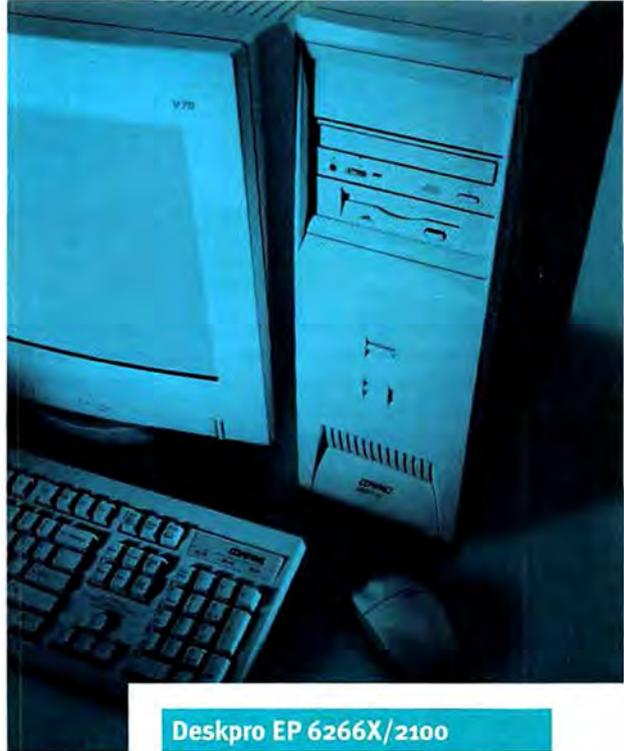
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Model 6400X/6400/CDS

\$2,269¹

- Intel Pentium II Processor @ 400 MHz
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- ATI RAGE PRO TURBO AGP Graphics
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- Compaq V75 17" (16" viewable) monitor
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Pine kit staggered along at 1 fps—more slide show than video—though the image itself was good (a bit better than the Intel's). Connecting to the Net over a 128-kbps ISDN line didn't improve the image quality, but its frame rate perked up to 4 fps. The CU-SeeMe software doesn't support H.324, so we couldn't connect modem-to-modem. And while the White Pine product is the only kit here to offer multiuser conferencing without additional hardware or software, you must split the available bandwidth over the multiple sessions—which means each video session could look like an outtake from *The Blob*. Finally, White Pine's is the only unit that doesn't support application sharing.

The 3Com Bigpicture kit was even more problematic to set up. It comes with three videoconferencing programs: Boxtop's IVisit, VDONet's VDOPhone, and Microsoft's NetMeeting. IVisit's video images were so low-resolution and tiny (half the size of

Blurry and Blurrier



the smallest Post-it note), we didn't finish testing with it. We couldn't get VDOPhone to work, even after calls to 3Com's support. When we finally switched to NetMeeting, the 3Com's image quality was horrible—so pixelated that we could just vaguely make out people's faces, but that was it. Given such a low picture quality, the frame rate hardly matters, but for the record it came in at about 1 fps over modem dial-up and 10 fps over ISDN. Bigpicture is designed to work over a direct modem-to-modem (H.324) link as well, but only through VDOPhone, so we couldn't test this feature.

3Com promotes the Bigpicture package for business as well as consumer use, but even the users that the vendor put us in touch with gave us lackluster feedback. One user hadn't yet convinced his IS department to let him use the kit at the office; another user was less interested in videoconferencing than in the NetMeeting software's application-sharing function.

THE HIGH END

Videoconferencing for Business

COMPARED TO THE LOW-END videoconferencing kits we reviewed, the three high-end products bear less resemblance to one another. PictureTel's LiveLAN is intended strictly for use on LANs. We also looked at the company's Live200, which supports only direct ISDN-to-ISDN connections in its standard configuration. LiveLAN and Live200 each cost \$1100 per user, including microphone and speakers; to connect Live200 to an ISDN jack you'll also need to buy an NT1 box for around \$150. The Intel Business

Video Conferencing 4.0 kit, which is ready for both ISDN and LAN use out of the box, costs \$1349 with an NT1 included, \$1195 without. All three systems deliver image quality that is good enough to let you discern the expressions and gestures of the per-

1 MYSTERY WOMAN: Images were blurriest when we connected over the Internet using regular phone lines.

2 THE VEIL LIFTS, PARTLY: Thanks to a direct ISDN connection, some of the details—such as glasses, necklace, hair style, and a bemused smile—emerge.

3 GOOD PICTURE HUNTING: LAN-based video yields detail such as laugh lines around the mouth. But don't expect TV quality.

son you're talking with and—if several people are at the other end—to figure out which person is talking.

Out of the box, LiveLAN can connect with other H.323-compatible products on the LAN and (assuming

your firewall permits it) over the Internet. Image quality is acceptable, but PictureTel's pixel-filling algorithm often breaks the image up into a grid of chunky fragments. We got a reliable 15 fps in the smoother-motion setting (176 by 144 pixels, or QCIF); switching to sharper-picture mode (352 by 288 pixels, or CIF) made still objects look a bit sharper, but moving objects actually appeared fuzzier.

Installing Live200 was less painful than setting up most ISDN products we've encountered. We just ran the setup program, following the configuration instructions, and it worked the first time. Even the whiteboard and other desktop-sharing tools worked once we entered both phone numbers for the system ▶

we were calling. (ISDN adapters have two 64-kbps channels, each with its own phone number.) The picture quality seemed to improve over a single 64-kbps ISDN connection as well, though it produced the same blobby grids as the LiveLAN unit. We got around 12 fps in both smoother-motion and sharper-picture settings. In fact, the two modes were almost indistinguishable, except that the latter caused intermittent problems, such as blank images and low frame rates, that we couldn't resolve even with PictureTel's tech support. The CD-ROM includes Windows 95 drivers so you can use the ISDN adapter for Internet access. But since the software supports only direct ISDN-to-ISDN connections, you can't videoconference over the Internet. A \$150 software upgrade lets you convert Live200 to a LiveLAN setup, but doing this disables the ISDN adapter.

Live200 supports remote control of the camera at the far end. If the person you're talking to has a compatible motorized camera, you can pan, zoom, and focus it from your end. LiveLAN works with PictureTel 330 NetConference MultiPoint Server, and both products work with LiveGateway. NetConference can display several conference attendees at the same time on one screen, making it the video equivalent of a conference call on the phone. LiveGateway, an H.323-to-H.320 bridge, lets LiveLAN users conference with Live200 and other H.320-compatible desktop or stand-alone videoconferencing systems.

VIDEO ONLY HALF BAD

WE FOUND THE Intel Business Video Conferencing 4.0 kit tricky and nonintuitive to set up, and getting the best results using this kit over the LAN took some trial and error. For example, we assumed that the top, 400-kbps bandwidth setting would yield the best results, but actually the picture looked much better at 200 kbps.

Once we got things tuned up, the Intel package produced the best images among the kits evaluated. Picture quality wasn't great by TV standards, and there was some pixelation, but the unit clearly outclassed either PictureTel product. Over direct ISDN connections (H.320), we got about 15 fps using the default smoother-motion (QCIF) setting—fast enough that we couldn't perceive individual frames. When we switched to sharper-picture (CIF) mode, the frame rate dropped to about 10 fps, but the image showed greater detail. Over our LAN, we got similar frame rates but even more detail; the CIF image actually approached TV quality. The Intel kit's image quality over the Internet was much worse, but it was still far superior to what we saw from any of the low-end products.

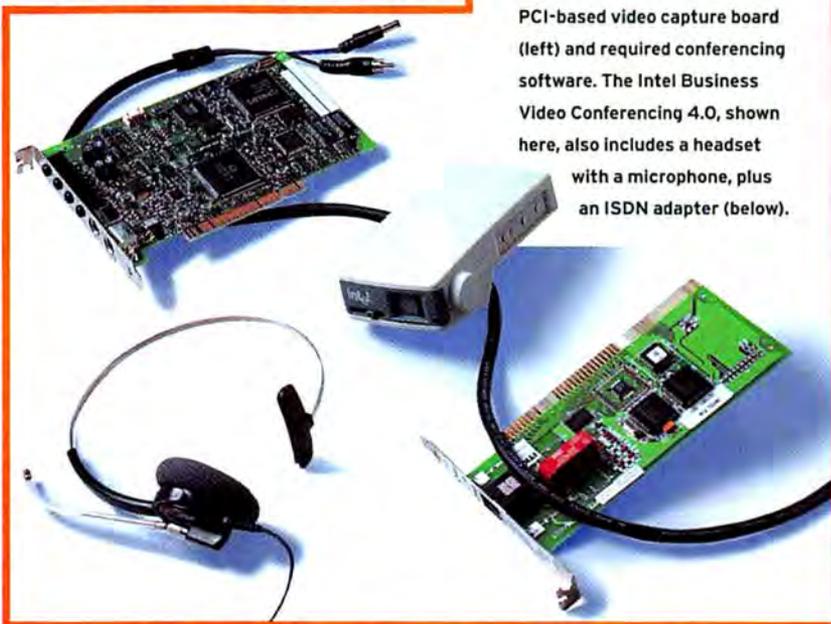
Though picture quality was high, Intel's software was at times a little flaky. For example, after hanging up we sometimes had to reboot before we could make another call. Other times, text in dialog boxes and start-menu buttons disappeared. Eventually we just got in the habit of rebooting every time we wanted to make another call—a real drag if you have to make a lot of video calls.

DESKTOP VIDEOCONFERENCING Still Not Ready for Big Business

OUR TESTS INDICATE that the six products we tested push current PCs and Windows 95 beyond their limits. Even our relatively high-end test systems often fell short on horsepower. The products require a mind-boggling number of drivers and other software components.

So is desktop video good enough for business? "That depends on your business and your definition of 'good enough,'" says IDC analyst Ed Buckingham. "A couple of people in our office have the very low-end tools. Sure, it's a 2-inch image and not very good quality, but to the extent you can actually see who's in the room when having a meeting, it seems to be good enough." On the other hand, the vendors themselves don't seem ready to bet their businesses on their own products: "I keep asking the vendors to

Behind the Scenes



TAKING A LOOK INSIDE: In addition to a camera (center), most PC-based videoconferencing kits come with an ISA- or PCI-based video capture board (left) and required conferencing software. The Intel Business Video Conferencing 4.0, shown here, also includes a headset with a microphone, plus an ISDN adapter (below).

set me up with a videoconference and we'll use the technology to talk about the technology," continues Buckingham, "but none of them have been willing."

Dataquest analyst Sujata Ramnarayan is even more skeptical. The low-end Internet- and modem-based systems are "really not very good at this time," she says. "Consumers might buy them on impulse because they look cute." And as for ISDN? "A lot of times, calls are not very successful—they don't go through," says Ramnarayan. "The cost-versus-quality ratio is not good enough unless you're in particular industries where you can justify the value. For example, say something goes wrong with the equipment in a manufacturing plant, and the technician can't get there for a day or two. If a videoconferencing system can cut repair time by a day or two, you're willing to make a trade-off." ▶

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MAKING THE CASE FOR

Videoconferencing

PC-BASED videoconferencing isn't for most businesses. At best, LAN-based videoconferencing offers semisatisfactory results and makes sense only in certain situations—for example, for people working in a large building or on a campus, where it can cut down on meeting time. Even then, however, to argue successfully for adoption you'll have to convince the bean counters *and* your IS manager. And given the immature state of the technology, you can expect an uphill fight. Still, with these tips gleaned from interviews with early adopters and from our own testing, you may get the powers that be to see things your way.

1 SAVE MONEY ON AIR TRAVEL. A thousand bucks sounds like a lot for a computer add-on, but if it saves the company a few plane tickets, the system quickly pays for itself. To replace many meetings, though, you need to accommodate more than two people in a videoconference. Fortunately, that can easily be arranged without any additional capital investment. Telephone companies like AT&T, Frontier, and MCI sell time on *multipoint control units* that connect multiple ISDN (H.320) videoconferencing

users and automatically switch to the person talking; it's similar to having the phone company set up a conference call.

2 SAVE EMPLOYEES' TIME. Several users told us that the people who are most enthusiastic about desktop videoconferencing are busy executives and professionals who attend many local meetings. They could save 20 minutes of travel time per meeting by holding videoconferences instead of walking across a large plant or driving across town.

3 BEAT OUT THE COMPETITION. One company, Caterpillar, has five of its globally dispersed engineers use ISDN videoconferencing to troubleshoot parts. They are able to check out the situation "live" in less time than it would take to reach the airport.

4 LEVERAGE EXISTING INVESTMENT. If your company already has H.320-compatible (or -upgradable) stand-alone videoconferencing installations in place, desktop systems can pay off a lot faster. In addition to making one-on-one calls, you can arrange one-to-many connections, with one person on a PC and a whole group in a conference room. You don't even have to put a camera on the



desktop to leverage the hardware. If you install an H.320-to-H.323 gateway on your LAN, anyone on the network with a microphone and a copy of NetMeeting (which is free) can join a group videoconference on the speakerphone.

5 USE EXISTING BANDWIDTH MANAGEMENT TOOLS. IS managers tend to see videoconferencing as a major traffic management problem, but that might be a hasty judgment. As one manager discovered, most of his bridges and routers already came with some traffic-prioritizing tools that he could use to improve video frame rates—so he didn't need to buy anything new.

Still, telecommuters might benefit from some of the high-end products. An ISDN connection between your home office and the remote access server on your firm's LAN supplies enough bandwidth to meet the minimum requirement for videoconferencing. Images are good enough that you can focus on what the people at the other end are saying instead of how awful their images look and how disembodied their voices sound. In many cases the per-minute connect charges will be local rather than long-distance, and your LAN won't need any extra software or hardware beyond the ISDN remote-access link.

The early LAN videoconferencing adopters we interviewed work at big organizations with large campuses and at geographically dispersed sites with fast WAN connections (T1 or faster). Many users deal with applications in which visuals are crucial; they include engineers collaborating on tractor-part designs and specialists from a big-city medical center who must sit in on examinations in suburban satellite clinics.

And what about the low-end products? All three kits can save video to AVI files and single frames as bitmaps, either from the

bundled camera or from another source like a camcorder. A couple of business users we spoke with say they regularly use their kits to capture images to paste into word processing documents. Otherwise, if you want to send images over the wires, you're better off with e-mail and a scanner.

LOOKING INTO THE FUTURE

HIGHER-BANDWIDTH connections like DSL, cable modems, and 384-kbps ISDN should make desktop videoconferencing more practical in the next year or two. Also, for a higher monthly fee, ISPs will likely provide priority Internet service, where users can access less-congested segments of the network. But whether you'll actually want a PC videoconferencing system is another matter. Placing videophone calls might make you feel like James Bond in the 21st century. But having that unblinking eye staring at you all day could make you feel like Winston Smith in 1984.

Robert Lauriston is a writer who lives in Berkeley, California. Michael Desmond is a senior associate editor for PC World. ■

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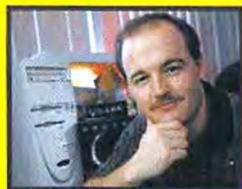
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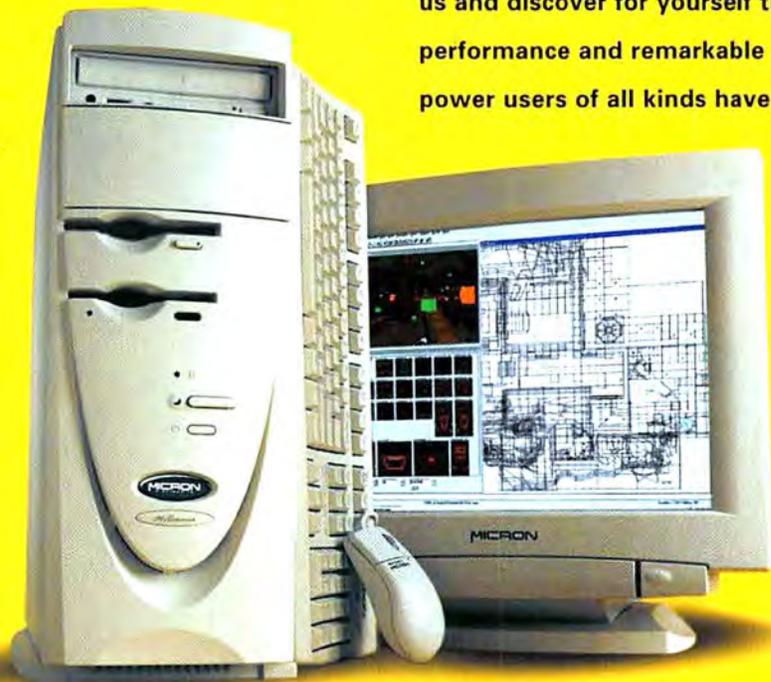
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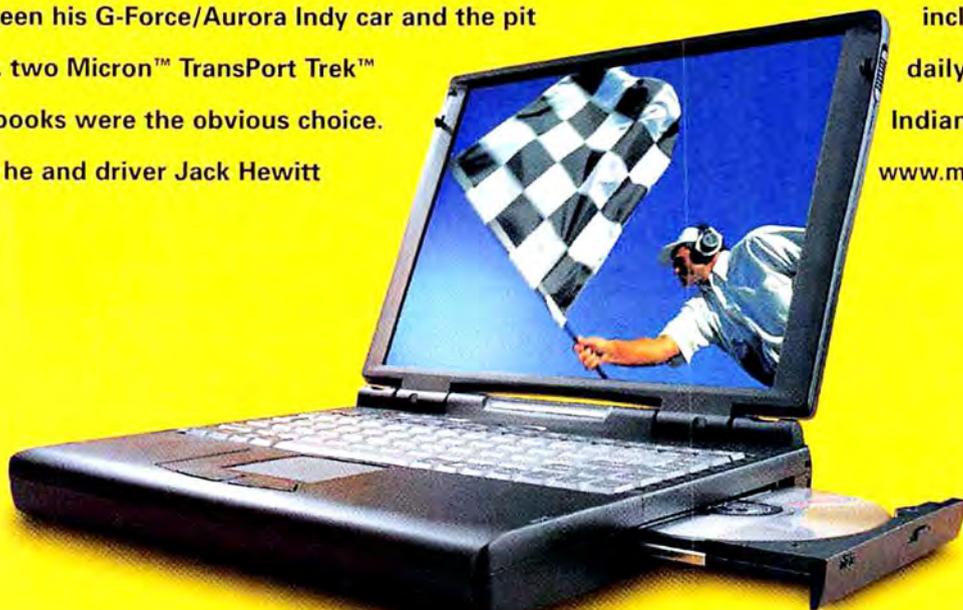
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<ul style="list-style-type: none"> • Intel Pentium® processor with MMX™ technology 233MHz • 32MB EDO RAM • 2.1GB hard drive • 12.1" SVGA TFT display 	<ul style="list-style-type: none"> • Intel Pentium processor with MMX technology 233MHz • 64MB EDO RAM • 3.2GB hard drive • 13.3" XGA TFT display • Microsoft Office Small Business Edition 	<ul style="list-style-type: none"> • Intel Pentium processor with MMX technology 266MHz • 64MB EDO RAM • 3.2GB hard drive • 13.3" XGA TFT display • Microsoft Office Small Business Edition
\$1,899 Bus. Lease \$66/mo.	\$2,299 Bus. Lease \$80/mo.	\$2,499 Bus. Lease \$87/mo.

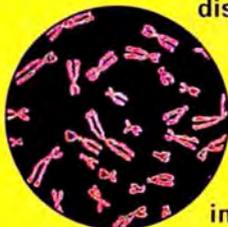


Circle 161 on reader service card

Call Toll Free 800-289-1320
www.micronpc.com/pcwd

TO HELP GUIDE THE FUTURE OF MEDICINE, STI MUST PROVIDE THEIR CLIENTS WITH UNWAVERING RELIABILITY AT REASONABLE COST. (THAT'S EXACTLY WHAT MICRON SERVERS PROVIDE)

Since 1985, medical associations and pharmaceutical companies have enlisted Scientific Therapeutics Information, Inc. to develop and distribute research data used to keep doctors on the cutting edge of medicine. This type of time-critical information must be accurate, affordable, and most importantly reliable. Which is why STI turned to Micron. Our NetFRAME servers provide the reliability, security, 24x7 availability and price that allow STI to spend more time managing vital information and less time managing its network



Perhaps that's why Bill Medico, STI's Information Technology Manager, provides STI's staff with the fastest, most reliable hardware on the market today by continuing to purchase additional NetFRAME servers, Micron desktops and award-winning notebooks. Thousands of people worldwide count on STI to help them get the data they need, and Micron is proud to give STI the technology edge to make that happen. If you're in the market for a server and are looking for the ultimate in reliability and price, call us and find out how we can help you.



"Micron's Dual-Processor...Server Runs Full Steam Ahead"

- PC Computing

THE NEW NETFRAME 3100 SETS A NEW STANDARD FOR ENTRY-LEVEL PC SERVERS.

While fully loaded systems aren't always needed at first, the ability for a server to grow as your business grows is critical. The new NetFRAME[®] 3100 provides that upgrade path. It incorporates mid-range features like hot swap hard drives, convenient remote management technology and a highly integrated motherboard. It also features



the 440BX chip set – Intel's latest chip set technology supporting 100MHz front side bus and 100MHz SDRAM. Combined with the fastest processors available, this server offers networked businesses the performance of a dependable mid-range server at an entry-level price.

High Dependability Servers At A Low Price

NetFRAME [®] LV2001	NetFRAME LV2000	NetFRAME 3101	NetFRAME 3100
<ul style="list-style-type: none"> • Intel Pentium[®] II processor 266MHz • 64MB ECC SDRAM • 4GB Ultra Wide SCSI-3 hard drive • Single or dual Intel Pentium II processors • 512KB integrated L2 ECC cache • ECC SDRAM option (4 DIMM slots) • 5 expansion slots: 4 PCI, 1 ISA • Integrated Adaptec PCI Ultra Wide SCSI-3 controller • Intel EtherExpress[™] Pro 100 network adapter • 32X EIDE CD-ROM drive • Upgradable to 36GB storage • Intel LANDesk[™] Server Manager 2.8 • Dedicated server technical support, 7x24 • 5-year/3-year Micron Power[™] limited warranty • 1-year next-business-day on-site service* 	<ul style="list-style-type: none"> • Intel Pentium II processor 266MHz • 64MB ECC SDRAM • 4GB Ultra Wide SCSI-3 hard drive • Microsoft[®] Windows NT[®] Server 4.0 (10-user license) • NOS support (3 first-year incident resolutions), 7x24 • Single or dual Intel Pentium II processors • 512KB integrated L2 ECC cache • ECC SDRAM option (4 DIMM slots) • 5 expansion slots: 4 PCI, 1 ISA • Integrated Adaptec PCI Ultra Wide SCSI-3 controller • Intel EtherExpress Pro 100 network adapter • 32X EIDE CD-ROM drive • Upgradable to 36GB storage • Intel LANDesk Server Manager 2.8 • Dedicated server technical support, 7x24 • 5-year/3-year Micron Power limited warranty • 1-year next-business-day on-site service* 	<ul style="list-style-type: none"> • Intel Pentium II processor 333MHz • 64MB ECC 100MHz SDRAM • 4GB Ultra Wide SCSI-3 hard drive • Intel 82440BX PCI chip set • 512KB integrated L2 ECC cache • 100MHz front side Bus • 3.5" floppy drive • Integrated Symbios PCI Ultra Wide SCSI-3 dual channel controller • 5 expansion slots: 3 PCI, 1 ISA 1 shared PCI/ISA • 8 drive bays: 1 external 3.5", 2 external 5.25" • 5 hot swap 1.0" hard drive bays • 32X EIDE CD-ROM drive • Integrated SVGA graphics (2MB) • Integrated Intel 10/100 Ethernet • Microsoft mouse with Mouse Manager • 104-key Enhanced PS/2 keyboard • Intel LANDesk Server Manager • Dedicated server technical support, 7x24 • 5-year/3-year Micron Power limited warranty • 1-year next-business-day on-site service* 	<ul style="list-style-type: none"> • Intel Pentium II processor 333MHz • 64MB ECC 100MHz SDRAM • 4GB Ultra Wide SCSI-3 hard drive • Microsoft Windows NT Server 4.0 (10-user license) • NOS support (3 first-year incident resolutions), 7x24 • Intel 82440BX PCI chip set • 512KB integrated L2 ECC cache • 100MHz front side Bus • 3.5" floppy drive • Integrated Symbios PCI Ultra Wide SCSI-3 dual channel controller • 5 expansion slots: 3 PCI, 1 ISA 1 shared PCI/ISA • 8 drive bays: 1 external 3.5", 2 external 5.25" • 5 hot swap 1.0" hard drive bays • 32X EIDE CD-ROM drive • Integrated SVGA graphics (2MB) • Integrated Intel 10/100 Ethernet • Microsoft mouse with Mouse Manager • 104-key Enhanced PS/2 keyboard • Intel LANDesk Server Manager • Dedicated server technical support, 7x24 • 5-year/3-year Micron Power limited warranty • 1-year next-business-day on-site service*
\$1,999 Bus. Lease \$70/mo.	\$3,099 Bus. Lease \$108/mo.	\$2,899 Bus. Lease \$101/mo.	\$3,999 Bus. Lease \$129/mo.



Circle 168 on reader service card

Call Toll Free 800-289-1320
www.micronpc.com/pwd

Dig that cool sound!

A PL+ multimedia monitor is one cool kitty. Great looks. Nice price. And the sweetest sound around.

Naturally, the 15" (13.8" V.A.) and 17" (15.7" V.A.) screens provide bright, beautiful images. But check the audio, daddy-o. That's where they really cook.

There's a built-in microphone and headphone jack. Plus two powerful, 3W Stereo Dome™ speakers that make sound-based applications jump up and jive.

The low price/jazzy features combo is what made CTX famous over 12 years ago. You'll find it in every product line. Along with excellent quality. Superb reliability. And service that's hard to beat.

So get on the horn and call 800-888-2120 for more information. CTX—because paying more than you have to is like crazy, man, crazy.

A man wearing a patterned vest over a black turtleneck is playing a saxophone. A white CTX monitor is balanced on his head. A yellow arrow points from the text 'Integrated Speakers' to the speaker grilles on the monitor.

Integrated
Speakers

www.ctxintl.com

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Circle 77 on reader service card

CTX

COMMITTED TO XCELLENCE™

Small Office Home Office



Make the **WEB** Do the **WORK**

Get money. Find help. Cut through red tape. All on the Net. ♦ By Ken Fermoye



I N S I D E

198 Hot Picks for the Home Office

*Cool tools that make small
businesses sizzle.*

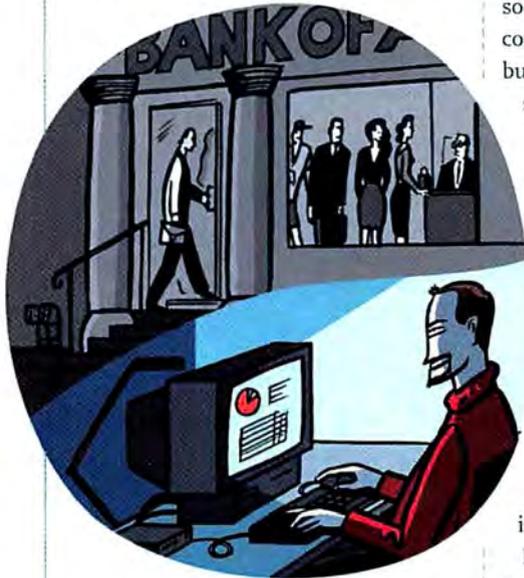
200 Bookmark Page

*Essential bookmarks for
budding entrepreneurs.*

ILLUSTRATIONS BY CHRISTOPH HITZ

The **smartest thing** I've done since launching my publishing and editing service is to take on a **silent partner**. It's called **the Internet**.

IT LETS ME SPEND less time on the piddling, time-consuming tasks involved in running my business—like applying for a loan or a business license, shopping for office supplies, and sending



overnight packages—so I can devote more time to making money.

Using Web-based services to help with these small-business equivalents of stoop labor frees time I once spent away from the office or on the phone. I can focus instead on the writing and publishing projects that bring in the bucks at my three-person editorial services business.

The Web will never fully replace real-world business resources and human interaction, but it has already become indispensable to my business.

GETTING LOANS: SHOW ME THE MONEY

ALL SMALL BUSINESSES need money. Getting it used to mean trekking to banks and finance companies, filling out endless forms, and supplicating flint-hearted loan officers. The process could take weeks, and it was as much fun as being hit slowly with a brick.

A couple of years ago, I needed a new camera and a special lens to complete a job for a client—and I needed it *yesterday*. The three banks I approached couldn't move fast enough with a line of credit, so I wound up at the local office of a loan company. I got the money within hours, but the high interest rate ate up a good share of my gross profit on the project.

It won't happen again: Recently, I needed a \$3500 loan for a new workstation and scanner, so I pointed my Web browser to **Quicken Business CashFinder** (www.cashfinder.com), Intuit's comprehensive loan broker site. CashFinder listed ten participating lenders, from American Express and Citibank to Union Bank of California (with many more slated to come aboard by year's end). I applied for the loan in a three-step process.

First I answered a few questions online, such as how long I'd been in business, how long at my current location, and how much money I wanted to borrow. CashFinder analyzed my responses and within a minute showed me ten different financing options, from credit cards to bank loans to equipment leases.

Some lenders had offices near me; for others, the closest office was online.

CashFinder let me choose up to three of the options offered. Then it built a custom Windows program containing all the information I needed to complete the selected application forms, presenting it in a guided, fill-in-the-blanks approach. I had no trouble downloading and installing the software on my PC. Finally, I filled out, printed, and mailed the loan application. Altogether I spent less than an hour on the task—far less time than it takes to drive to a local bank and wait for an interview with a loan officer. (Another nice touch: Because you store the application on your PC, your financial data remains confidential, rather than parading through the Internet.) Lenders responded in less than 48 hours—and yes, I got a line of credit soon after, which I can tap into for future needs.

Besides its Business CashFinder, Intuit offers two other great financial sites: **Intuit** (www.intuit.com) and **Quicken.com** (www.quicken.com). Together, these sites offer the most comprehensive lineup of financial services I've found on the Web, thanks to their partnerships with banks, insurance companies, brokerage firms, and the federal government. New partners and services appear every month.

CUTTING THROUGH RED TAPE

NEXT TO BANKS, government entities have the highest IQs—that's Irritation Quotients—for small businesses. If you

Snail Mail the Easy Way



STILL SENDING mail using old-fashioned postage stamps? Step into the 21st century with a Personal Post Office for the PC from Pitney Bowes. This electronic postage meter prints postage directly onto envelopes and on meter tape for packages (anywhere from a penny up to \$99.99) and can meter up to 10 envelopes per minute. When the meter needs a postage refill, a built-in modem lets you purchase additional postage by phone—and believe me, that's extremely handy. I used to waste up to

Intuit's Online Loan Broker Cuts the Money Chase

Get Money Fast: (1) The Quicken Business CashFinder site brings multiple lenders to you. (2) First, you fill in a step-by-step questionnaire about your business's money needs. (3) Based on your input, CashFinder

have ever tried to get a business license or a copy of a zoning ordinance or government report, you know it can take weeks of letter writing, faxing, and telephoning. I've used the Web to beat the bureaucracy, but zeroing in on the right government office online is still a hit-and-miss proposition. Not every municipality and agency is up to Web speed yet.

For information at the national level, I start with **FedWorld** (www.fedworld.gov), an indispensable gateway to everything federal. Run by the U.S. Department of Commerce, FedWorld provides plenty of ways to pinpoint the location of data, forms, and advice offered by the feds.

an hour standing in line at the post office with my old, heavy meter, waiting for a clerk to reset the amount for me. An optional electronic scale is available for \$5 more. You can also learn the secrets of direct mail advertising with Mail Marketer, a CD-ROM bundled with the meter. If you're not sure whether the Personal Post Office will fit your needs, no problem: You can try it for 90 days—free, except for the postage you use. • **Pitney Bowes**; \$20 per month (\$25 with scale); 800/672-6937; www.pb.com

READER SERVICE NO. 471

—Steve Bass

FedWorld lets me quickly plow through multiple government sites and documents in minutes instead of months to get the information I need.

For example, when I began gathering data for a corporate white paper on telephony, FedWorld led me to an excellent (and free for the downloading) 41-page Glossary of Telecommunications Terms (www.fcc.gov/Consumers/glossary.html). This handy guide helped me cut through the jargon-infested thicket of new telephony technologies and deregulation rules. Try getting this glossary by calling the Federal Communications Commission directly, and see how many bureaucrats you have to talk to before you're finally told to look on their Web site.

The all-encompassing **White House** Web site (www.whitehouse.gov) opens the gate to nearly every resource the feds have to offer. It includes Commonly Requested Federal Services—direct links to information on Social Security, trademark and copyright issues, taxes, and grants and government contracts—and the Interactive Citizens' Handbook, a virtual-links switchboard for finding the right offices and phone numbers of federal government branches and agencies.

Another excellent source for targeting the right online government connections is *Government on the Net* (Nolo

returns a list of lending options available for your business. (4) You can select up to three options to compare. For each, you're given the range of money available from each lender. (5) After you select the lender and financing options, CashFinder builds a custom Windows-executable program containing all the forms you'll need for your application. The program then steps you through the process of filling them in.

Press, 1998, \$40), a book-and-CD-ROM set with links to more than 2000 sites related to all levels of government. The book describes what you'll find at each site, while the CD-ROM contains live links to get you there quickly.

In some instances, locating information about a particular local or regional government body can be especially difficult. Start your search with **Yahoo Regional: U.S. States** (www.yahoo.com/Regional/U_S_States), select your state, and follow links to the specific county or city of interest. I've tracked down everything from state income tax schedules to the exact room number in City Hall where I needed to go to file a form.

You can expect to strike out occasionally. Some government entities have adapted to the Web better than others. But when you're successful, it beats being bounced like a football from department to department in search of help. ▶

DESPERATELY SEEKING TECH SUPPORT

IN MY THREE-PERSON business, I'm not just CEO, chief finance officer, and janitor—I'm also the MIS guy, which means that I spend a lot of time hunting down technical support on the Web. Sites like those run by **Microsoft** (www.microsoft.com) and **Adobe** (www.adobe.com) are full of searchable databases, FAQs, and the latest drivers and bug fixes. And finding what you need online is a lot easier and more pleasant than calling the vendor, getting put on hold, and then enduring minutes of elevator music before reaching a corporate minion who may or may not know anything.

Though the Web is useful for getting technical answers, I often resort to a source of tech support that's somewhat less frequented but more up-close and personal: user groups. I've belonged to ten groups over the past 17 years and received far more assistance from them than I've paid for in dues.

Recently, for instance, I bought a new motherboard, CPU, and SDRAM to upgrade one of my computers. I sent e-mail to two of the hardware gurus in my home group, soliciting their help in the installation project. "Bring the system and your new goodies to the next hardware SIG [special interest group] meeting, and we'll give you a hand," they replied. I did just that; 2 hours later the upgraded PC was up and running at warp speed. I couldn't have done that by calling a vendor support phone line. Most user groups have local meetings where you can meet and greet fellow members; others, while still close-knit and helpful, reside only on chatty Web sites.

To find a user group in your area, I recommend visiting the **Association of PC User Groups** (www.apcug.org). If you want a general roundup of useful data, try **The User Group Network** (www.user-groups.com), which carries a mixed bag of news, product reviews, and technical information, including a Q&A posting area, for both PC and Mac users. **Delphi Internet**

(www.delphi.com), a site made up of various subject-organized "communities," offers friendly advice and support for all levels of PC users in a number of moderated forums. To get started, go to either www.delphi.com/pccompat (for hardware assistance) or www.delphi.com/doswin (for Windows help).

HIRING A VIRTUAL STENO POOL

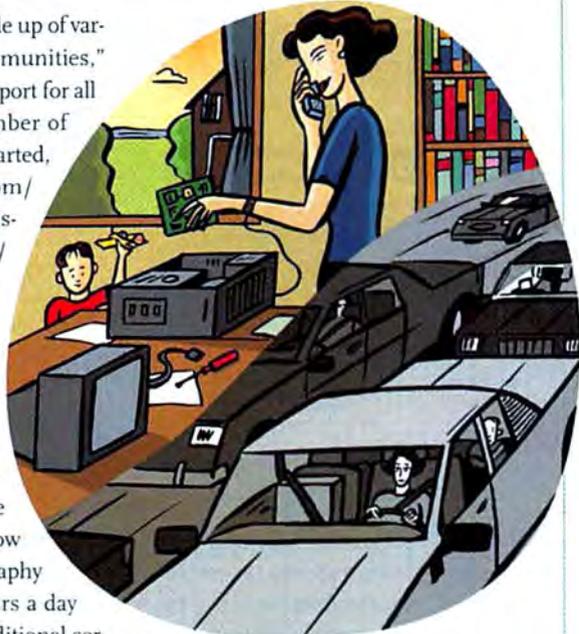
NOT SO VERY LONG ago, if I needed some dictation transcribed, I hired a temp—or schlepped a tape cartridge to a transcription service. Now I use a simple online stenography pool that is available 24 hours a day and costs less than most traditional services. **CyberTranscriber** (Speech Machines, 888/267-9891, www.cybertranscriber.com) employs a sophisticated speech-recognition system to take dictation and return it as e-mail.

After registering a password at the CyberTranscriber site, you receive an account ID. Then you call a toll-free number, enter your ID, and dictate your golden words over the phone. It's kludgy, but

Though the Web is **useful** for getting **tech support**, I often resort to a source that's less frequented but more **up-close and personal**: user groups.

you can also work from a PC equipped with microphone and speakers or (even better) a headset. You can use your telephone's keypad to play back the dictated material before submitting it—rewinding and rerecording as needed.

I woke up one night with an idea for a syndicated monthly column I write. Instead of running downstairs to a computer in my office, I picked up the bedside phone, speed-dialed CyberTranscriber, and dictated some notes. When I checked my e-mail the next morning, my thoughts were all there, dutifully



transcribed. My wife, who has had surgery for repetitive-strain problems, appreciates how the system spares her many long bouts of typing.

Beyond the initial \$30 registration fee, you pay a \$10 monthly fee that covers four 225-word pages of transcription; additional pages cost \$3.50 each. In contrast, my local transcription service charges \$6 to \$7 per page. CyberTranscriber claims to achieve verbatim accuracy, keeping correction time extremely low. My experience? Terrific—almost 100 percent of my words have been correctly transformed into print; I attribute the handful of errors to poor pronunciation on my part. Turnaround time averages less than 3 hours, with delivery guaranteed no later than the next day.

FINDING A PACKAGE DEAL

THE BOX IS SEALED and you're ready to ship it to a customer. If you're like me, you've logged days of precious time over the years calling shipping companies, comparing prices, and hunting for the best deal. But I don't do it anymore. Now I let WorldWide Merchant's **InterShipper** (www.wmmerchant.com/iship/ship.asp) figure all the rates for me. I merely enter my zip code, the destination code, my package's size and weight, and the type of service (such as overnight or sec- ▶

You have what it takes to make your

small business into whatever you want

accomplish more

it to be. We can help you in ways you

never thought of. From accounting

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Office Supply Side Economics

STORES WITHOUT DOORS: Shopping for office supplies online may not always be cheaper, but it can certainly save time.

ond-day). InterShipper then calculates the cost of shipping the package by the U.S. Postal Service, Federal Express, United Parcel Service, or some other carrier, complete with a chart comparing all rates, and links to each shipper's site.

Need to know whether your package arrived safely? InterShipper's companies provide quick online package tracking and full information about the other services they offer. You can go directly to each shipper's Web site (see "Essential Bookmarks for Small Businesses"), or

Snagging a store clerk can be harder than catching the eye of a waiter in a French restaurant.

Online "clerks" are easy to find and offer more information.

use InterShipper's links to get there. Then bookmark the tracking pages of the services you use most often.

GETTING THE GOODS ONLINE

AFTER BUYING computer hardware, software, and office supplies from retail stores or mail-order catalogs for years, I recently investigated the online alternatives. My conclusion: Savings are possible, if not always huge, and ordering online can be convenient—especially if you need to shop during off-hours. Comparison-shopping from your desktop also lets you hit the offline stores knowing exactly what you want and how much you should pay for it.

Snagging a clerk in a retail store can be harder than catching the eye of a waiter in a French restaurant. Online "clerks" (that is, Web pages) are comparatively easy to find, provide more information than you'll get in many computer stores, and stay on duty 24 hours a day, seven days a week. Sites like **Computer Discount Warehouse** (www.cdw.com) provide you with detailed apples-to-apples comparisons of the products they sell. Other sites, such as **Software.net** (www.software.net) and



Egghead.com (www.egghead.com), let you download and install new software instantly; to unlock the display case, you simply supply your credit card info.

PriceWatch (www.pricewatch.com) and **ComputerESP** (www.computeresp.com) specialize in comparison shopping. Type the name of the product you want, and

you'll get back a list of online sites that sell it, ordered from cheapest to most expensive. For example, a 3Com Palm III handheld organizer that lists for \$399 in retail stores was available for as little as \$323 on sites noted by ComputerESP.

Of course, the online shopping experience isn't all peaches and correction fluid. You won't always save money—but you can find bargains. Office supply giant **Quill** (www.quillcorp.com) consistently has good buys. I recently got ten reams of 20-pound copier paper for \$2 each, and a remanufactured LaserJet III toner cartridge cost \$30 (versus \$35 for the same cartridge at a local computer shop). Quill offers free shipping on most orders above \$45. **Office Depot** (www.officedepot.com) pays for shipping on orders of \$50 or more. The **OfficeMax** site (www.officemax.com) has competitive prices and posts SOHO business resource pages and a product information directory, both containing useful links to related sites.

How much time you save by shopping online depends on the old real estate essential: location, location, location! I live within a 10-minute drive of six computer, office supply, and electronics superstores, plus several smaller computer storefronts, so shopping online doesn't save me much time. For someone who lives far from such abundance, virtual storefronts are a great resource.

REAL-TO-REAL

USING THE WEB as a silent partner is great. But doing some chores right still requires you to put shoe leather to pavement or telephone to ear. For instance, although I rely heavily on e-mail, I find that face-to-face meetings and phone calls continue to be vital in some situations.

Real-time relationships with real people remain the foundation of success in conducting and expanding a business. Using the Web to do the grunt work gives you more time to get those meetings in—and complete your real work, too.

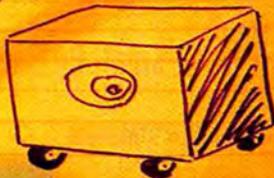
Ken Fermoye is a Los Angeles-based freelance technology writer and a syndicated computer columnist.

CROSS

8.5x11

New Product Idea

Q3 "Video add on"

100 w subwoofer
+ (2) AK speakers
+ standsIssues:Timing for titanium tweeter
Reduce from 8 to 6 weeksSend specs to
Mullers for
production quote

Casters vs. Legs

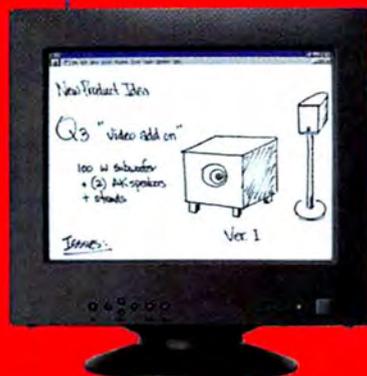
Price difference?

Ver. 2

upload

A notepad with a memory chip?

(LOOKS LIKE YOUR NOTES JUST GOT A LOT MORE POWERFUL.)



- ▶ store all of your notes on your PC
- ▶ search your notes by keyword or date
- ▶ convert selected handwriting to text
- ▶ cut and paste into other documents
- ▶ e-mail, print, or fax notes from your PC

The CrossPad. With IBM® Ink Manager™ software. Take notes anytime, anywhere. At 2.2 pounds and 3/4" thick, it's lighter and slimmer than a laptop. Welcome to the future. 800-510-9660. www.cross-pcg.com.

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CROSS[®]
pen computing group

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Cool Tools That Make Small Businesses Sizzle

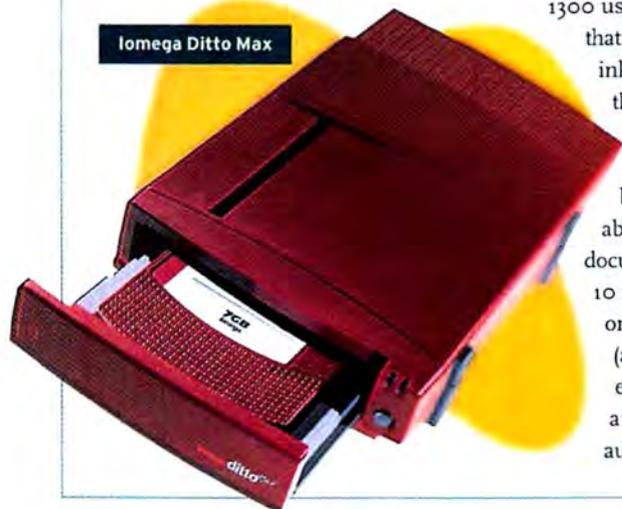
BY STEVE BASS

THE FIVE-BUTTON SCAN

THROW AWAY your copier. Get rid of your fax machine. I have a better idea: the **Visioneer PaperPort OneTouch** scanner. Connect it to your PC, and you'll have almost everything you need to run your office. The \$249 OneTouch looks like any other flatbed scanner, but with one important difference—five buttons adorn its front panel instead of none. Push a button to scan your document. Press another to scan *and* fax the document. Want to copy something to your printer, or optically recognize the text? All together now: Press a button.

This 36-bit, 600-by-1200-dots-per-inch color scanner is a snap to install: Just plug it into your PC's parallel port. It's compact (about 10 inches wide by 18.5 inches high), so it doesn't hog your desk space. Black-and-white documents took seconds to scan—with sharp output.

Omega Ditto Max



Color scans were minutes slower, and I had to tweak some images to make them look good, but that's not uncommon even with high-end scanners. The OneTouch comes with PaperPort—my favorite document management program—and PictureWorks PhotoEnhancer, a useful image manipulation tool. • **Visioneer PaperPort OneTouch**; \$249 list; Visioneer; 800/787-7007; www.visioneer.com

READER SERVICE NO. 472

INSTANT PHOTO LAB

"WHAT, ANOTHER printer?" I exclaimed as I opened the box. But when I saw the first document slide out of the **Alps MD-1300**, I was stunned: The photo I printed on plain paper looked like—a real photo. When I printed it at 1200 by 600 dpi on Alps's glossy Photo-Realistic stock, the output was photo-shop stunning. The secret: Unlike ink jet printers, the MD-1300 uses Micro Dry waterproof ink that affixes firmly to the page. The ink doesn't smudge or soak into the paper and make the image look fuzzy. The \$549 MD-1300 prints out ordinary black-and-white documents at about 2 pages per minute; color documents take from 3 to almost 10 minutes per page, depending on image size. The unit is small (about 19 inches wide, 11 inches deep, and 7 inches high) and holds 100 pages in its automatic sheet feeder. Adobe's



Visioneer PaperPort OneTouch

reliable Photo-Deluxe photo editing program also comes bundled with the printer. Regular color ink cartridges cost \$7 each; photocolored cartridges (good for about 15 full-page photos) are \$12. Special paper is priced at \$10.50 for 20 sheets. • **Alps MD-1300**; \$549 street; Alps Electric; 800/825-2577; www.alpsusa.com/md1300.htm
READER SERVICE NO. 473

BACK UP TO THE MAX

YOU'VE TURNED on your PC, eager to finish a critically important project. The computer starts up, but the hard disk isn't responding. Yep, the worst has happened: The drive's dead, kaput, a goner. No problem—you have a recent backup, right? Listen, the worst *can* happen, and the best way to protect yourself is with a tape backup drive. I use the \$200 **Omega Ditto Max** because it's fast, reliable, and quite capacious. I can work with tape cartridges ranging from a trim 3GB compressed (about \$20) to a whopping 7GB (\$30). The external Ditto Max backs up data at about 19MB per second, the internal at 36MB. (Their actual speed depends on the type of files you're backing up: On my system, a 1GB backup takes 20 minutes.) The drive includes Ditto Tools 1-Step software for backing up and restoring data, and FullBack—a recovery program that provides protection in case

of a system crash. • **lomega Ditto Max**; \$200 list; lomega; 800/697-8833; www.iomega.com
READER SERVICE NO. 474

THE NO-SURPRISE-CALLS PC PHONE

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Meridian 9617 USB

• **Meridian 9617 USB**; \$330 street; Northern Telecom; 800/667-8437; www.nortel.com

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HOT OFF THE INTERNET

YOU ALREADY KNOW what a valuable business research tool the Internet can be. But you can also get great advice from Usenet newsgroups. Examples: the newsgroup misc.taxes.moderated helps with tax issues; Symantec's 90 moderated discussion groups offer product support; and biz.jobs.offered has tons of employment listings. The problem? Even for experienced users, newsgroups are hard to access and manage. The easiest—and cheapest—way to get to the data is with **Free Agent 1.11**, a top-notch

freeware newsreader. Free Agent takes you online to download message headers (or to sample available newsgroups), then carries you offline to browse the headers and choose the most intriguing messages. Once back online, the program retrieves the messages you've selected and lets you log off to read and respond to them. • **Free Agent 1.11**; free; Forte; 760/431-6460; www.forteinc.com

MA BELL DOES E-MAIL

I WAS PEDALING the backroads of California's wine country on a ten-speed bike when I spotted a pay phone and decided to check my e-mail. So I called a toll-free number and punched in my code—and a synthesized voice read me the e-mail headers. I chose specific messages, listened to them, forwarded one as a fax, replied to another, and deleted the rest. **Mail Call**'s handy service lets you do all this and more. It will immediately read specific messages (say, from your boss) and skip others (maybe from your ex-spouse). You can reply with one of four canned messages or use the telephone's



buttons to send your number. You can even record a 15-second message to accompany your reply. The cost for all this convenience? About \$10 a month for 30 minutes of use (19 cents per minute thereafter); forwarding a fax sets you back 19 cents per page. Mail Call is ideal if you're tired of schlepping that



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READER SERVICE NO. 476

WHAT'S YOUR POLICY?

WHEN I FIRST hired employees, I faced an onerous task: creating a policy manual. But luckily I have **Policies Now**, a nifty \$119 program from KnowledgePoint. I supply details about my company in answer to step-by-step questions, choosing from more than 90 topics that fit my business. For example, I can add boilerplates dealing with child care benefits, safety, work schedules, and employee conduct. The program customizes and prints my official Bass International Employee Handbook, complete with a table of contents. And I'm covered legally, since the policy is written to meet federal labor laws.

Performance Now, also \$119, provides a quicker way to write employee performance reviews. Test-drive either product by downloading a trial copy at www.fileworld.com. Or create a performance review for \$10 at KnowledgePoint's Web site. • **Policies Now and Performance Now**; each \$119 list; KnowledgePoint; 800/727-1133, www.knowledgepoint.com

READER SERVICE NO. 477

Contributing Editor Steve Bass is president of the Pasadena IBM users group. ■

Essential Bookmarks for Small Businesses

FIND IT FAST

- ▶ **AT&T Toll-Free Internet Directory** www.tollfree.att.net/dir800 Find toll-free numbers for thousands of businesses by name, category, city, or state.
- ▶ **Big Book** www.bigbook.com Search the Yellow Pages, get consumer information and custom maps with driving instructions.
- ▶ **BizProWeb** www.bizproweb.com More than 675 pages of links and resources for SOHO entrepreneurs.
- ▶ **Brint Research Initiative** www.brint.com Massive collection of business information and links.
- ▶ **DeJa News** www.dejanews.com Read Usenet newsgroup postings without a newsreader by using this powerful Web-based searcher.
- ▶ **Infoseek The Business Channel** www.infoseek.com/business A well-organized information "switchboard" to virtually any business-related topic.
- ▶ **KnowX** www.knowx.com Search public records nationwide and run business background checks for as little as \$7.
- ▶ **Small & Home-Based Business Links** www.bizoffice.com A cornucopia of reference info, SOHO newsgroup access, and links to business marketing tips.
- ▶ **Small Business Focus** www.sbfocus.com In-depth search engine focuses exclusively on sites for the entrepreneur.
- ▶ **Switchboard** www.switchboard.com Find people, businesses, Web sites, and phone numbers.
- ▶ **Yahoo Business** www.yahoo.com/business Strong search directory provides topic-based links.



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- ▶ **Better Business Bureau** www.bbb.org Alert yourself to the latest business scams, and read reports on firms before you do business with them.
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- ▶ **SOHO America** www.soho.org Enjoy some of the same support, benefits, and other resources that big-business honchos take for granted.

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- ▶ **Microsoft SmallBiz** www.microsoft.com/smallbiz Software behemoth offers free downloads and advice.
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- ▶ **The PC Guide** www.pcguid.com Avoid spending big bucks on repairs by reading and adopting this site's helpful PC maintenance tips.
- ▶ **PC Mechanic** www.pcmec.com Get do-it-yourself instructions for recognizing, installing, and repairing standard PC components.
- ▶ **Tucows** www.tucows.com The mother lode of downloadable freeware and shareware has it all, from antivirus utilities to Web site creation tools.

GOVERNMENT RESOURCES

- ▶ **The Business Law Site** members.aol.com/bmethven Comprehensive overview of federal and state business laws and regulations, available legal services, court case reviews, and business codes.
- ▶ **Federal Web Locator** www.law.vill.edu/fed-agency/fedwebloc.html Villanova University's one-stop collection point for federal government information.
- ▶ **IRS** www.irs.ustreas.gov/prod/tax_edu Save money and time with IRS experts' answers to tax FAQs.
- ▶ **Small Business Administration** www.sba.gov Learn how to jump-start your business with SBA information and assistance.

FINANCIAL INFORMATION

- ▶ **Financial Calculators** www.hsh.com/mort_calc.html Calculators for figuring "what if" scenarios, from business loans to mortgages.
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- ▶ **Online Banking Report** www.onlinebankingreport.com Well-organized links to online headquarters of numerous banks, credit unions, and other financial institutions.

HELP FOR YOUR WEB PAGE

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- ▶ **Web Site Garage** www.websitegarage.com Free utilities and tests help you tune up your Web site for top performance.

AT YOUR SERVICE

- ▶ **Research-It** www.itools.com/research-it This online library reference desk has dictionaries, a thesaurus, language translators, and other tools.
- ▶ **Sales Leads USA** www.abii.com Downloadable mailing lists, customer analyses, and sales leads.
- ▶ **World Wide Freelance Directory** www.cvp.com/freelance Features a comprehensive listing of freelance consultants.

PACKAGE TRACKING

- ▶ **DHL** www.dhl.com
- ▶ **Federal Express** www.fedex.com
- ▶ **RPS** www.shiprps.com
- ▶ **United Parcel Service** www.ups.com
- ▶ **U.S. Postal Service** www.usps.gov



FIND LINKS TO ALL THE SITES above at PC World Online (www.pcworld.com/aug98/soho). Download software mentioned in the main article at PC World Online's FileWorld (www.fileworld.com). ■



Are you getting **true** value from your Windows[®] 98 video card?

Productiva G100
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Hardware DVD video upgrade for Productiva G100
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HP VECTRA VL Series 8 with Productiva G100 inside
June 30, 1998



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With this kind of winning combination, it's no surprise Matrox has won over 300 international awards for its video cards. The Productiva G100 from Matrox. A small price to pay for true Windows 98 performance.

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Matrox outperforms the competition	
WinBench 98 Business 1280x1024x24bpp	
Matrox Productiva G100 AGP 8MB SDRAM	155
Real3D Starfighter AGP 8MB SGRAM	122
ATI Xpert 98 AGP 8MB SDRAM - Failed	

*Estimated Street Prices accurate at time of printing. The tests were performed without independent verification by Ziff-Davis. Ziff-Davis makes no representations or warranties as to the result of the tests. WinBench, 3D WinBench, and WinMark are trademarks of Ziff-Davis Inc. in the US and other countries. All tests performed on a 300MHz Celeron Pentium III 300 system (4MB of SDRAM) under Windows 95 OSR2.1. WinBench 98 Business run at 1280x1024x24bpp@75Hz. Matrox Productiva G100 configured with 8MB of SDRAM for the AGP bus and using driver revision 4.00. ATI Xpert 98 configured with 8MB of SDRAM for the AGP bus and using driver revision 4.10.01.2312. Real3D Starfighter configured with 8MB of SGRAM for the AGP bus and using driver revision 4.10.01.0189.

matrox

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Performance and service that fit your life.

We make computers one at a time and to order. That's the only way we know how. Tell us what you want to do, and we'll create unique solutions customized to fit your life.

Being a direct vendor, CyberMax is able to offer you more of the very latest in technology and the most current pricing when compared to any retail store. One example is the new 100MHz Bus with CPU speeds up to 400 MHz. The new BX chipset from Intel and the Aladdin V chipset from ALi have enabled CyberMax systems to break speed records. CyberMax systems increase productivity, no matter how demanding your work load gets.

Awards tell the world CyberMax builds a computer every bit as good as the big names. We just happen to sell them at a lower price. At CyberMax, we don't build computers to win awards. We build computers to solve the problems you face in life, in business or at home.

*CyberMax named in Top-5 Technology listing**

1	NEC
2	Gateway 2000
3	Micron
4	Dell
5	CyberMax

"If only the best will do, you want to shop at the direct companies that offer the latest technologies... CyberMax continues to provide consumers with plenty of choices."

*PC Computing "The Direct 100" February '98

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- ❖ 32MB SDRAM
- ❖ 2.1GB Hard Drive
- ❖ CyberMax 15" (.28dp-13.8" VA) Color Monitor
- ❖ 24x Max EIDE CD-ROM
- ❖ K56flex™ Voice/Fax Modem w/ Speakerphone (V.90-ready)
- ❖ Altec Lansing ACS90 Speakers
- ❖ Corel WordPerfect Suite 8 & Max's Multimedia Pack

D801 **\$799**

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- ❖ Cyrix MII™ 333 Processor w/ MMX™
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"If you're looking for speed in everyday Windows applications, but don't want to spend the money for a 266MHz PII system, check out the CyberMax."

- Home PC Lab Winner/Home PC

"PowerMax outpaced Dell's... Dimension XPS... the PowerMax makes an excellent bridge for that long migration to Windows® NT... tremendous bang for the buck."

- PC Computing MVP Finalist
Fall Comdex 1997

"The Max C6 233... stacks up well against those of the more expensive Pentium II 266 MHz systems... lots of room for expansion... a great balance of performance and price."

- Windows Stellar September 1997

For the second time, in a few short months, CyberMax received PC Computing's 5Star Award. This time it was for our Cyrix 6x86MX, which offers exceptional value and performance when compared to the Pentium II. *"You won't find a better deal for Windows NT at these speeds."*

- PC Computing 5 Star Award September 1997

For 17 of the last 18 months, CyberMax has appeared on PC World's Top-20 Budget Desktop list. As one analyst wrote, *"CyberMax delivers a lot of bang for the buck."*

- PC World Top 20 List

"The Max C6 233... earns our Editors' Choice because it offers the best balance of price, performance and features."

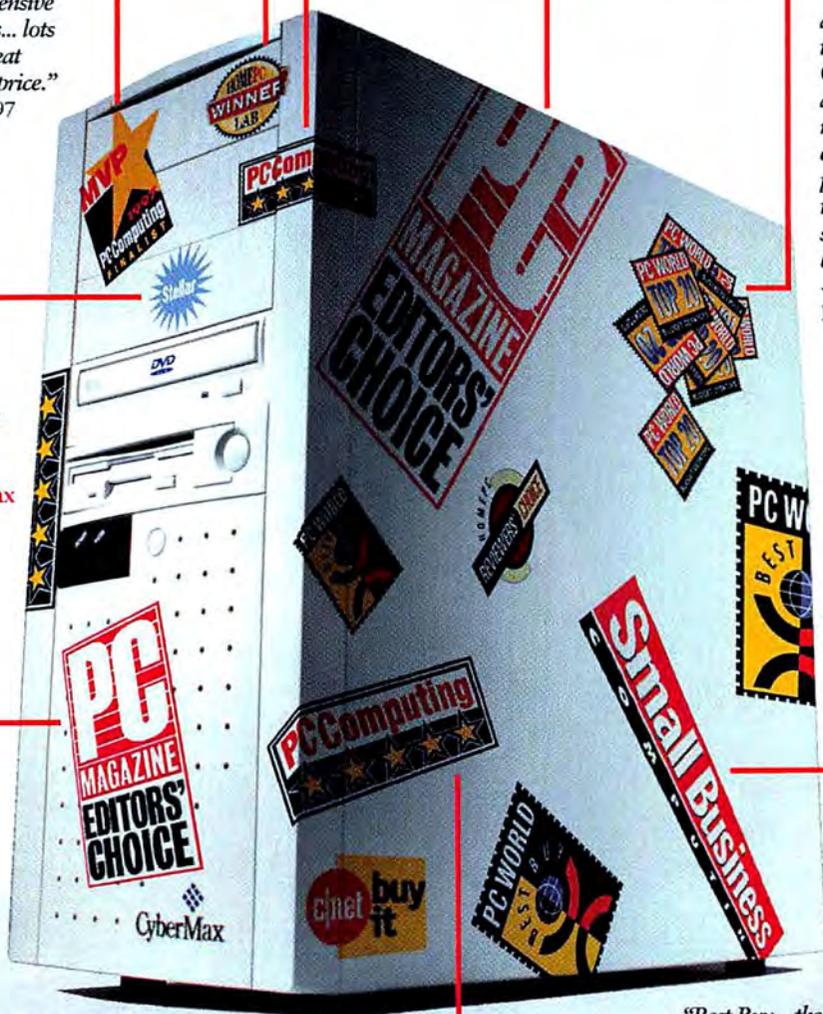
- PC Magazine: Editors' Choice September 1997

"AMD's K6 chip strikes again, this time inside the multimedia wise CyberMax PowerMax, a Best Buy for the third month. Multimedia enthusiasts and game players will want to take a close look at this sturdy and expandable bargain-price tower."

- PC World Best Buy
February 1998

To win this system and learn more about the new AMD-K6-2 "The Smart Choice for 3D" visit

www.games.net/CyberMax



"... an incredible bargain... ideal for the cost-conscious yet demanding SOHO user... the PowerMax was nothing short of a great performer, it achieves such status without sacrificing a thing."

- PC Magazine Editors' Choice Award June 1997

"CyberMax's PowerMax delivers faster performance... for hundreds less."

- PC Computing 5 Star Award June 1997

"Best Buy... the CyberMax 6x86MX, an admirably well-rounded machine with a bargain basement price."

- Small Business Computing November 1997

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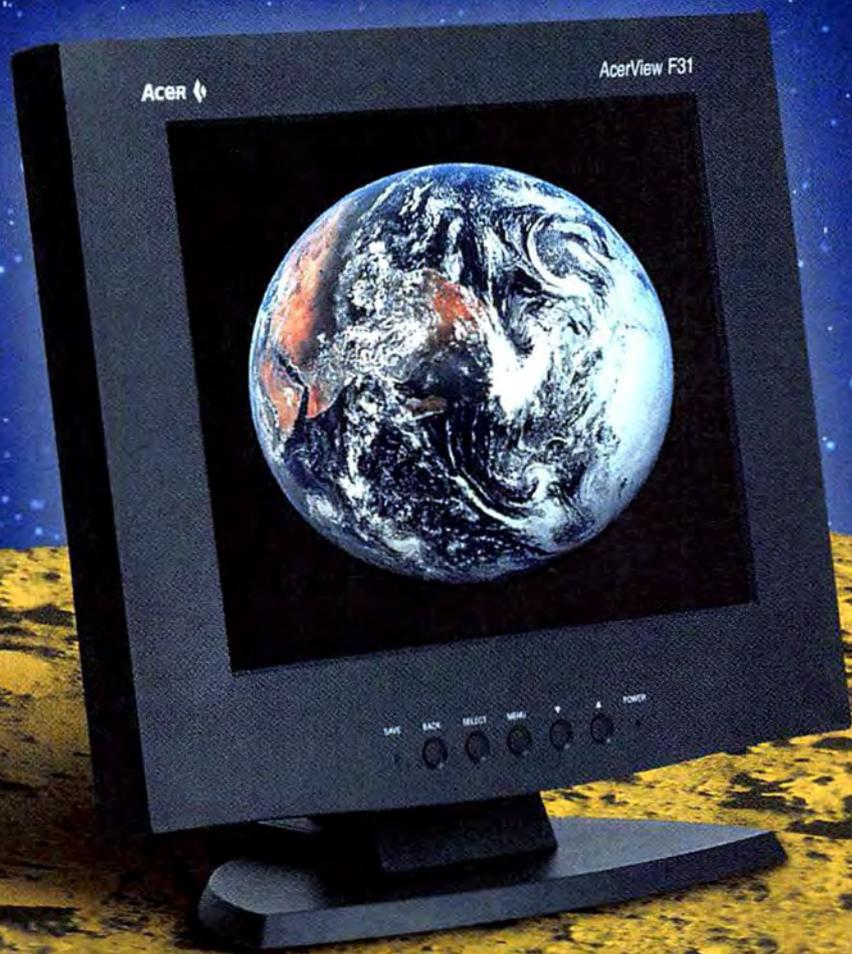

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TOP 100

208 Power Desktops



218 Budget Desktops



228 Notebooks



232 Home PCs



235 Printers



239 Monitors



243 Graphics Boards



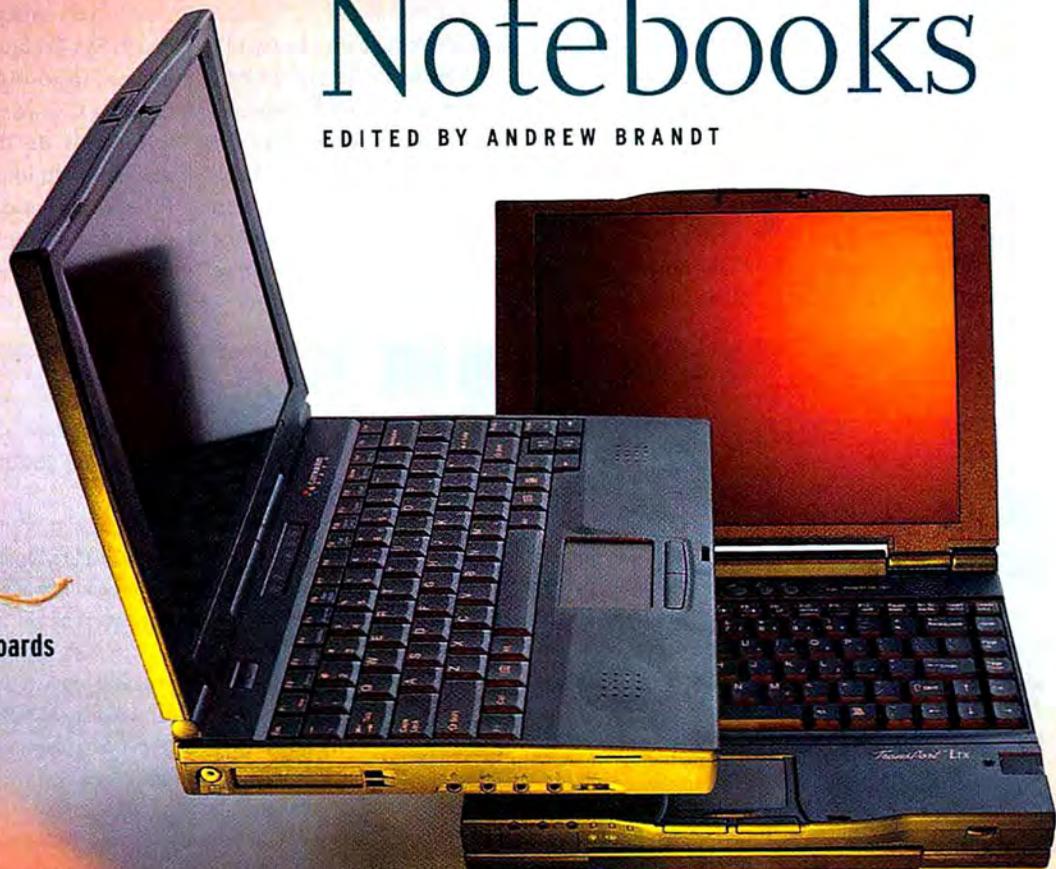
245 Modems



MMX LIVES ON:

Good-bye Desktops, Hello Notebooks

EDITED BY ANDREW BRANDT



MMX KEEPS GOING AND GOING: Gateway's Solo 2300 SE (left) and Micron's GoBook 266 sip power, while PII laptops chug.

EIGHTEEN MONTHS ago, PCs based on Intel's Pentium MMX processor were all the rage. The new chip didn't make a huge difference in the speed of standard business applications such as word processors and spreadsheets, but it gave the few available MMX-enhanced applications a big shot in the arm (in our tests, Adobe's Photoshop was 50 percent faster). More recently, PMMX desktops have distinguished themselves as the perennial good deal: Continually dropping prices kept them in the running against the latest Intel processor.

This month we bid adieu to the Pentium MMX desktop PC: Not a single one remains on our Top 20 charts. Instead, early PCs based on Intel's Pentium II processor have replaced PCs based on PMMX as the next great deal in desktop machines. For example, the Micro Express MicroFlex-B833, a PII-233 system in 13th place on our Budget Desktops chart, costs only \$1249 and runs applications 44 percent faster than our PMMX-200 PC WorldBench 98 baseline system.

But there's one place MMX-based systems still figure prominently: in the notebook market. Why? First of all, because

they run on an older and slower chip, PMMX notebooks tend to cost a lot less than comparably equipped Pentium II portables. The average price of a PMMX notebook on our Top 10 Notebooks chart this month is \$2392, compared to \$3299 for PII notebooks. Battery life is another big consideration. Intel hasn't manufactured a PII chip that conserves notebook

Most new notebooks are PIIs—all but two portables on our power chart this month are based on that chip—but Intel won't have a more battery-efficient PII chip available in the near future. Until it does, if you care less about having the fastest portable and more about being able to work on that report right up until the plane lands, take a close look at MMX laptops.



K.O. THE RIVALS: Dell's corporate-minded OptiPlex GX1 400.

CORPORATE GETS CHEAPER

THE COST OF A corporate PC running Windows NT is coming down to earth. Today, a machine with the NT operating system, a network card, and advanced management features may not cost much more than a general home-office system. For instance, this month a pair of midpriced PII-400 Windows NT machines made our Power Desktops

chart: Sys Technology's \$2799 Performance Pro 400BA and Dell's new \$2819 OptiPlex GX1 400.

Not only do the prices of the two machines fall in the middle of those for PII-400s on our chart, they set a couple of performance records for Windows NT machines we've tested. The Sys 400BA's PC WorldBench 98 score of 252 makes it

batteries as efficiently as a mobile PMMX chip does. As a result, the average PMMX notebook battery lasts about 5.5 hours—1 hour and 45 minutes longer than the average PII notebook. Micron's GoBook 266, a \$3448 Pentium MMX-266 in fourth place on the power chart, has one of the longest-running batteries we've seen, with a life of more than 8 hours.

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following section should answer most of them.

How do the charts work? The Top 20 and Top 10 charts are evolving lists of the best PCs, monitors, modems, printers, and graphics boards we've tested. System charts are divided by price. Power desktops cost \$2250 or more; power notebooks cost \$2750 or more. We compare new products to previously reviewed hardware, updating the charts to reflect price cuts and other changes.

Where do you get your prices? We estimate street prices based on vendor information and our own research, including surveys of retail outlets. We recheck all prices every month.

What does the overall rating mean? This 100-point scale reflects results from our hands-on evaluations and performance tests. A score in the 90s is exceptional, while one in the 80s is among the best and one in the 70s is above average.

What does the PC WorldBench 98 score mean? It's a measure of how fast a PC is in relation to our baseline machine, a Gateway

PMMX-200 configured with 32MB of RAM, a 2GB hard drive, and 512KB of secondary cache. A PC that scores 200, for instance, is twice as fast as the baseline system.

Where do the scores for reliability, support quality, and support policies come from? Reliability and support quality scores are based on surveys of *PC World* readers and anonymous support calls made by *PC World* staff. The policies score is based on vendor support policies.

What do all those word scores mean? Word scores for performance and price are based on a product's rating in relation to other products in its category. For instance, we score the performance of Windows NT PCs separately from that of Windows 95 machines. (Based on our PC WorldBench 98 tests, Windows NT machines are faster on average than Win 95 PCs.)

Check out *PC World's* Top 400 reviews online. Go to PC World Online (www.pcworld.com/top400) to explore our Top 400, which provides comprehensive reviews and ratings for products in 16 categories. You'll also find reviews not available in print.

the fastest PC we've tested with this operating system. The OptiPlex GX1 400's second-highest NT score of 244 slides it in behind the 400BA. The GX1 400 is the better deal of the two, however: Its price includes a network card (unlike the 400BA), and it has more expansion room than we've seen in a while—three drive bays, seven open card slots, and a pair of RAM sockets. Finally, it sports a unique modular design that permits easy access to any part of the computer's interior.

THE ULTIMATE HOME PC?

WHEN IT COMES to advances in PC video, sound, and displays, the best place to look is often a company's line of home machines; that's where the latest multimedia features show up. If Compaq's new Presario 5600 series of Pentium II-400 PCs (due out this fall) is any indication, the typical home PC may soon come with a flat-panel display, a cable-modem hookup, and high-fidelity speakers—not to mention a huge hard drive and more RAM than anyone ever thought affordable.

We sneaked a peek at a preproduction version of one of the Presario 5600 series machines—a Pentium II-400 that will ship with 128MB of RAM, a 12GB hard disk, an internal Iomega Zip drive, and a second-generation DVD-ROM drive, all for an anticipated price of about \$2700. The Presario 5600's cutting-edge display is Compaq's 15-inch FT500 active-matrix LCD screen, which plugs into a special Digital Flat Panel

connector integrated into the Presario's motherboard. Though it's less expensive than other flat-panel screens we've seen, the FT500 can inflict sticker shock—it adds \$999 to the PC's price. Luckily, you have the option of plugging a standard monitor into the system's VGA port.

The Presario's modem is an as-yet-unnamed Compaq 56-kilobits-per-second V.90 model that can also serve as your connection to a 10-megabits-per-second cable-modem service. That means you

won't need to buy a separate cable-modem card if you subscribe to the Internet through your cable TV company. The Presario's two slim JBL Pro multimedia speakers put out twice the power of average computer speakers. They can stand on your desk or be hooked onto either side of the flat-panel display.

HOME MOVIES, HOLLYWOOD QUALITY

PERHAPS MOST intriguing, the Presario 5600 series PCs should be the first to come with a FireWire port—a high-speed connection that some tout as the succes-

need. The PC's FireWire port, built into the front of the system's case, will eliminate the need for a special video digitizing card. You can edit your masterpieces using Asymmetrix's Digital Video Pro-

If you've always wanted to create your own videos or home movies, a Compaq 5600 series PC could be for you.

ducer software (which is bundled with the Presario), then connect a VCR to one of the video card's TV-out ports to make videotape copies.

VIDEO VICTORS

THIS MONTH, besides *Top 10 Graphics Boards* see the roundup "Whiz-Bang Graphics" (page 146). Snatching top honors: Real3D's StarFighter PCI and Diamond's Stealth II G460 AGP cards.

At \$290, Real3D's StarFighter is the most expensive of the PCI video cards on this month's chart, but it offers superior 3D performance. Diamond's Stealth II

G460—our favorite AGP board—is a great combination card for 3D graphics, games, and general business applications. Its price of \$130 was also one of the lowest of all the cards we tested.

Andrew Brandt is an associate editor for PC World. Staff Editor Grace Aquino, Associate Editor Vince Bielski, Senior Associate Editor Bryan Hastings, Assistant Editor Mick Lockey, as well as freelance writers Nancy Can-

HIGH-TECH HITS HOME:
Compaq's cutting-edge Presario 5600 series PC.



nor to the still-nascent Universal Serial Bus. To date, FireWire can be used only for downloading video from a digital camcorder. But if you've always wanted to produce and edit your own video clips or home movies, a digital video camera and a Presario 5600 series PC may be all you

ning, Jon L. Jacobi, Alex Jorge, and Gordon Meyer contributed to the Top 100 this month. Testing for the Top 100 was performed by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeff Kuta, Nancy Miller, and Mike Salayko of the PC World Test Center. See page 14 for contact information. ▶

TOP 20 POWER DESKTOPS

	SYSTEM	Last month	Month tested	Street price (5/15/98)	CPU	Comments
1	 Gateway GP6-400 800/846-2000 www.gateway.com	1	July 98	\$2620	Pentium II-400	Top PII-400 is also cheapest of its CPU class on chart, following a \$293 price cut.
2	 Micron Millennia 400 DVD Edition 888/634-8799 www.micronpc.com	2	July 98	\$3275	Pentium II-400	Fastest Windows 95 PC also most expensive, includes DVD-ROM drive.
3	 Dell Dimension XPS R400 800/388-8542 www.dell.com	4	July 98	\$3099	Pentium II-400	Pricy PII-400 sheds \$50; includes DVD-ROM drive, MS Office, 14.4GB hard disk.
4	 Micron Millennia 350 Personal Edition 888/634-8799 www.micronpc.com	3	July 98	\$2855	Pentium II-350	The less expensive of two PII-350 PCs on chart has large 10GB hard drive.
5	 Dell OptiPlex GX1 400 800/289-3355 www.dell.com	n/a	NEW	\$2819	Pentium II-400	Powerful corporate desktop's modular design makes upgrades easy.
6	Gateway G6-333 800/846-2000 www.gateway.com	6	June 98	\$2398	Pentium II-333	Fast Windows 95 PC drops \$132; includes 2X DVD-ROM drive, lots of software.
7	Dell Dimension XPS R350 800/388-8542 www.dell.com	7	July 98	\$2949	Pentium II-350	Slower, slightly cheaper sibling of XPS R400 is otherwise virtually identical.
8	Compaq Deskpro EP Model 6400 400CDS 800/345-1518 www.compaq.com	8	July 98	\$3079	Pentium II-400	Slick convertible case and network features add appeal to corporate speedster.
9	HP Vectra VL Series B 800/752-0900 www.hp.com	9	July 98	\$2750	Pentium II-400	Easy-access design and superlative performance in affordable PII-400.
10	Dell Dimension XPS D333 800/388-8542 www.dell.com	n/a	May 98	\$2529	Pentium II-333	\$270 off July price; loaded PII-333 with 2X DVD-ROM drive, Turtle Beach sound card.
11	Gateway E-3110 333 800/779-2000 www.gateway.com	10	July 98	\$2747	Pentium II-333	Network-ready tortoise; one of two power PCs to include a 19-inch monitor.
12	NEC Direction SP B400 888/863-2669 www.necnow.com	n/a	NEW	\$2915	Pentium II-400	NEC's fastest Windows 95 machine has gargantuan 14.4GB hard drive, long warranty.
13	CyberMax PowerMax H3 800/437-4596 www.cybermaxpc.com	n/a	NEW	\$2349	Pentium II-333	Graphics powerhouse is a bargain, with 128MB of RAM and a great 3D video card.
14	Quantex QP6/333 SM-4x 800/896-4898 www.quantex.com	n/a	NEW	\$2299	Pentium II-333	Least-expensive PII-333 offers middle-of-the-road performance, great video card.
15	NEC PowerMate 8000 888/863-2669 www.necnow.com	12	May 98	\$2448	Pentium II-333	Quick PII-333 PC upgrades to 14X-32X CD-ROM; includes ethernet card.
16	Kingdom Pinnacle PII-333 800/385-3436 www.kingdomcomputers.com	15	July 98	\$2397	Pentium II-333	Fastest Windows 95 PII-333 includes DVD-ROM drive, poor keyboard.
17	Sys Performance Pro 400BA 800/613-9963 www.systechology.com	n/a	NEW	\$2799	Pentium II-400	Fastest PC on power chart has large 8.4GB hard drive; easy to upgrade.
18	HP Brio PC 800/752-0900 www.hp.com	n/a	May 98	\$2539	Pentium II-300	Large price drop since July returns PII-300 to the chart; multifunction keyboard.
19	Sys Performance Pro 333H2 800/613-9963 www.systechology.com	18	June 98	\$2627	Pentium II-333	Well-configured, very fast PII-333 comes with Windows NT 4.0.
20	Premio Shadowhawk LX PII 333 800/677-6477 www.premiopc.com	n/a	June 98	\$2450	Pentium II-333	Includes Office 97 Professional Edition, fine sound; support policies lag.



Best Buy

See features chart, page 210; test report, page 212.

n/a = not applicable

¹A system's performance word score is relative to scores of other PCs running the same operating system. For more details, see "Our Guide to the Top 100."²For more information about all products in this table, circle reader service no. 907

GATEWAY'S NETWORK-EQUIPPED GP6-400 leads our Power Desktops chart for the second month in a row as our top Best Buy. Micron's pricey, consumer-oriented Millennia 400 DVD Edition, the fastest Windows 95 system we've tested, hangs on in second place. If you're in the market for a very fast Windows NT machine, take a look at Sys Technology's Performance Pro 400BA, a Pentium II-400 PC that set a new speed record in our test suite. Only one new power system misses the chart: the \$3122 Starburst PII-333 from Netis, which hit the streets as the costliest new PII-333 desktop we saw this month. You can find many PII-350 and -400 PCs that are better equipped and less steep than the Starburst PII-333.

SCORECARD

★ Overall rating	PC WorldBench 98/operating system	Performance ¹	Features and design	Vendor's system reliability	Price	Vendor's support quality/policies	Reader service number ¹
88	204/Win 95	very good	outstanding	average	average	above average/best	682
86	210/Win 95	outstanding	very good	above average	very expensive	above average/best	683
85	199/Win 95	very good	very good	above average	expensive	above average/best	684
85	194/Win 95	very good	very good	above average	average	above average/best	685
85	244/Win NT 4.0	very good	good	above average	average	above average/best	686
84	179/Win 95	good	very good	average	inexpensive	above average/best	687
84	187/Win 95	good	very good	above average	average	above average/best	688
82	200/Win 95	very good	very good	average	expensive	average/best	689
82	207/Win 95	outstanding	very good	average	average	average/poor	690
82	164/Win 95	satisfactory	very good	above average	inexpensive	above average/best	691
81	163/Win 95	satisfactory	outstanding	average	average	above average/best	692
80	207/Win 95	outstanding	very good	below average	average	average/good	693
80	171/Win 95	good	outstanding	³	inexpensive	³/best	694
79	173/Win 95	good	good	average	inexpensive	average/best	695
77	175/Win 95	good	very good	below average	inexpensive	average/good	696
77	181/Win 95	good	good	³	inexpensive	³/fair	700
75	252/Win NT 4.0	outstanding	good	³	average	³/good	697
74	162/Win 95	satisfactory	good	average	inexpensive	average/fair	698
74	220/Win NT 4.0	good	very good	³	average	³/good	699
73	168/Win 95	good	very good	³	inexpensive	³/poor	701

Scorecard weightings ▶ Performance 25 percent Features 25 percent Reliability 15 percent Price 15 percent Quality/policies 10 percent each

¹ Insufficient data to give a rating.

GP6-400 was able to remain at the top of our power chart.



Gateway GP6-400

With a PC World-Bench 98 score of 204, the GP6-400 delivers typical Windows 95 performance for its class, just a hair slower than Micron's Millennia 400 DVD Edition, the fastest Win 95 PC we've ever tested. (At second place, the Millennia 400 scored 210, but it costs \$655 more than the GP6-400.) Bundled with a 100-megabits-per-second SMC Etherpower II 10/100 ethernet adapter and Intel's LAN-Desk Client Manager software, the GP6-400 comes ready to connect to your office network. A 10GB hard disk and a built-in Iomega Zip drive provide ample storage.

After hours, the GP6-400 doubles as a first-class entertainment system. Audio is outstanding: The Boston Acoustic Micro Media System, consisting of a subwoofer and two palm-size satellite speakers, delivers terrific sound from high treble to low bass. Color-coded audio ports on the back of the PC case setup.

While the GP6-400 case is attractive and easy to open, it wasn't designed with the versatile practicality of squarish PCs. Its curvy lines prevent you from resting external drives or floppy disks on top—as well as such no-nos as your coffee cup.

Gateway's documentation gives you an entire volume on maintenance and troubleshooting, as well as a diagnostic CD-ROM and manual. The bundled discs—including Microsoft's Office 97 Small Business Edition—are nicely organized in a compact binder instead of separate jewel cases. The company has long received high marks from our readers for its service. For \$2620, the GP6-400 is a whole lot of computer and a resounding Best Buy.

This Month's Best Buys

1 GATEWAY GP6-400

PRO: Excellent performance, great sound system
CON: Round case top prevents stacking of external peripherals

Want Formula 1 performance at a Honda price? Gateway's GP6-400 comes close, leading a pack of five

superfast Pentium II-400 and -350 PCs on our power chart for the second month running. The midsize tower is one of several Pentium II-400 systems (along with HP's Vectra VL Series 8, Dell's OptiPlex GX1 400, Sys's Performance Pro 400BA, and NEC's Direction SP B400) to sell for under \$3000. Add Gateway's stellar support policies and a \$293 price drop since last month, and it's clear how the \$2620

2 MICRON MILLENNIA 400 DVD EDITION

PRO: Fastest Win 95 PC we've tested, DVD-ROM drive, superior reliability and service

CON: Expensive; uninspiring sound and monitor

A remarkable blend of power and style, the Micron Millennia 400 DVD Edition may have set the performance standard among Pentium ▶

	SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor tube/viewable diagonal (inches)	Modem speed (kbps)
1	Gateway GP6-400*	Pentium II-400	Windows 95	64	512	10	STB Velocity 128 (AGP)	4/SGRAM	17/15.9	not included
2	Micron Millennia 400 DVD Edition*	Pentium II-400	Windows 95	64	512	10	Diamond Viper V330 (AGP)	4/SGRAM	17/16	56 ²
3	Dell Dimension XPS R400*	Pentium II-400	Windows 95	64	512	14.4	STB Nvidia Plus	4/SGRAM	17/15.8	56 ²
4	Micron Millennia 350 Personal Edition*	Pentium II-350	Windows 95	64	512	10	Diamond Viper V330 (AGP)	4/SGRAM	17/16	56 ²
5	Dell OptiPlex GX1 400*	Pentium II-400	Windows NT 4.0	64	512	6.4	integrated ATI 3D Rage Pro	4/SGRAM	17/15.9	not included
6	Gateway G6-333	Pentium II-333	Windows 95	64	512	8.4	STB Velocity 128 (AGP)	4/SGRAM	17/16.1	56 ²
7	Dell Dimension XPS R350	Pentium II-350	Windows 95	64	512	14.4	STB Nvidia Plus	4/SGRAM	17/15.8	56 ²
8	Compaq Deskpro EP Model 6400 400CDS	Pentium II-400	Windows 95	64	512	6.4	Diamond Viper V330 (AGP)	4/SGRAM	17/16	56 ²
9	HP Vectra VL Series 8	Pentium II-400	Windows 95	64	512	10	Matrox MGA G-100 (AGP)	4/SGRAM	17/15.9	not included
10	Dell Dimension XPS D333	Pentium II-333	Windows 95	64	512	8.4	STB Velocity 128 (AGP)	4/SGRAM	17/15.9	56 ²
11	Gateway E-3110 333	Pentium II-333	Windows 95	64	512	8.4	ATI Xpert@Work	8/SGRAM	19/17.9	56 ²
12	NEC Direction SP B400	Pentium II-400	Windows 95	64	512	14.4	Diamond Viper V330 (AGP)	4/SGRAM	17/15.8	56 ²
13	CyberMax PowerMax H3	Pentium II-333	Windows 95	128	512	8.4	Symmetric GlyderMax-2	8/SGRAM	19/18	56 ³
14	Quantex OP6/333 SM-4X	Pentium II-333	Windows 95	64	512	8.4	Diamond Fire GL 1000 Pro	8/SGRAM	17/16	56 ³
15	NEC PowerMate 8000	Pentium II-333	Windows 95	64	512	6.4	ATI 3D Rage Pro	8/SGRAM	17/16	not included
16	Kingdom Pinnacle PII-333	Pentium II-333	Windows 95	64	512	8.4	ATI Xpert@Work	4/SGRAM	17/15.7	56 ²
17	Sys Performance Pro 400BA	Pentium II-400	Windows NT 4.0	64	512	8.4	Matrox Millennium II (AGP)	8/WRAM	17/15.9	56 ²
18	HP Brio PC	Pentium II-300	Windows 95	64	512	8	Matrox Millennium II (AGP)	4/WRAM	17/15.8	56 ²
19	Sys Performance Pro 333H2	Pentium II-333	Windows NT 4.0	64	512	8.4	Matrox Millennium II (AGP)	8/WRAM	17/15.9	56 ²
20	Premio Shadowhawk LX PII 333	Pentium II-333	Windows 95	64	512	8.4	ATI Xpert@Work	8/SGRAM	17/15.7	56 ²

* Best Buy ¹ PC World defines towers as taller than 20 inches, midtowers as 15.5 inches to 20 inches, and minitowers as shorter than 15.5 inches.
² Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.

II-400 machines. With a PC WorldBench score of 210, it's the fastest Windows 95-based system we've ever tested. At \$3275 it's not cheap, but along with blazing speed it's loaded with features and comes from a company that has an enviable record of service and reliability.

Multimedia fans will welcome the second-generation DVD-ROM drive, although you won't find any DVD-ROM titles in the box. An internal Iomega Zip drive and a 10GB hard disk with a fast ATA-33 interface provide plenty of storage. Micron also throws in a 56-kilo-bits-per-second modem from 3Com, and bundles Microsoft Office 97 SBE.

For a system designed around multi-

media, the Millennia's monitor and sound were unimpressive. The Diamond Viper V330 AGP card delivers snappy graphics for business software and 3D games alike, but the 17-inch Micron 700 FGx monitor that came with our test PC seemed fuzzy and washed out. In addition, the integrated Crystal sound chip and the Altec Lansing AV390 speaker-subwoofer combo produced surprisingly little bass until we cranked the volume past the halfway point.



Millennia 400 DVD Edition

Micron's documentation consists of little more than individual component manuals. But support policies are first-rate, with a three-year parts and one-year labor warranty and 24-hour toll-free phone support seven days a week.

3 DELL DIMENSION XPS R400

PRO: Huge hard disk, good sound, Trinitron monitor, DVD-ROM and Zip drives

CON: Slowest PII-400 we've tested, hard-to-open case, support quality variable



Dell's top-of-the-line Dimension XPS R400 ranks third in our set of Pentium II-400 Best Buys. At \$3099, the XPS R400 is still pricey despite a \$50 price drop since last month. It's also encumbered with the lowest PC WorldBench score among the PII-400 PCs we tested, but thanks to its loaded configuration the Dimension nonetheless earns a Best Buy.

The XPS R400's forte is storage: A speedy IBM Deskstar hard disk holds a whopping 14.4GB of data (the XPS R400 is one of three Top 20 power PCs with this

EXPANDABILITY

CUSTOMER SUPPORT

CD/DVD-ROM drive speed	Sound board	Case style ¹	Max. RAM (MB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
13X-32X	Ensoniq Audio PCI	midtower	384	2	2/2	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
2X DVD-ROM	integrated Crystal PnP	midtower	384	2	2/1	4	3/1	24	Sat., Sun.	BBS, CIS, WWW
2X DVD-ROM	Turtle Beach Montego	midtower	384	2	2/1	2	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
12X-32X	integrated Crystal PnP	midtower	384	2	2/1	4	3/1	24	Sat., Sun.	BBS, CIS, WWW
14X-32X	Crystal 4236B	midtower	384	2	2/1	7	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
2X DVD-ROM	Ensoniq Audio PCI	midtower	384	1	3/2	2	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
2X DVD-ROM	Turtle Beach Montego	midtower	384	2	2/1	2	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
12X-24X	ESS 1869	desktop	384	2	1/1	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
12X-32X	HP Audio (AZT 100B)	midtower	768	1	2/1	4	3/3	11 ⁴	none	AOL, BBS, CIS, WWW
2X DVD-ROM	Turtle Beach Montego	midtower	384	1	3/1	2	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
13X-32X	Ensoniq Audio PCI	midtower	384	2	2/2	2	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
14X-32X	integrated	midtower	384	2	3/0	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
14X-32X	Ensoniq Audio PCI	midtower	384	1	2/3	4	3/1	24	Sat., Sun.	BBS, WWW
14X-32X	Ensoniq Audio PCI	midtower	384	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
14X-32X	integrated Yamaha OPL3-Sax	midtower	384	2	2/1	5	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
2X DVD-ROM	Sound Blaster AWE64	midtower	512	2	3/2	3	varies ³ /1	12.5	Sat.	WWW
14X-32X	Sound Blaster AWE64	midtower	1024	2	3/2	4	varies ⁶ /5	24	Sat., Sun.	WWW
14X-32X	HP Audio (AZT 100B)	midtower	192	2	2/1	3	3/3	16 ⁴	Sat.	AOL, CIS, WWW
14X-32X	integrated Yamaha OPL3-Sax	midtower	384	1	3/1	3	varies ⁶ /5	24	Sat., Sun.	WWW
12X-24X	Sound Blaster AWE64	midtower	512	2	3/2	3	3/3	9	none	BBS, WWW

¹ Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

² Not toll-free.

³ Five years on CPU and main RAM, three years on other parts.

⁴ Six years on CPU and main RAM, one to five years on other parts.

giant drive). A second-generation DVD-ROM drive ensures compatibility with the latest games and MPEG-2 video titles, while the internal Iomega Zip drive lets you back up or share large data files easily.

To round out its multimedia capabilities, the R400 comes with the 4MB STB Nvidia Plus AGP graphics card. The intuitive front-panel push-button controls on the crisp 17-inch Trinitron monitor provide a welcome change from the usually confusing on-screen menus that most high-end monitors use.

Inside the R400, we found a clean design and adequate room for expansion, with one exception: A 56-kbps modem occupies the lone ISA slot. Our only major complaint is



Dell Dimension XPS R400

with the case, which should slide off effortlessly, but is just about impossible to open. And contrary to its name, the Dell QuietKey keyboard that came with the system we evaluated produced a lot of clicking when we typed.

Dell's useful setup guides and manuals—including an illustrated, poster-size foldout—should put novices at ease, while the company's three-year parts warranty can help protect your investment. Dell also offers 24-hour toll-free tech support,

but the quality of that service has raised a few concerns recently: Some of our readers have sent us letters complaining about long lapses of time on hold when calling Dell with support questions.

4 MICRON MILLENNIA 350 PERSONAL EDITION

PRO: Fast and loaded, good service and support

CON: No DVD-ROM drive; so-so monitor



Micron's Millennia 350 Personal Edition has much in common with its sibling, the Millennia 400 DVD Edition (see previous pages). It has the same sculpted case, a similarly loaded configuration (without the DVD-ROM drive), and a rather steep price for its CPU class. But even at \$2855 the Millennia 350 lands near the top. Why? Because like the Millennia 400, it's the fastest PC we've tested in its processor class.

With a PC WorldBench score of 194, this Millennia lags behind its fleet-footed sibling by about 8 percent, but it's nearly as fast as the slowest PII-400, Dell's ▶

Dimension XPS R400. Still, for those used to working on an older system, the crisp response of this PC is like trading in a pair of rusty metal skates for rollerblades.



Millennia 350 Personal

The large 10GB hard disk and Iomega Zip drive are welcome additions, and we also like the disc-loading mechanism on the trayless 12X-32X CD-ROM drive, though a DVD-ROM drive would let you watch DVD movies, too.

The "Personal" in the system's name means that it's intended mainly for home-office use. Whereas the 400 DVD Edition comes with Microsoft Office SBE, the 350 dishes out the Audio Works Pro Studio sound-editing package. The 17-inch Micron monitor provides an ample viewable area, but its display looked a bit fuzzy and slightly bowed in our tests. Those who spend their days with eyeballs

glued to the screen might want a sharper 17- or 19-inch monitor. The Altec Lansing ACS-290 speaker system isn't bad once you crank it up, but the subwoofer sounds muddy at low volume.

We found the Millennia 350's off-white midtower case to be sturdy, stable, and easy to open. Inside, a whisper-quiet fan blows air directly over the enormous heat sink on the processor. The keyboard, though slightly spongy, is comfortable, as is the Microsoft IntelliMouse. ▶

TOP 20 POWER DESKTOPS

TEST REPORT

SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	PC World-Bench 98 score	Faster Slower	Average of tested Pentium II-400s
1 Gateway GP6-400*	Pentium II-400	Win 95	64	512	204		
2 Micron Millennia 400 DVD Edition*	Pentium II-400	Win 95	64	512	210		
3 Dell Dimension XPS R400*	Pentium II-400	Win 95	64	512	199		
4 Micron Millennia 350 Personal Edition*	Pentium II-350	Win 95	64	512	194		
5 Dell OptiPlex GX1 400*	Pentium II-400	Win NT 4.0	64	512	244		
6 Gateway G6-333	Pentium II-333	Win 95	64	512	179		
7 Dell Dimension XPS R350	Pentium II-350	Win 95	64	512	187		
8 Compaq Deskpro EP Model 6400 400CDS	Pentium II-400	Win 95	64	512	200		
9 HP Vectra VL Series 8	Pentium II-400	Win 95	64	512	207		
10 Dell Dimension XPS D333	Pentium II-333	Win 95	64	512	164		
11 Gateway E-3110 333	Pentium II-333	Win 95	64	512	163		
12 NEC Direction SP B400	Pentium II-400	Win 95	64	512	207		
13 CyberMax PowerMax H3	Pentium II-333	Win 95	128	512	171		
14 Quantex OP6/333 SM-4x	Pentium II-333	Win 95	64	512	173		
15 NEC PowerMate 8000	Pentium II-333	Win 95	64	512	175		
16 Kingdom Pinnacle PII-333	Pentium II-333	Win 95	64	512	181		
17 Sys Performance Pro 400BA	Pentium II-400	Win NT 4.0	64	512	252		
18 HP Brio PC	Pentium II-300	Win 95	64	512	162		
19 Sys Performance Pro 333H2	Pentium II-333	Win NT 4.0	64	512	220		
20 Premio Shadowhawk LX PII 333	Pentium II-333	Win 95	64	512	168		

*Best Buy

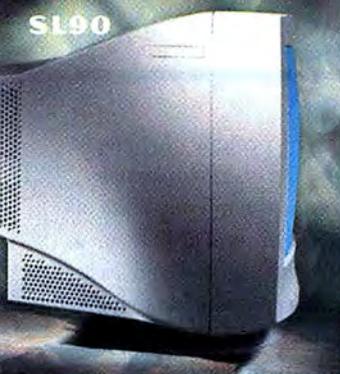
Application test times in minutes

0 10 20

Word 97 Word Pro 97 Excel 97 1-2-3 97 Paradox 8.0 Picture Publisher 7.0

TEST CENTER HOW WE TEST All systems are tested with PC WorldBench 98, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs are tested with either Windows 95 or Windows NT 4.0, and video resolution is set to 800 by 600 in 65,536 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench 98 score is a sum of the weighted, normalized result of each script: Word 97 (10 percent), Word Pro 97 (10 percent), Excel 97 (20 percent), 1-2-3 97 (20 percent), Paradox 8.0 (20 percent), and Picture Publisher 7.0 (20 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing). ¹Under Windows 95.

SL90



THE 19" MONITOR

THE COMPETITION

COULDN'T MAKE

SL90. MORE MONITOR. MORE WORK SPACE.

Introducing the SL90, the 19" class monitor with a 15" footprint. Panasonic made the space-saving design the competition could not produce. While other 19" class monitors have the depth of a 17", the SL90 is the first to fit comfortably in the space of a 15". The result, more working area on your screen and your desk!

But the SL90 doesn't stop short when it comes to performance. You still get incredible picture quality, up to 1600 x 1280 resolution and an eye-saving 95kHz refresh rate. Still tight on space? Panasonic also offers the SL70, a 17" class monitor with the footprint of a 14".

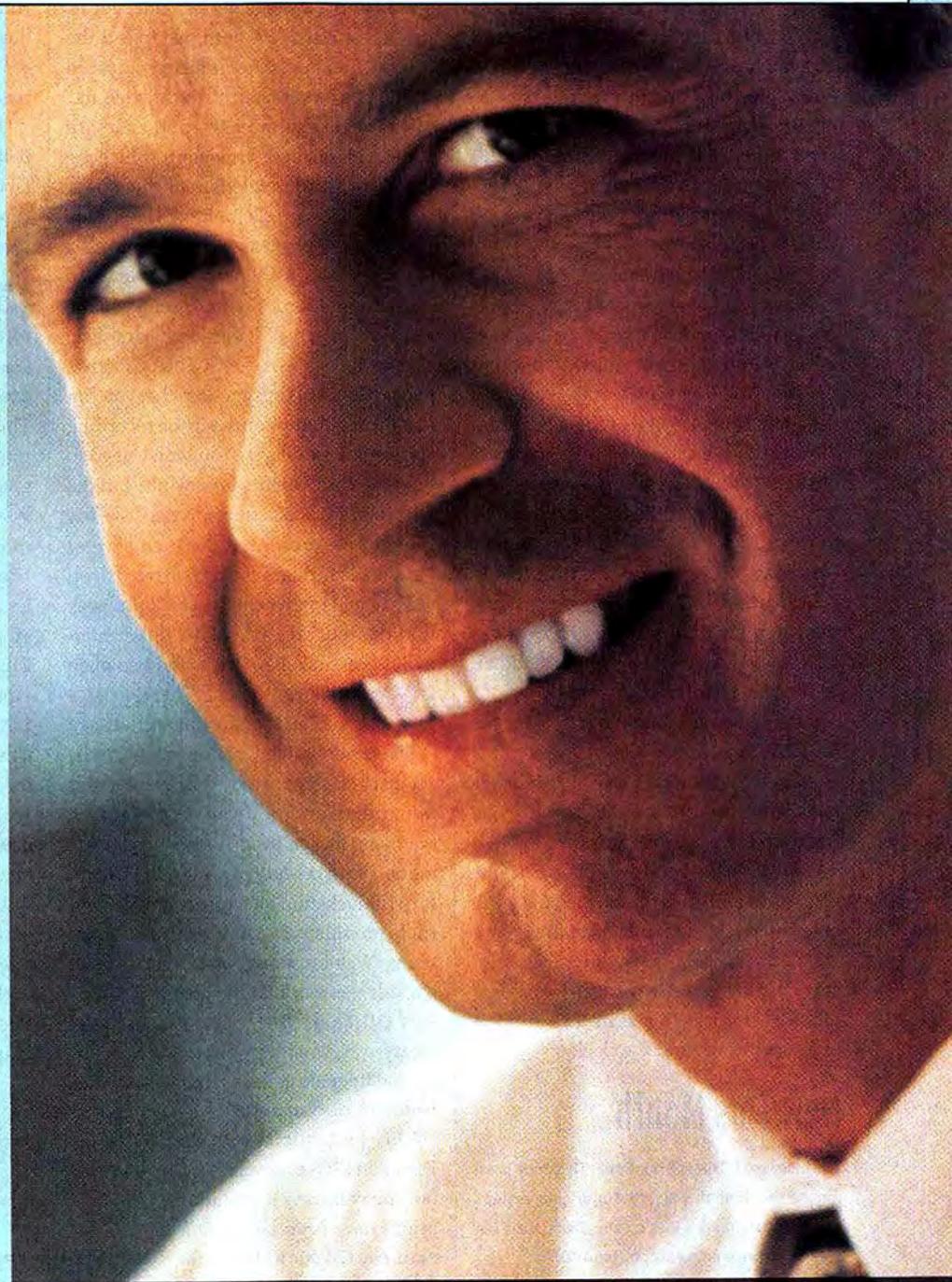
Model	SL90	SL70
Dot Pitch (mm)	0.25	0.27
Max. Res. (H X V)	1600 X 1280	1280 X 1024
H-Scan (kHz)	30 - 95	30 - 70
Viewable Area	18.0"	16.0"

And, we don't stop short when it comes to support either. We've got you covered with the most extensive warranty and customer support program in the industry, including a 3-Year Warranty, On-Site Swap and Toll-Free Hotline. You simply won't find anything better than it.

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5 DELL OPTIPLEX GX1 400

PRO: Reasonably priced corporate PII-400, easy access to interior, excellent monitor

CON: Slower than the other 400-MHz Windows NT system on our chart

 A perfectly engineered tool is always appreciated. At \$2819, this zippy midtower system is a corporate IS person's dream machine, featuring integrated remote-management hardware, an easy-access interior, and a PC WorldBench score of 244.

With the OptiPlex's modular case design, every part of the PC swivels, glides, or swings open for easy access. It's literally a snap: Just press a button on the front and flick the case-lock switch at the back, and the cover swings up out of the way. Expansion cards are mounted on a separate chassis that slides out as you press a lever—no scraped knuckles here. The power supply pivots upward to provide easy access to RAM slots and the motherboard. Although the graphics chip is integrated on the motherboard, the OptiPlex GX1 has an AGP slot so you can add an AGP video board later, if you like.

But upgrading shouldn't be in the cards for some time, thanks to the hardware Dell already includes. The 6.4GB hard disk is sufficient for most uses (though we're seeing much larger drives on other top-end systems). Dell's Ultrascan 1000HS, one of the best 17-inch Trinitron displays available, offers excellent image quality.

Dell covers the PC with its industry-standard three-year warranty on parts (one year for labor), and its tech support lines operate around the clock.

New This Month

The following PCs made our Power Desktops chart for the first time this month. For original reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/top400).

12 NEC DIRECTION SP B400

PRO: Huge hard drive, top-notch components

CON: Mediocre monitor, disorganized interior
NEC's newest Direction models—the SP B350 and SP B400—are midtower PCs

for the small office. Both use the newest 100-MHz bus and have identical sets of components. We reviewed the \$2915 Direction SP B400 because it's the faster of the pair—it attained a PC WorldBench score of 207, average performance for its processor class. On both, we found the multimedia perks incomplete compared with other power chart PII-400 systems.

Wrapped in the easy-open case are some high-quality components, which are the real stars of this show. Complementing the speedy processor are Diamond's 4MB Viper V330 AGP video card, IBM's extremely large 14.4GB Deskstar hard disk, a 14X-32X CD-ROM drive, and a 3Com 56-kbps modem that you can use for making phone calls or recording voice-mail messages. You won't need to upgrade components for a while, but the Direction's lack of a free internal drive bay most likely prompted the inclusion of IBM's second-largest IDE drive. If you want to add to this lineup, you'll probably find the four free PCI slots, three externally accessible drive bays, and two open DIMM sockets sufficient. There's also a case lock to keep stealthy tinkerers at bay.

The .27-dot-pitch C700 monitor can be set up to display 1280 by 1024 resolutions, but at that level of detail it develops an annoying flicker. Even at 1024 by 768 resolution with 24-bit true color, this monitor still lacks the sharpness of other 17-inch models; you may be in for some blurry Web browsing, or at least difficult spreadsheet work on the included Microsoft Office 97 SBE package. To avoid bleary eyes, you may want to pay \$300 extra and upgrade to the sharper 19-inch C900 monitor.

NEC's intentions with the Direction SP B400 were good, but the company's execution might have been better. One example: On our test unit, the CPU's connection to the motherboard was a bit wobbly; we traced the problem to loose screws, a seemingly minor fault that could nevertheless cause the system to develop sporadic problems if the tower gets jostled. The internal drive cables also

could benefit from a couple of strategic cable ties to keep the interior accessible.

This system comes with every piece of hardware needed for voice mail or a speakerphone: modem, phone cord, basic sound card, and a mike with a stand. But our test system lacked the ACS-90 speakers that should have come with the PC, so we couldn't evaluate these features.

On the bright side, if the Direction misbehaves NEC will replace the hardware—labor included—anytime during the first three years, with on-site service covered for one year.

13 CYBERMAX POWERMAX H3

PRO: Inexpensive graphics workstation with OpenGL graphics card, 128MB of RAM, Zip drive

CON: Mediocre speed for a PII-333

The PowerMax H3 is designed from the ground up to do heavy-duty commercial graphics work for cheap. This new \$2349 system from CyberMax includes a 19-inch monitor, the GlyderMax-2 2D/3D graphics accelerator card, an internal Iomega Zip drive, and a generous 128MB of fast SDRAM memory.

Despite all this graphics power, however, the PowerMax scored only 171 in our PC WorldBench tests. Only two other Windows 95 PCs with PII-333 processors on our chart were slower.

With this system's high-end graphics hardware, it's surprising that CyberMax didn't send us the evaluation PC installed with Windows NT Workstation—the Microsoft operating system of choice for graphics professionals. The machine is also missing an ethernet card, which you'll need if you plan to connect to your company's server.

The unusual graphics card included with the PowerMax H3 comes from Symmetric, STB's recently acquired professional graphics division. The GlyderMax-2 AGP card is designed around the Permedia 2 chip set and comes equipped with 8MB of SGRAM—twice the video memory found in most new PCs. It supports ▶



Dell OptiPlex GX1 400



PowerMax H3 PII-333



NEC Direction SP B400

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Circle 54 on reader service card

OpenGL, Direct3D, and 3D Studio Max. With ultrahigh refresh rates and a dedicated geometry engine, it should be great for CAD work or high-end graphic design. The 19-inch CyberMax AT1097F monitor can't quite keep up with the video card, though. At its maximum 1600 by 1200 resolution, images looked a bit fuzzy; in 1280 by 1024 mode, the display is much sharper—good enough to avoid eyestrain during lengthy sessions.

The PowerMax H3 features five open drive bays and four unused card slots to accommodate future upgrades. The system comes with Microsoft's thumbwheel-enhanced IntelliMouse, which we like, but we thought the keys on the included keyboard offered too little resistance.

CyberMax's documentation is informative and nicely produced. The company offers a warranty for three years on parts and one year on labor, and promises to return a PC sent for repairs within three days. CyberMax also provides round-the-clock telephone technical support.

14 QUANTEX QP6/333 SM-4X

PRO: Least-expensive PII-333 on chart

CON: Annoying on-screen monitor controls

A competitively low price of \$2299 makes Quantex's QP6/333 SM-4x the cheapest Pentium II-333 on the power chart, though its performance ranks in the middle among other PII-333 systems running Windows 95.

Power desktop users are sure to appreciate the sizable capacity of IBM's 8.4GB Deskstar hard drive and the high-quality graphics produced by the 8MB Diamond Fire GL 1000 Pro AGP video card.

The 17-inch Quantex AT897 monitor supports resolutions up to 1600 by 1200 pixels, which should make it well suited to large spreadsheets—but instead, with each step beyond 800 by 600 pixels, fuzziness increased. We also didn't like the interface (called the OSD Control) used to adjust the AT897's advanced settings. The control consists of a dial below the front of the screen and a crescent-shaped button on the front. The position and stiffness of the dial makes any adjust-

ment a chore. The old-fashioned contrast knob and power button (also on the monitor's front) are welcome additions.

The included modem is a V.90-upgradable 56-kbps ViVa LC-SM—sounds fancy, but it's a bargain-basement model that comes with shareware-quality RingCentral voice-mail software. If you stick to using it only for data transmission, you might not notice the difference.

The system comes with a stack of reference CD-ROMs including Compton's Reference Collection, Compton's Interactive Encyclopedia and World Atlas, and the American Heritage Talking Dictionary. The only disc in the package for business use is Corel's WordPerfect Suite 8.

The keyboard's Windows 95 keys (placed next to <Ctrl> and <Alt>) save you some mouse clicks. On the other hand, the standard Microsoft PS/2 mouse feels clunky compared with the IntelliMouse, which is becoming a standard. Perhaps the most appealing feature of this PC is that when you click Shut Down, the system powers itself down automatically.

Quantex's quick setup and service guides help ease installation; included is a detailed Internet manual that helps you learn the basics and get online. The user manual primarily covers Windows 95, and doesn't contain the system-specific hardware and troubleshooting sheets we expect. But Quantex's toll-free technical support and fax-back lines are available anytime. The company offers a three-year warranty on parts and will pay for labor for one year.

17 SYS PERFORMANCE PRO 400BA

PRO: Highest PC WorldBench 98 score on chart

CON: Spartan system manuals, no network card or bundled software

Sys Technology's competitively priced \$2799 Performance Pro 400BA enters the power chart with a record-setting PC WorldBench score of 252. One of the first Pentium II-400 PCs we've tested running Windows NT, the 400BA comes with an

8MB Matrox video card and 64MB of RAM, helping it carve a 42-point lead over the fastest PII-400 Windows 95 machine and an 8-point lead over Dell's leaner (but less upgradable) NT desktop, the OptiPlex GX1 400. The dearth of bundled software and the inclusion of both Windows NT and Intel's LANDesk Client Manager suggests that the 400BA is intended for corporate environments. Nevertheless,

you'll need to add a network card to this system if you plan to use it on a network. Sys ships the machine with a 56-kbps internal modem instead of an ethernet card.

The Pentium II-400 CPU is just one of the robust components that Sys harnessed in the 400BA to rack up such a high benchmark score. All the basic hardware is top-notch, including the 8.4MB Deskstar hard drive from IBM and the Sound Blaster AWE64 sound card. The Matrox Millennium II AGP video card may not be on our Top 10 list, but it's still satisfactory for general business use.

Sys cut a few corners by using up half the RAM socket real estate with a pair of 32MB DIMMs, when one slightly more expensive 64MB DIMM would have left more expansion room. (You still get two open DIMM sockets with this configuration, but even three sockets wouldn't let you upgrade to the listed maximum of 1GB of RAM—the most on the power chart—without replacing all the DIMMs.) The 400BA comes with no bundled software beyond the operating system and the normal system drivers. And the included user manual lacks the information we expect with most new PCs, like setup instructions and troubleshooting guides.

Sys backs up its products with a limited parts warranty that covers the processor and RAM for six years, and the rest of the PC's components for one to five years. ▶



Performance Pro 400BA



Quantex QP6/333 SM-4x

BEYOND THE TOP 20

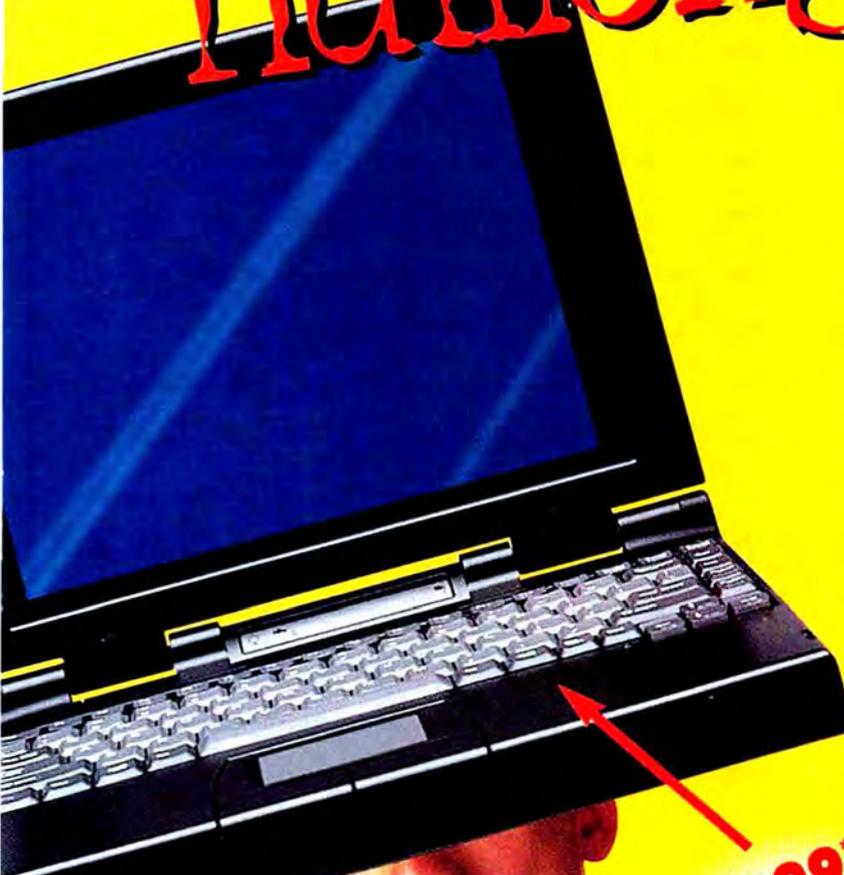


We evaluated this system along with the others, but it didn't score high enough to reach the Top 20 Power Desktops chart.

For the write-up, see PC World Online (www.pcworld.com/top20pcs).

◆ Netis Starburst PII-333

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TOP 20 BUDGET DESKTOPS

	SYSTEM	Last month	Month tested	Street price (5/15/98)	CPU	Comments
1	 Gateway G6-300b 800/846-2000 www.gateway.com	1	July 98	\$1995	Pentium II-300	Fastest PII-300 drops \$130 in price, offers balanced configuration, MS Office.
2	 CyberMax PowerMax HI 800/437-4596 www.cybermaxpc.com	n/a	NEW	\$1599	Pentium II-266	Low price includes DVD-ROM drive, great video card.
3	 Quantex QP6/333 SM-3x 800/896-4898 www.quantex.com	n/a	NEW	\$1999	Pentium II-333	Upgradability and better support make this the best PII-333 deal on chart.
4	 Quantex QP6/300 SM-4x 800/896-4898 www.quantex.com	n/a	May 98	\$2149	Pentium II-300	Despite \$300 price cut, well-stocked PII-300 is still most expensive Best Buy.
5	 Gateway E-3110 300 800/779-2000 www.gateway.com	2	May 98	\$2089	Pentium II-300	Price of network-oriented PC rises \$90 from last month.
6	Micro Express MicroFlex-C866 800/989-9900 www.microexpress.net	n/a	NEW	\$1599	Pentium II-266	Corporate-minded desktop includes second-generation DVD-ROM drive.
7	 Quantex QP6/266 M-2x 800/896-4898 www.quantex.com	3	July 98	\$1499	Pentium II-266	Sluggish but affordable PII-266 includes gobs of software, nice monitor.
8	 CyberMax PowerMax 7 800/437-4596 www.cybermaxpc.com	6	May 98	\$1858	Pentium II-300	\$91 price drop on fast, expandable multimedia system with big hard drive.
9	Unicent Avanta L333 800/308-3614 www.unicent.com	4	June 98	\$1999	Pentium II-333	\$50 off slowest PII-333 on chart; phone support could be better.
10	NEC Direction 333L 888/863-2669 www.necnow.com	5	May 98	\$1999	Pentium II-333	Name change and \$68 price cut can't stop former Best Buy from slipping.
11	Micro Express MicroFlex-F300e 800/989-9900 www.microexpress.net	8	May 98	\$1699	Pentium II-300	Refreshed system features \$100 drop in price, hard drive upgrade to 6GB.
12	Dell Dimension XPS D266 800/388-8542 www.dell.com	9	May 98	\$2129	Pentium II-266	Well-supported PII-266 with Office 97 drops \$70; second-slowest budget system.
13	Micro Express MicroFlex-B833 800/989-9900 www.microexpress.net	7	July 98	\$1249	Pentium II-233	Least-expensive budget chartmaker has smallest monitor, very good warranty.
14	Polywell Poly K6266Mx 800/999-1278 www.polywell.com	14	May 98	\$1375	AMD K6-266	Price slashed \$220 on expandable AMD K6; history of unresponsive support.
15	ProGen Polaris PII-350 888/776-9595 www.progen.com	15	July 98	\$1999	Pentium II-350	\$150 price cut for chart's only PII-350, but support policies hold it back.
16	Micro Express MicroFlex-B2450 800/989-9900 www.microexpress.net	11	June 98	\$1299	AMD K6-233	Slowest budget PC refreshed with 6GB hard drive, \$200 price drop.
17	Midwest Micro Pro 333 Office Pro PC 800/728-8582 www.mwmicro.com	n/a	NEW	\$2239	Pentium II-333	Most expensive PII-333 on budget chart includes 8.4GB hard drive.
18	Kingdom Pinnacle 300/P2 800/385-3436 www.kingdomcomputers.com	n/a	May 98	\$1847	Pentium II-300	\$350 plunge on fast system is largest price cut on budget chart.
19	ProGen Polaris PII-333 888/776-9595 www.progen.com	12	May 98	\$1599	Pentium II-333	Cheapest budget PII-333 PC is least upgradable; shortest support hours.
20	Tagram Thunderbolt H2630 800/824-7267 www.tagram.com	13	June 98	\$2199	Pentium II-333	Fast PC includes Zip drive; support drops off after three years.



Best Buy

See features chart, page 220; test report, page 222.

n/a = not applicable

¹ A system's performance word score is relative to scores of other PCs running the same operating system. For more details see "Your Guide to the Top 100."² For more information about all products in this table, circle reader service no. 908.

FOR THE SECOND MONTH RUNNING, prices on Pentium II-333 and PII-300 systems take a nosedive, bringing several former power chart competitors over to the budget ranks, including our new number four Best Buy, the \$2149 Quantex QP6/300 SM-4x. The cheapest PII-333 system, ProGen's \$1599 Polaris, stalls in 19th place, due partly to the vendor's skimpy support. Among the new systems missing the cut are Racer's Talladega 333PS and the Equium 7000S from Toshiba. The \$1949 Talladega was an average performer for its processor class, but Racer's lack of online support counted against its product. At \$2225 the Equium is a very expensive PII-266 budget system; the average PII-266 PC costs \$1700.

SCORECARD

★ Overall rating	PC WorldBench 98/operating system	Features and design	Price	Performance ¹	Vendor's system reliability	Vendor's support quality/policies	Reader service number ²
85	173/Win 95	very good	average	outstanding	average	above average/best	702
82	155/Win 95	outstanding	average	good	³	³/best	703
82	164/Win 95	very good	average	very good	average	average/best	704
81	151/Win 95	outstanding	expensive	good	average	average/best	705
81	172/Win 95	good	expensive	outstanding	average	above average/best	706
80	194/Win NT	very good	average	good	³	³/best	707
80	138/Win 95	very good	average	good	average	average/best	708
79	152/Win 95	very good	average	good	³	³/best	709
79	158/Win 95	very good	average	good	³	³/best	710
78	169/Win 95	very good	average	very good	below average	average/good	711
78	161/Win 95	good	average	very good	³	³/best	712
78	142/Win 95	good	expensive	good	above average	above average/best	713
77	144/Win 95	good	inexpensive	good	³	³/best	714
77	145/Win 95	good	inexpensive	good	³	³/good	715
77	181/Win 95	very good	average	outstanding	³	³/fair	716
77	140/Win 95	good	inexpensive	good	³	³/best	717
77	167/Win 95	very good	expensive	very good	³	³/fair	718
77	164/Win 95	very good	average	very good	³	³/fair	719
77	172/Win 95	good	average	outstanding	³	³/fair	720
76	171/Win 95	very good	expensive	very good	³	³/fair	721
Scorecard weightings	Features 25 percent	Price 22 percent	Performance 18 percent	Reliability 15 percent	Quality/policies 10 percent each		

¹ Insufficient data to give a rating.



Gateway G6-300b

In our PC World-Bench 98 tests, the G6-300b scored an impressive 173—fastest in its CPU class. And because it includes a 13X–32X CD-ROM drive rather than a DVD-ROM one, you save about \$200. The STB Velocity 128 graphics adapter includes a TV-out port, and the 17-inch EV700 monitor provides decent graphics at resolutions up to 1024 by 768. The monitor's on-screen display selection dial is user-friendly and tucks behind a drop-down door when not in use.

The interior of the G6-300b's curvaceous case has lots of room for upgrades: two PCI slots, an ISA slot, and a combination PCI/ISA slot. But you'll need to remove the existing hard disk temporarily if you want to add a second. There's plenty of room to maneuver if you plan to install an internal backup device, such as an Iomega Zip or CD-Recordable drive.

Gateway bundles Microsoft's Office 97 Small Business Edition, Info Highway, and Bookshelf 98 reference software with the PC. New owners also receive a free one-month subscription to the Gateway.net Internet service. Our readers rate the reliability of Gateway PCs as outstanding. In our anonymous calls, support personnel answered the 24-hour toll-free lines quickly and provided accurate and courteous help. Gateway's warranty of three years on both parts and labor is above average.

2 CYBERMAX POWERMAX H1

PRO: Inexpensive former power-chart system includes multimedia components and software

CON: Case cover is difficult to remove and replace



CyberMax's well-equipped new PowerMax H1 jumps into budget Best Buy territory this month, thanks to a substantial price drop on Intel's 266-MHz Pentium II processor. But the PC's low \$1599 price doesn't mean you sacrifice performance. Its PC WorldBench score of 155 is good for a PII-266, and CyberMax bundles some high-quality multimedia components into this home-office-oriented system. ▶

This Month's Best Buys

1 GATEWAY G6-300B

PRO: Great price and good performance

CON: No DVD-ROM drive included



Gateway's budget champion, the G6-300b, stays in the number one spot for the second month in a row. The \$1995 midtower is faster than all

the other Windows 95 systems on the budget chart (except for the number 15 ProGen Polaris PII-350). It comes with a spacious 8.4GB hard drive, and its price falls \$130 this month. Unlike its slower sibling, the \$1909 GP6-266b, it doesn't have a DVD-ROM drive. But we still think the G6-300b is the better value, thanks largely to its excellent performance and high-quality components.

	SYSTEMS	CPU	Operating system	RAM (MB)	Secondary cache (KB)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor tube/viewable diagonal (inches)	Modem speed (kbps)
1	Gateway G6-300b*	Pentium II-300	Windows 95	64	512	8.4	STB Velocity 128 (AGP)	4/SGRAM	17/15.9	56 ²
2	CyberMax PowerMax H1*	Pentium II-266	Windows 95	64	512	6.4	Number Nine 9FX Reality 334	4/SGRAM	17/16.1	56 ³
3	Quantex QP6/333 SM-3x*	Pentium II-333	Windows 95	64	512	6.4	STB Velocity 128 (AGP)	4/SGRAM	17/16.1	56 ³
4	Quantex QP6/300 SM-4x*	Pentium II-300	Windows 95	64	512	6.4	Number Nine Revolution 3D	8/WGRAM	19/17.9	56 ³
5	Gateway E-3110 300*	Pentium II-300	Windows 95	64	512	8.4	ATI 3D Rage Pro Turbo PC2TV	8/SGRAM	17/15.9	not included
6	Micro Express MicroFlex-C866	Pentium II-266	Windows NT 4.0	64	512	6.4	STB Velocity 128 (AGP)	4/SGRAM	17/16.1	56 ³
7	Quantex QP6/266 M-2X	Pentium II-266	Windows 95	32	512	4.1	STB Velocity 128 (AGP)	4/SGRAM	17/16.1	56 ³
8	CyberMax PowerMax 7	Pentium II-300	Windows 95	64	512	8.4	STB Velocity 128 (AGP)	4/SGRAM	17/16.1	56 ³
9	Unicent Avanta L333	Pentium II-333	Windows 95	64	512	8.4	ATI Xpert@Work (AGP)	4/SGRAM	17/15.9	56 ²
10	NEC Direction 333L	Pentium II-333	Windows 95	64	512	6.4	Diamond Viper 330 (AGP)	4/SGRAM	17/16	56 ²
11	Micro Express MicroFlex-F300e	Pentium II-300	Windows 95	64	512	6	ATI Xpert@Work (AGP)	8/SGRAM	17/15.8	56 ³
12	Dell Dimension XPS D266	Pentium II-266	Windows 95	32	512	4	STB Velocity 128 (AGP)	4/SGRAM	17/15.8	56 ²
13	Micro Express MicroFlex-B833	Pentium II-233	Windows 95	64	512	4.3	STB Velocity 128 (AGP)	4/SGRAM	15/13.7	56 ²
14	Polywell Poly K6266Mx	AMD K6-266	Windows 95	64	512	7	Diamond Stealth 3D 2000 Pro	4/EDO DRAM	17/15.8	56 ³
15	ProGen Polaris PII-350	Pentium II-350	Windows 95	64	512	8.4	Intel Express 3D	4/SGRAM	17/16	56 ²
16	Micro Express MicroFlex-B2450	AMD K6-233	Windows 95	64	1024	6	ATI Xpert@Work	4/SGRAM	17/15.8	56 ³
17	Midwest Micro Pro 333 Office Pro	Pentium II-333	Windows 95	64	512	8.4	ATI 3D Rage Pro	8/SGRAM	17/16.1	not included
18	Kingdom Pinnacle 300/P2	Pentium II-300	Windows 95	64	512	6.4	ATI 3D Rage Pro	4/SGRAM	17/15.7	56 ²
19	ProGen Polaris PII-333	Pentium II-333	Windows 95	64	512	8.4	Number Nine Revolution 3D	8/VRAM	17/16	56 ²
20	Tagram Thunderbolt H2630	Pentium II-333	Windows 95	64	512	6.4	ATI Xpert@Work	8/SGRAM	17/16.1	56 ³

* Best Buy

¹ PC World defines towers as taller than 20 inches, midtowers as 15.5 inches to 20 inches, and minitowers as shorter than 15.5 inches.² Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.

including a second-generation Toshiba DVD-ROM drive as well as a wavetable-equipped Ensoniq PCI sound card that plays music well.

But the PowerMax H1 is also intended to help you get your work done. Thanks to its superb software bundle, you have a virtual reference library at your fingertips. With Compton's dictionary and encyclopedia, SoftKey's Key Day Planner and Label Maker, and Corel's WordPerfect Suite 8, you'll have all the software you need to get your small business organized. In the event of serious trouble, CyberMax also throws in a recovery CD-ROM that can restore your system's hard drive to its factory-shipped condition.



CyberMax PowerMax H1

CyberMax did cut corners in a few areas to keep the PowerMax H1's price low. You get a standard Microsoft mouse, not an Intellimouse with a convenient thumb-wheel for scrolling through documents. We couldn't find a model name or company address anywhere on the 56-kilobits-per-second voice modem or in its manual. Generic components can be wild cards; they're often cheaper, but since it's hard to know if you're getting a good deal, we can't recommend them.

We also didn't like the PC's removable case—a single piece of steel that covers three sides. It was tedious to unscrew and even harder to line up correctly when we wanted to put the PC back together.

3 QUANTEX QP6/333 SM-3X

PRO: Inexpensive PII-333 PC

CON: Shared PCI/ISA slot wasted by modem



Quantex's newest entry into the budget ranks scored only 6 PC WorldBench points above Unicent's ninth-place Avanta L333. Both cost \$1999 and use the same Pentium II-333 chip—so why is the Quantex our number three Best Buy, while the Avanta languishes in the middle of the pack? Support policies are an important factor in our rankings, and Quantex's are top-notch. The QP6/333 SM-3x also includes an AGP graphics card and a speedy 13X-32X CD-ROM drive, perks that further contribute to its high rating.

Unlike many new PCs, this Quantex system doesn't come with a built-in

EXPANDABILITY

CUSTOMER SUPPORT

CD/DVD-ROM drive speed	Sound board	Case style ¹	Max. RAM (MB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
13X-32X	Ensoniq Audio PCI	midtower	384	1	2/3	3	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
2X DVD-ROM	Ensoniq Audio PCI	midtower	384	2	2/3	3	3/1	24	Sat., Sun.	BBS, WWW
12X-32X	Ensoniq Audio PCI	midtower	384	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
14X-32X	Ensoniq Audio PCI	midtower	512	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
13X-32X	Ensoniq Audio PCI	midtower	384	2	3/2	3	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
2X DVD-ROM	Sound Blaster AWE64	midtower	512	2	3/0	4	4/4	24	Sat., Sun.	WWW
13X-32X	Ensoniq Audio PCI	midtower	384	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
13X-32X	Ensoniq Audio PCI	midtower	512	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
13X-32X	Ensoniq Audio PCI	midtower	384	2	3/1	4	5/3	24	Sat., Sun.	BBS, WWW
14X-32X	integrated Yamaha OPL3-Sax	midtower	384	1	3/1	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
14X-32X	Super Sound32 32W-3D	midtower	512	2	3/0	4	4/4	24	Sat., Sun.	WWW
14X-32X	Turtle Beach Montego	midtower	384	2	3/1	3	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
12X-24X	Sound Blaster AWE64	midtower	512	2	3/0	4	4/4	24	Sat., Sun.	WWW
12X-24X	CS37-3DIS	midtower	256	4	3/0	4	3/5	24	Sat., Sun.	WWW
12X-32X	Aureal Vortex PCI Audio	midtower	384	2	3/1	3	3/1	9	none	BBS, WWW
2X DVD-ROM	Sound Blaster AWE64	midtower	768	1	3/0	3	4/4	24	Sat., Sun.	WWW
12X-32X	Ensoniq Audio PCI	midtower	384	1	2/1	4	varies ⁴ /3	12	Sat.	BBS, WWW
12X-24X	Ensoniq Audio PCI	midtower	512	3	3/2	4	varies ⁴ /1	12.5	Sat.	WWW
14X-32X	S3 SonicVibes PnP	midtower	1024	2	2/1	0	3/1	9	none	BBS, WWW
12X-24X	Ensoniq Audio PCI	midtower	384	2	3/0	4	3/1	24	Sat., Sun.	BBS, WWW

¹ Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.
⁴ Five years on CPU and system memory, three years on all other parts.

omega Zip drive. It should be a while, though, before you need to off-load data from the roomy 6.4GB Seagate Medalist Pro hard drive (a Best Buy in our July hard disk roundup). If you decide you want more storage, there's plenty of space inside to mount additional hard disks or a Zip drive—but you'll have to navigate the haphazardly scattered cables and power cords. The only free bays are 5.25 inches high, so you'll probably need special rails to mount the smaller, 3.5-inch internal drives. Quantex uses a single 64MB RAM module, so if you ever find that you need more RAM, you can add two more DIMMs to the system without removing the original one.



Quantex QP6/333 SM-3X

In our test PC, Quantex had attached the 56-kbps Digan Systems modem to the one shared ISA/PCI slot instead of the free ISA slot beneath it. This use of the versatile shared slot is a waste of the PC's resources. Moving the modem card to the appropriate slot isn't difficult, but it's a nuisance you shouldn't have to deal with.

Quantex guarantees the QP6/333's hardware for three years and will fix it for free the first year. The company has its own support BBS; you can download

updated drivers or support information from there or its Web site. You can also call the company's round-the-clock technical support line if you're having late-night computer troubles.

4 QUANTEX QP6/300 SM-4X

PRO: Very good price, quality components

CON: Sluggish performance, blurry monitor



A \$300 price drop combined with attractive multimedia hardware and a home-office software bundle help this former power contender capture a budget Best Buy spot this month. But if you want your PC to move so fast that you feel the wind on your face, take note: This \$2149 midtower's lackluster PC World-Bench score of 151 trails that of every other PII-300 system in our Top 20.

The QP6/300 SM-4x, though, is nicely equipped with an Ensoniq Audio PCI sound board, a 14X-32X CD-ROM drive, and an excellent AGP video card, the 8MB Number Nine Revolution 3D.

Despite the presence of this card, ▶

video might be the QP6/300 SM-4x's Achilles' heel. The 19-inch MAG DJ900 display was so blurry, we constantly felt the urge to rub our eyes. It couldn't seem to keep up with the high-end AGP card.

Despite Quantex's terrific support policies, our readers rank the quality of Quantex support as only average. The company's around-the-clock toll-free phone support has nevertheless improved over



Quantex QP6/300 SM-4X

the past few months. In our most recent anonymous calls, hold times were significantly shorter than the 45 minutes we used to wait to reach a technician. The fielding of questions, however, could still

stand some improvement—the support techs to whom we talked didn't seem to know where to begin, and could answer our questions only after putting us on hold to consult with others.

5 GATEWAY E-3110 300

PRO: LAN adapter and client management software included, top-tier support policies

CON: Curved case top makes stacking external components difficult



Great performance and good components help the E-3110 300 stand out, but its price rises \$90 to \$2049 this month as part of Gateway's recent price restructuring. The result: The E-3110 300 drops three places despite an impressive PC WorldBench score of ▶

TOP 20 BUDGET DESKTOPS

TEST REPORT

SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	PC World-Bench 98 score	← Faster Slower →	Average of tested Pentium II-333s ¹
1 Gateway G6-300b*	Pentium II-300	Win 95	64	512	173		
2 CyberMax PowerMax HI*	Pentium II-266	Win 95	64	512	155		
3 Quantex QP6/333 SM-3x*	Pentium II-333	Win 95	64	512	164		
4 Quantex QP6/300 SM-4x*	Pentium II-300	Win 95	64	512	151		
5 Gateway E-3110 300*	Pentium II-300	Win 95	64	512	172		
6 Micro Express MicroFlex-C866	Pentium II-266	Win NT 4.0	64	512	194		
7 Quantex QP6/266 M-2x	Pentium II-266	Win 95	32	512	138		
8 CyberMax PowerMax 7	Pentium II-300	Win 95	64	512	152		
9 Unicent Avanta L333	Pentium II-333	Win 95	64	512	158		
10 NEC Direction 333L	Pentium II-333	Win 95	64	512	169		
11 Micro Express MicroFlex-F300e	Pentium II-300	Win 95	64	512	161		
12 Dell Dimension XPS D266	Pentium II-266	Win 95	32	512	142		
13 Micro Express MicroFlex-B833	Pentium II-233	Win 95	64	512	144		
14 Polywell Poly K6266Mx	AMD K6-266	Win 95	64	512	145		
15 ProGen Polaris PII-350	Pentium II-350	Win 95	64	512	181		
16 Micro Express MicroFlex-B2450	AMD K6-233	Win 95	64	1024	140		
17 Midwest Micro Pro 333 Office Pro PC	Pentium II-333	Win 95	64	512	167		
18 Kingdom Pinnacle 300/P2	Pentium II-300	Win 95	64	512	164		
19 ProGen Polaris PII-333	Pentium II-333	Win 95	64	512	172		
20 Tagram Thunderbolt H2630	Pentium II-333	Win 95	64	512	171		

*Best Buy

Application test times in minutes

Word 97 Word Pro 97 Excel 97 1-2-3 97 Paradox 8.0 Picture Publisher 7.0

TEST HOW WE TEST All systems are tested with PC WorldBench 98, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs are tested with either Windows 95 or Windows NT 4.0, and video resolution is set to 800 by 600 in 65,536 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench 98 score is a sum of the weighted, normalized result of each script: Word 97 (10 percent), Word Pro 97 (10 percent), Excel 97 (20 percent), 1-2-3 97 (20 percent), Paradox 8.0 (20 percent), and Picture Publisher 7.0 (20 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing). ¹Under Windows 95.

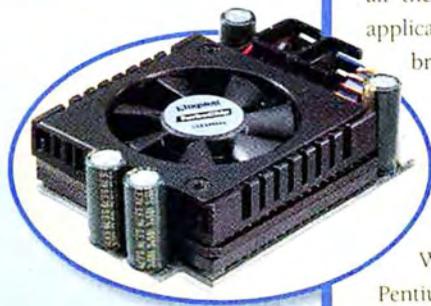
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Circle 133 on reader service card

172. The E-3110 300 also includes corporate add-ons such as an SMC EtherPower II 10/100 ethernet card for high-speed



Gateway E-3110 300

network connections, and DMI-2 management software, which lets administrators upgrade the system remotely. As with most PCs sold with ethernet cards, it doesn't come with a modem.

The E-3110 300 is outfitted with a 17-inch monitor for the budget chart (it was configured with a 19-inch monitor two months before, when it was a power chart contender). It also comes with an 8.4GB hard drive and an ATI 3D Rage Pro Turbo PC2TV graphics card that includes video-out ports and 8MB of SGRAM. Also surprising for a corporate box: The E-3110 includes an Ensoniq Audio PCI audio card and reasonably good-sounding Altec Lansing ACS-41 speakers. The only problem: If you like to stack external drives on top of your PC, you're out of luck. The case's stylish curved top prevents it.

Color-coded cables and ports make attaching peripherals easy. And the cover is a breeze to remove, too: Just twist off the two large screws with your fingers and slide back the side panel to reveal the orderly interior. Gateway's support policies are terrific, including a three-year parts and labor warranty and 24-hour toll-free technical support.



MicroFlex-C866

fast midtower ships with Windows NT 4.0 and Intel's LANDesk Client Manager software. The MicroFlex-C866 also comes loaded with a DVD-ROM drive and a high-quality AGP video card. Best of all, at only \$1599 it's one of the most affordable PII-266 corporate or small-business workstations in our budget ranks (though it lacks a network adapter).

Among the included high-performance hardware is a 6.4GB Quantum Fireball hard drive. A fast drive often doesn't have much effect on overall system performance (business applications can't tax a hard drive to its limits). But if you plan to use this PC for high-end multimedia production or to work with large database files, then the performance benefit of the Fireball drive becomes more substantial.

We didn't like the generic feel of the MicroFlex-C866, from its heavy steel chassis cover to its plain-vanilla keyboard and mouse. Accessing the PC's interior requires removing four Phillips-head screws and doing a fair amount of nudging and prying to the cover. Putting the case back together took a degree of coordination worthy of a Russian ballet troupe. Our keyboard was firm to the touch and quiet, but the keys were a bit taller than the norm. And unlike most new PCs, the C866 doesn't include a thumbwheeled mouse for scrolling through documents.

There's plenty of room to maneuver if you plan to upgrade this system. Our test unit arrived with its internal cables neatly bundled, and thanks to a pair of open DIMM sockets, you'll be able to add RAM without removing the memory already in the system. But the one free ISA slot is blocked by tall capacitors on the Taicom 56-kbps modem underneath it. If you try to squeeze another card into the slot, you risk damaging the modem.

Micro Express offers an above-average four-year warranty on parts and labor, and telephone support is available around the clock. We wish more vendors showed as much faith in their products' quality.

17 MIDWEST MICRO PRO 333 OFFICE PRO PC

PRO: Top-notch components; good performance

CON: Limited phone support hours, expensive

The \$2239 Pro 333 Office Pro PC from Midwest Micro costs more than four of the other five PII-333 systems on our Budget Desktops chart, but components like an Iomega Zip drive and a high-quality 8MB ATI 3D Rage Pro video card help justify the higher price. The Pro 333 is also reasonably fast, earning a PC WorldBench score of 167—the eighth-highest among this month's chartmakers.

Midwest Micro's warranty covers parts

and labor on most components for three years, and the parts warranty extends to five years for the CPU and RAM. But users who don't happen to conveniently encounter problems during the



Pro 333 Office Pro PC

hours Midwest Micro provides phone support might be in for a frustrating wait—support technicians are available only 12 hours each weekday and 6 hours on Saturdays. With the exceptions of ProGen and Kingdom, every other company on the chart provides 24-hour phone support every day of the week.

Midwest Micro has put together a strong software bundle consisting of Office 97 SBE and Microsoft's Plus program, which lets you customize features like desktop patterns and icons in integrated themes. But in a corporate environment, IS personnel could probably do without the help-desk calls the Plus program might generate: Each time we attempted to change the desktop icon themes, the program crashed. ▶

New This Month

The following PCs made our budget desktops chart for the first time this month. For original reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/top400).

6 MICRO EXPRESS MICROFLEX-C866

PRO: Sprightly and affordable multimedia PC

CON: Cover is difficult to open and close, generic keyboard and mouse

With the Micro Express MicroFlex-C866 on your desk, you won't need to worry about obsolescence anytime soon. This

BEYOND THE TOP 20



We evaluated these systems along with the others, but they didn't score high enough to reach the Top 20 Budget Desktops chart. For write-ups, see PC World Online (www.pcworld.com/t20pcs).

- ◆ Acma NPower 6333P
- ◆ DTK Apri-76M/P333
- ◆ EPS Evolution XP-266
- ◆ NexTrend NexStar 208w PII-300
- ◆ Racer Talladega 333PS
- ◆ Toshiba Equium 7000S
- ◆ Total Peripherals Serengeti 300+

WHEN THE PROS TESTED THE
NEW HITACHI MONITORS,
THEY LIKED WHAT THEY SAW.

"One 19-inch unit, the SuperScan Elite 751, distinguished itself from the others... great test scores"
PC Magazine

"SuperScan Elite 751 led the pack... delivers the same high-end image quality expected of the manufacturer... 1997 Product of the Year"
Imaging

"The best image available... SuperScan Elite 751"
Computer Shopper

"SuperScan Pro 800 is a true bargain... solid scores... terrific price"
PC Computing

"Our top 21-inch monitor... SuperScan Elite 802 had the best image quality... and its price is low"
Byte

"The Elite 802's image is solid in all respects, all the way up to 1800 x 1440... excellent performance at a reasonable price"
Cadavyst

"Best buy... SuperScan Pro 500 displays razor sharp text and graphics... very crisp text detail, accurate color graphics quality... terrific low price"
PC World



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IMATION

TOP 10 NOTEBOOK PCs

	POWER NOTEBOOK	Last month	Month tested	Street price (5/15/98)	CPU	Comments
1	 Quantex H 1331 800/896-4898 www.quantex.com	1	June 98	\$3099	Pentium II-266	\$200 price cut on unit with port replicator, second battery.
2	Dell Inspiron 3200 D266XT 800/388-8542 www.dell.com	2	June 98	\$3099	Pentium II-266	\$100 reduction on notebook with latest CPU, good price.
3	Dell Latitude CPI D266XT 800/388-8542 www.dell.com	3	July 98	\$3699	Pentium II-266	\$100 off fast, thin, versatile, top-of-the-line model.
4	Micron GoBook 266 888/634-8799 www.micronpc.com	n/a		\$3448	Pentium MMX-266	Unique platform-battery design delivers enormous uptime.
5	Gateway Solo 5100 LS 800/846-2000 www.gateway.com	5	June 98	\$3249	Pentium MMX-266	Light weight, strong battery, big screen highlight this roadster.
BUDGET NOTEBOOK						
1	 Gateway Solo 2300 SE 800/846-2000 www.gateway.com	1	June 98	\$1749	Pentium MMX-200	Low price, good battery keep multipurpose unit on top.
2	Quantex H 1330 800/896-4898 www.quantex.com	4	March 98	\$2349	Pentium MMX-233	\$242 drop in price lifts presenter's choice to second place.
3	Compaq Armada 1571DM 800/345-1518 www.compaq.com	n/a		\$1999	Pentium MMX-200	Great sound, good price, strong battery.
4	Acer Extensa 394T 800/733-2237 www.acer.com/aac	2	May 98	\$2299	Pentium MMX-200	Marathon battery and light weight make this the best traveler on chart.
5	CTX EzBook 774 MT-FK 800/888-9052 www.ctxintl.com	n/a	May 98	\$1649	Pentium MMX-200	Inexpensive tote-along is great for students' homework and surfing.
 Best Buy See features chart, page 230.						

n/a = not applicable ¹ Includes computer, adapter, power cord, and floppy drive or CD-ROM drive. ² For more information about all products in this table, circle reader service no. 901.



FAME CAN BE FLEETING. After Micron's TransPort XKE 266 and Meridian fought their way to the top of our power and budget charts in May, the vendor unexpectedly dumped them to make way for new offerings. Soon afterward, Micron set up a Web site to promote one of its new notebooks—the GoBook 266. But on the site, the vendor didn't name itself as the maker of the notebook, hoping the mystery would create excitement for the portable.

It did. The press has hyped the GoBook as a superb travel notebook.

But is it? Well, yes and no.

The Micron GoBook placed fourth on our power chart thanks to its good price and long-lasting battery. But depending on how you use this travel companion, it forces you to make some serious compromises that other portables do not.

Of the seven machines we tested this month, the Compaq Armada 1571DM is the only other new chart maker. The Compaq is a solid and inexpensive all-around performer—with some of the loudest speakers we've ever heard in a notebook.

ZIP VERSUS SUPERDISK LS-120

Call it the battle to back you up. Until recently, if you wanted to back up, store, or transfer large amounts of data from your notebook's hard drive, it was a hassle: You had to use a cable to hook up an external drive to the portable.

Not anymore. Compaq, Fujitsu, Hewlett-Packard, and NEC now offer notebooks with a choice of two internal storage drives: Iomega's Notebook Zip drive or Mitsubishi's SuperDisk LS-120. Other major vendors plan to follow suit soon.

The benefit of choosing a Zip drive over a SuperDisk is that more desktop PC users have a Zip drive. So if you want to swap big files between your notebook and a desktop, you'll have better luck with the Iomega device. But because Zip drives for notebooks fit into the CD-ROM drive bay, you won't be able to run both a Zip drive and a CD-ROM drive at the same time. And there's the extra weight to consider. Carrying the Iomega Zip drive will add about half a pound to your load.

The SuperDisk has three advantages over its more popular competitor. It costs less money (\$99 compared with \$199 for a Zip drive). Second, an LS-120 holds a little more (120MB versus the Zip's 100MB). Finally, the SuperDisk, which replaces the floppy drive in your notebook, is backward-compatible with floppies, so you can use all those 1.4MB disks lying around your office to transfer small files.

So which storage device should you choose? If transferring files between computers is a primary consideration, go with Zip. If not, then SuperDisk is a better buy.

SCORECARD

★ Overall rating	PC WorldBench 98 score/performance	Price	Vendor's system reliability	Features and design	Vendor's support quality/policies	Battery life (hours:min)/rating	Traveling weight ¹	Reader service number ²
91	142/outstanding	inexpensive	³	outstanding	³ /fair	2:54/poor	average	601
91	145/outstanding	inexpensive	average	outstanding	average/fair	2:58/poor	average	602
91	146/outstanding	average	average	outstanding	average/good	3:44/poor	average	603
86	116/very good	inexpensive	above average	good	³ /fair	8:09/outstanding	average	604
84	117/very good	inexpensive	average	very good	below average/fair	5:59/good	light	605
Power scorecard weightings	Performance 22 percent	Price 14 percent	Reliability 22 percent	Features 16 percent	Support 10 percent	Battery life 8 percent	Weight 8 percent	
86	103/very good	very inexpensive	average	satisfactory	below average/fair	5:52/good	average	606
86	113/outstanding	average	³	outstanding	³ /good	5:46/good	average	607
86	94/good	inexpensive	average	good	above average/fair	5:22/good	average	608
85	101/very good	average	³	very good	³ /fair	8:20/outstanding	light	609
85	100/very good	very inexpensive	³	good	³ /poor	5:38/good	average	610
Budget scorecard weightings	Performance 14 percent	Price 22 percent	Reliability 22 percent	Features 16 percent	Support 10 percent	Battery life 8 percent	Weight 8 percent	

³ Insufficient data to give a rating.

This Month's Best Buys

POWER NOTEBOOKS

1 QUANTEX H 1331

PRO: Includes port replicator, second battery, and carrying case

CON: Cramped keyboard

The Quantex H 1331 continues its reign. A \$200 price cut (to \$3099) helps keep the H 1331 at the top of our power chart for the third month in a row.

This Quantex has desktop alternative written all over it. Not only does the H 1331 have what it takes to replace your desktop PC, but Quantex sweetens the already good deal by including a \$169 port replicator, a \$169 second battery, and a carrying case gratis. No other vendor on the power chart offers such a full bundle.

Based on Intel's latest notebook chip—the Pentium II-266—the Quantex delivers desktoplike performance: Its hot PC WorldBench 98 score of 142 makes it among the fastest notebooks we've ever

tested. The 4GB hard drive provides ample space for software and data. And the 13.3-inch active-matrix screen is almost as big as an external monitor.

The one drawback to using the Quantex as a desktop replacement: If the CD-ROM drive is in the one modular bay, to use the floppy drive you have to attach it with a cable to the parallel printer port. That means you can't use the floppy and a printer at the same time.

Though it isn't the sharpest-looking notebook around, the black and boxy H 1331 is well built, with no discernible flex in the body or the screen panel. Even the CD-ROM drive tray, which is frequently one of the flimsiest parts of a system, seems to be unusually stable. The ports do not have covers, but they are recessed out of harm's way.

You'll appreciate the Quantex's modest 7.4 pounds of heft (average for a notebook, but light for a desktop alternative) when you hit the road. You won't like its puny

battery life of less than 3 hours—a by-product of the power-hungry PII processor. But the included second battery, weighing just under a pound, helps make up for the deficiency.

Generally, the H 1331 is comfortable to use. Its screen is easy on the eyes, though dimmer than some—a problem only under the harshest lighting conditions. The compact, rectangular keyboard has firm action, but too many small function keys make touch-typing harder than usual.

On the other hand, Quantex did finely tune the touchpad.

You also get the security of a well-written, nicely illustrated user guide and a three-year warranty on the CPU and memory. But coverage on other parts extends for only one year. In our any-

mous calls to Quantex's round-the-clock technical assistance, we received barely adequate advice: Reps gave wishy-washy responses to our problems, and twice we waited more than 30 minutes for help. ▶



Quantex H 1331

	POWER NOTEBOOK	CPU	Traveling weight (pounds) ¹	RAM (MB)	Hard drive (GB)	Color screen type	Screen diagonal (inches)	Screen resolution	Maximum screen colors	Battery type	Pointing device
1	Quantex H 1331*	Pentium II-266	7.4	64	4	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
2	Dell Inspiron 3200 D266XT	Pentium II-266	7.4	64	4	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
3	Dell Latitude Cpi D266XT	Pentium II-266	7.6	64	4	active	13.3	1024 x 768	65,536	lithium ion	touchpad
4	Micron GoBook 266	Pentium MMX-266	8.2	32	2	active	12.1	800 x 600	16.8 million	lithium ion	touchpad
5	Gateway Solo 5100 LS	Pentium MMX-266	6.4	48	2	active	14.1	1024 x 768	16.8 million	lithium ion	touchpad
BUDGET NOTEBOOK											
1	Gateway Solo 2300 SE*	Pentium MMX-200	8	32	2	dual-scan	12.1	800 x 600	16.8 million	NIMH	touchpad
2	Quantex H 1330	Pentium MMX-233	7.6	64	3.2	active	13.3	1024 x 768	65,536	lithium ion	touchpad
3	Compaq Armada 1571DM	Pentium MMX-200	8	32	3	dual-scan	12.1	800 x 600	16.8 million	lithium ion	touchpad
4	Acer Extensa 394T	Pentium MMX-200	7.2	32	3.2	active	12.1	800 x 600	65,536	lithium ion	touchpad
5	CTX EzBook 774 MT-FK	Pentium MMX-200	8.2	40	2	active	12.1	800 x 600	65,536	NIMH	touchpad

*Best Buy ● Yes ○ No ¹Includes computer, adapter, power cord, and floppy drive or CD-ROM drive. ²Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

BUDGET NOTEBOOKS

1 GATEWAY SOLO 2300 SE

PRO: Great price, good performance

CON: Dual-scan screen, no modem

A great price earns the Gateway Solo 2300 SE—a sturdy mainstream notebook with a strong battery—our chart's top budget spot for the second month in a row.

Gateway kept the price down to \$1749 by leaving out the modem and using a 12.1-inch dual-scan screen instead of a costlier active-matrix

one. Like most other dual-scan screens, the Solo's is difficult to view from any angle except directly in front, and the one included on our test unit was unevenly lit. Still, at this price most people who write memos and crunch numbers on their notebooks will be satisfied.

You can also connect this gray, boxy Gateway to an optional \$100 port replicator or \$199 mini-docking station and turn the notebook into a desktop alternative. The Solo has only a single modular bay, which holds either a CD-ROM drive or a floppy drive; an optional cable lets you connect either drive externally, so you can

use both at once. But since the cable connects to the parallel printer port, you won't be able to hook up the printer.

When you're away from a wall socket, you'll appreciate the Solo 2300 SE's battery life of nearly 6 hours. If you travel a lot, though, do yourself a favor and buy a lighter portable.

The solid-feeling Solo has several useful design features not found on all notebooks. The port covers fold all the way back and attach to the bottom of the unit—a clever trick that helps prevent them from breaking. In addition, the snap-out hard drive makes it easy for you to remove your data from your notebook and lock it in a drawer for safekeeping. And for a notebook sound system, the Solo's speakers produce unusually clear audio.

The keyboard splits the difference between crisp and mushy. We'd prefer something firmer, but you'll probably find it acceptable. The function keys are large and the touchpad responds adequately. But the buttons below the touchpad are a bit too small to reach for blindly.

In our technical support calls to Gateway recently, hold times were less than 10 minutes, which we consider

good. The advice was uneven, however: The staff resolved our modem problem correctly but flunked an easy hard drive question. We expect better from Gateway.

New This Month

The following PCs made our power and budget notebook charts for the first time this month. To find original reviews of previously tested notebooks on this month's charts, visit www.pcworld.com/top400.

POWER NOTEBOOKS

4 MICRON GOBOOK 266

PRO: Super battery life, flexible design

CON: Relatively heavy

If you don't mind a little extra bulk, the \$3448 Micron GoBook 266 is a fine long-distance traveler. But the notebook's unusual double-layer design doesn't come without some trade-offs.

The main unit of the GoBook—the top layer—has a thin 1.4-inch profile. Micron slimmed the notebook by eliminating a dedicated battery bay; in the remaining bay, a modular battery time-shares with a CD-ROM drive and a floppy drive. The bot-



Gateway Solo 2300 SE



Micron's GoBook uses an unusual twin-layer design.

EXPANDABILITY

CD-ROM drive speed	Modem speed (kbps)	Maximum RAM (MB)	Modular expansion bays	Bay for second battery	Optional docking station	Infrared port
12X-24X	56 ²	144	1	●	○	●
12X-24X	not included	144	1	●	○	●
12X-20X	not included	128	1	●	●	●
12X-24X	56 ⁴	96	1	●	●	●
12X-20X	56 ⁴	144	1	○	●	●
8X-20X	not included	192	1	○	●	●
12X-24X	56 ²	144	1	●	●	●
12X-20X	56 ²	96	1	●	●	●
8X-20X	33.6	128	0	○	○	●
12X-20X	56 ²	40	2	●	○	●

CUSTOMER SUPPORT

Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
varies ³ /1	24	Sat., Sun.	BBS, WWW
1/1	24	Sat., Sun.	BBS, WWW
3/1	24	Sat., Sun.	BBS, WWW
1/1	24	Sat., Sun.	BBS, CIS, WWW
1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
varies ³ /1	24	Sat., Sun.	BBS, WWW
1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
1/1	24	Sat., Sun.	BBS, CIS, WWW
1/1	12	none	WWW

³ Three years on CPU and main RAM, one year on other parts.

⁴ Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.

tom layer is nothing but a large-capacity power pack, less than two-thirds of an inch thick, that snaps onto the main unit.

The question is, does this fancy design make sense for the traveler? That depends on how far you're going with the notebook and what you're planning to do with it.

Let's first consider the main unit by itself. It weighs a mere 6.5 pounds (including AC adapter, modular battery, and CD-ROM drive). On the negative side of the ledger, Micron reports that the battery has a maximum life of three hours, which will frustrate you on long plane rides. And you can't use the CD-ROM drive and battery modules simultaneously. That leaves you with a notebook of limited versatility that's fine for short trips only.

The balance changes, however, when you snap on the bottom layer. In our tests this megabattery ran for more than 8 hours—a record for a Pentium MMX-266 notebook. (The Micron's 12.1-inch active-matrix screen—smaller than a more typical 13.3-incher—helps to extend the battery's life.) Add the couple of hours of power from the modular battery, and you'll be able to put in a long day of work and still have some juice left over for a game of computer golf.

Unfortunately, the battery layer also transforms this notebook into an unwieldy

traveling companion: Together, the layers swell the GoBook to 2 inches thick and 8.25 pounds, which just misses a "heavy" score on our charts.

Nonetheless, the Micron is pleasant to use. The keyboard has exceptionally crisp action, and the touchpad is responsive and easy to adjust. The charcoal gray unit's curved front also sets it apart from the boxy pack.

BUDGET NOTEBOOKS

3 COMPAQ ARMADA 1571DM

PRO: Booming sound, programmable keys

CON: Blotchy screen, somewhat slow

The Compaq Armada 1571DM is made for the generalist on a budget.

While the Armada offers solid performance and battery power, it really excels in sound. Feast your ears on output from perhaps the loudest speakers we've heard on any notebook—a far cry from the tinny squeaks that most portables emit.

The machine's swooped front end gives it an art deco look. The blotchiness of the dual-scan screen is noticeable on colored backgrounds like the Windows desktop, but not during word processing.

Keyboard response is firm enough. You'll also like the four programmable keys that you can assign to launch fre-

quently used applications. But controlling the pointer with the touchpad took some effort.

At 8 pounds, the Compaq won't be a burden on short trips. The integrated CD-ROM drive and AC adapter mean you won't forget them when you travel. You can double the already good battery life of 5.4 hours by removing the floppy drive and inserting an optional second battery. And for going online, there's a built-in modem.

The Armada's user guide is concise and clearly written. Our readers rate Compaq's support as above average, and it's available 24 hours a day, seven days a week. ■



Compaq's Armada 1571DM throws curves at you.

BEYOND THE TOP 10



We evaluated these systems along with the others, but they didn't score high enough to reach the Top 10 Notebook PCs chart.

For write-ups, see PC World Online (www.pcworld.com/top400).

- ◆ Fujitsu LifeBook 765Dx
- ◆ Micron TransPort Trek 233
- ◆ Toshiba Satellite 325CDS
- ◆ Transmonde Vivante SE 2266
- ◆ WinBook XLI 266

TOP 10 HOME PCs

	POWER SYSTEM	Last month	Month tested	Street price (5/15/98)	Comments
1	 Dell Dimension XPS R400 800/388-8542 www.dell.com	n/a	NEW	\$3199	PRO: Fastest home system to date by a long shot, first-class reliability and service ratings. CON: Very pricey, comes with limited software package, skimpy setup instructions.
2	Dell Dimension XPS D300 800/388-8542 www.dell.com	4	May 98	\$2349	PRO: Well-equipped power system, top-notch reliability and service ratings, reasonable price. CON: Scanty software package, setup instructions not very detailed.
3	IBM Aptiva E76 800/426-7235 www.ibm.com/pc/us/ibmhome	5	July 98	\$2098	PRO: Very inexpensive for a superfast system. CON: Only power machine with 15-inch monitor and no AGP.
4	Quantex QP6/333 SM-4x SE 800/896-4898 www.quantex.com	n/a	May 98	\$2299	PRO: Great speed and hardware package for a reasonable price. CON: Setup instructions not very comprehensive.
5	NEC Ready 9890 800/524-0819 www.nec-computer.com	n/a	NEW	\$2848	PRO: Monster speed (second-fastest home PC), great selection of software titles. CON: Expensive, history of poor system reliability and support.
BUDGET SYSTEM					
1	 Gateway G6-266 800/846-2000 www.gateway.com	n/a	NEW	\$1513	PRO: Super price, great starter package, comes with color printer, home-oriented software titles. CON: Lacks power for demanding apps, some software documentation is inadequate.
2	Gateway G6-300h 800/846-2000 www.gateway.com	3	July 98	\$1848	PRO: This month's fastest budget system, very good selection of family-focused software titles. CON: Expensive for a budget system.
3	HP Pavilion 3260 800/724-6631 www.hp.com	3	May 98	\$1148	PRO: Ultracheap, great for first-time PC buyers. CON: No secondary cache and minimal video RAM make this machine the slowest on our chart.
4	Quantex QP6/266 M-1x 800/896-4898 www.quantex.com	5	July 98	\$1498	PRO: Great price for second-fastest PC on budget chart, includes 17-inch monitor. CON: Limited range of software titles.
5	Micro X MPD 8010 800/736-4276 www.microx.com	n/a	NEW	\$1499	PRO: Excellent price, comes with 17-inch monitor and Zip drive. CON: Slow performance, new and unknown company.
 Best Buy n/a = not applicable 'On last month's power chart.					



HOME PC USERS can take the high road or the low road these days: Furious competition has brought 400-MHz speed demons and the more affordable (but much slower)

Celeron-based PCs as quickly to the kitchen table as to the office cube. We got our hands on five brand-new systems—three power and two budget machines—and four of them scored high enough to land on our chart.

Two superfast systems—Dell's Dimension XPS R400 and NEC's Ready 9890—each come with a 400-MHz Pentium II CPU and Intel's BX chip set. When the system bus runs at 100 MHz (rather than 66 MHz), you get a huge jump in performance: The XPS R400 is 20 percent faster than our previous peak performer, Quantex's QP6/333 SM-4x SE, making this Dell the fastest home PC we've ever seen.

That's the good news. Less impressive was the performance of machines using Intel's low-cost 266-MHz Celeron processor. Newcomer Micro X's MPD 8010 posted a low PC WorldBench 98 score of 119, similar to that of a Pentium MMX-

200-based system, but fared well enough in other areas to snag the bottom spot on our budget chart. Intel is rushing to put out a faster version of its low-end chip, so if you want cheap speed, wait for that.

POWER SYSTEMS

DELL'S NEW Dimension XPS R400 went right to the top of the power list. It's not just fast, it's remarkably well equipped, boasting an enormous 14GB hard drive, plus a 20-inch monitor, a DVD drive, a fancy Turtle Beach sound card, and a set of great Altec Lansing ACS495 speak-

ers. At \$3199, it's expensive. But if you're looking for a powerful multimedia PC that will hold its own well into the future, the XPS R400 is hard to beat.

If the R400's high price scares you off, though, consider the second-place Dell Dimension XPS D300, which, at \$2349, is a little more affordable. It costs \$100 less than last month and has plenty of speed to handle games, databases, and intensive business applications.

Moving up two slots to number three is Big Blue's Aptiva E76. Packing lots of muscle, this \$2098 PC is also our lowest-price power machine this month. With Lotus SmartSuite 97, good documentation, and an easy setup, this Pentium II-300 system is a good match for anyone who needs the power to play the latest games or crunch

unwieldy spreadsheets but would rather not lay out too much cash.

In fourth place is the affordable, fast, and feature-laden QP6/333 SM-4x SE from Quantex. Despite a PC



Dell Dimension XPS R400

SCORECARD

★ Overall rating	PC WorldBench 98 score/rating	Price	Reliability/support	Setup	Features	Reader service number
81	199/outstanding	expensive	above average/above average	fair	Pentium II-400, 64MB of SDRAM, 14GB hard drive, 2X DVD-ROM drive, 56-kbps modem, 20-inch monitor, Turtle Beach Montego sound card, AGP graphics card.	621
79	150/good	average	above average/above average	fair	Pentium II-300, 32MB of SDRAM, 6.4GB hard drive, 2X DVD-ROM drive, Cinemaster II MPEG decoder card, 56-kbps modem, 17-inch monitor, AGP graphics card.	622
77	165/outstanding	very inexpensive	average/average	good	Pentium II-300, 64MB of RAM, 8GB hard drive, 12X-24X CD-ROM drive, 56-kbps modem, 15-inch monitor.	-
75	163/outstanding	inexpensive	average/average	fair	Pentium II-333, 64MB of SDRAM, 6GB hard drive, 2X DVD-ROM drive, 56-kbps modem, 19-inch monitor, AGP graphics card.	623
67	191/good	expensive	below average/below average	good	Pentium II-400, 64MB of SDRAM, 8GB hard drive, 12X-32X CD-ROM drive, 56-kbps modem, 17-inch monitor, AGP graphics card.	624
Power scorecard weightings	Performance 30 percent	Price 15 percent	R/S 40 percent	Setup 5 percent	Features 10 percent	
84	145/good	inexpensive	average/above average	outstanding	Pentium II-266, 32MB of SDRAM, 2GB hard drive, 2X DVD-ROM drive, 56-kbps fax-modem, 15-inch monitor, Canon BJC-4300 color bubble jet printer.	625
83	159/good	moderate	average/above average	good	Pentium II-300, 32MB of SDRAM, 5GB hard drive, 2X DVD-ROM drive, 56-kbps fax-modem, 17-inch monitor, AGP graphics card.	626
82	77/fair	very inexpensive	average/average	outstanding	Pentium MMX-200, 32MB of SDRAM, 2GB hard drive, 8X-16X CD-ROM drive, 56-kbps modem, 15-inch monitor.	627
82	141/outstanding	inexpensive	average/average	fair	Pentium II-266, 32MB of SDRAM, 3.2GB hard drive, 12X-32X CD-ROM drive, 56-kbps modem, 17-inch monitor, AGP graphics card.	628
74	119/fair	inexpensive	average/average	fair	Celeron-266, 32MB of SDRAM, 6GB hard drive, 2X DVD-ROM drive, 56-kbps modem, 17-inch monitor, Zip drive.	629
Budget scorecard weightings	Performance 15 percent	Price 30 percent	R/S 40 percent	Setup 5 percent	Features 10 percent	All products: 903

WorldBench score that's 36 points behind the top dog Dell, this \$2299 PC is still very zippy. It comes with all the makings of a great home-office PC: a 6GB hard disk, a big 19-inch monitor, and a DVD drive.

New at number five is the other Pentium II-400 powerhouse, NEC's Ready 9890. Its performance blows away every home system but Dell's Dimension XPS R400. Like Quantex's QP6/333 SM-4x SE, the 9890 is well suited for the busy home office—but at \$2848, it costs almost \$550 more.

BUDGET SYSTEMS

GATEWAY'S G6-266 takes over the top budget spot this month. Like the discontinued G5-233 it replaces, the G6-266 comes with Canon's BJC-4300 color bubble jet printer. In fact, thanks to a Pentium II CPU, it's twice as fast as its predecessor, and only \$100 more expensive. The G6-266 can take on all kinds of family activities, like games, the Internet, and home

finances. This machine is a great choice for the family or home office on a budget.

Gateway also grabs second place with its G6-300h, which jumps from the power chart to the budget list after a price cut to \$1848. Well suited to the computer-savvy family, the G6-300h is better equipped than the G6-266: It has a 17-inch monitor, a 5GB hard drive, and fast performance—plus many great family and kids' software titles.

Holding on at number three is Hewlett-Packard's Pavilion 3260. This Pentium MMX-200 is no speed burner, but it has plenty of power for homework assignments, Net surfing, and family finances. At \$1148, this user-friendly PC is the computer for novices on a shoestring budget.

If your home office is growing but your money is tight, Quantex's QP6/266 M-1x, in fourth place, is an option. It has the power to make your demanding apps hum, and it comes with a useful business-oriented software bundle.



Gateway G6-266

The last budget spot this month goes to Micro X's MPD 8010, the only system on the chart based on Intel's Celeron chip. It's not very fast—our PC WorldBench tests put the MPD 8010 more than 20 points behind standard Pentium II-266 machines on the budget list. If you're not hankering to play high-end games or concoct ultralarge databases, however, this system from a relatively new PC maker might be worth checking out. For \$1499, you get a 17-inch monitor, a 6GB hard disk, a Zip drive, a DVD drive, and a respectable software bundle.

—Kirk Steers

Kirk Steers is a contributing editor for PC World. Testing performed by Ulrike Diehlmann of the PC World Test Center. ■

BEYOND THE TOP 10



We evaluated the following system this month also, but it didn't score high enough to make the Top 10 Home PCs power list. For a write-up, see PC World Online (www.pcworld.com/t10homepcs).

◆ Acer Aspire 2870

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Circle 256 on reader service card

TOP 10 PRINTERS

MONOCHROME PERSONAL PRINTER		Month tested	Street price (5/5/98)	Overall rating	Speed for plain text (ppm)	Speed for full-page graphics (ppm)	Comments	Reader service number
1	 Minolta PageWorks 6L 888/264-6658 www.minoltaprinters.com	Dec 97	\$299	83	5.2	3.2	 FEATURES: Laser, rated 6 ppm. Standard 256KB of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. SUMMARY: Low price, fast printing, and compact, sturdy design make it stand out among monochrome lasers, though documentation and gray-scale quality could be better.	630
2	Okidata OkiPage 6e 800/654-3282 www.okidata.com	June 98	\$314	81	5.1	3	 FEATURES: LED, rated 6 ppm. Standard 2MB of RAM, 1200-by-300-dpi maximum resolution, 100 sheets input and output. SUMMARY: Good print quality, strong graphics speed, small footprint, and simple control panel design make up for above-average price tag and unexceptional text speed.	631
3	NEC SuperScript 660plus 800/632-4636 www.nec.com	Dec 97	\$249	80	5.2	3.3	 FEATURES: Laser, rated 6ppm. Standard 256KB of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. SUMMARY: Fastest graphics on the monochrome chart, inexpensive, and quiet, but documentation is inadequate and paper trays are somewhat fragile.	632
4	HP LaserJet 6Lse 800/752-0900 www.hp.com	Dec 97	\$399	79	5.1	2	 FEATURES: Laser, rated 6 ppm. Standard 1MB of RAM, 600-by-600-dpi maximum resolution, 100 sheets input and output. SUMMARY: Strong print quality, design, documentation, and paper handling almost compensate for high price and slow graphics speed (it ties for slowest text speed, too).	633
5	Lexmark Optra E+ 800/539-6275 www.lexmark.com	Feb 98	\$399	79	5.4	1.6	 FEATURES: Laser, rated 6 ppm. Standard 2MB of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. SUMMARY: High price and slowest graphics speed on chart are balanced by good documentation and best print quality on chart.	634
COLOR PERSONAL PRINTER								
1	 Lexmark 5700 Color Jetprinter 800/539-6275 www.lexmark.com	June 98	\$249	81	2.8	0.4	 FEATURES: Ink jet, rated 8 ppm monochrome/4 ppm color. 1200-by-1200-dpi maximum resolution, 100 sheets input, 25 output. SUMMARY: Fine print quality at a good price makes this quiet, easy-to-use printer our top choice, though its weak black ink can leave colors looking a bit flat.	635
2	Epson Stylus Color 800 800/463-7766 www.epson.com	Dec 97	\$299	81	3.8	1.1	 FEATURES: Ink jet, rated 8 ppm monochrome/7 ppm color. 1440-by-720-dpi maximum resolution, 100 sheets input, 30 output. SUMMARY: Yet another \$50 price drop pulls the 800 up one place; a two-year warranty, vivid color, and blazing graphics speed don't hurt either. One complaint: Grays look harsh.	-
3	Canon BJC-4300 800/652-2666 www.ccsi.canon.com	Dec 97	\$179	81	2	0.3	 FEATURES: Ink jet, rated 5 ppm monochrome/2 ppm color. 720-by-360-dpi maximum resolution, 100 sheets input and output. SUMMARY: \$20 off already low price, great documentation, and useful software are offset by torpid text speed and so-so print quality on plain paper (output looks better on ink jet paper).	636
4	Epson Stylus Photo 700 800/463-7766 www.epson.com	NEW	\$279	80	1.4	0.5	 FEATURES: Ink jet, unrated. 1440-by-720-dpi maximum resolution, 100 sheets input, 30 output. SUMMARY: Lovely print quality, especially with photographs on ink jet stock, but you pay for it in speed—the worst here. The PhotoPC 600 digital camera can be plugged into it directly for easy photo printing.	-
5	HP DeskJet 722C 800/752-0900 www.hp.com	Dec 97	\$299	77	4.1	0.3	 FEATURES: Ink jet, rated 5 ppm monochrome/1.5 ppm color. 600-by-600-dpi maximum resolution, 100 sheets input, 50 output. SUMMARY: Good printing on plain paper and impressive text speed keep this printer on the chart, despite disorganized documentation and lack of toll-free tech support.	637
 Best Buy		 Windows 95-certified Plug and Play		All products: 904				



HOW WE TEST The overall rating for both monochrome and color personal 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 is based on tests that are designed and conducted by the PC World Test Center. All rights reserved.



IT'S OPEN SEASON on home digital photography, as printer makers clamor to claim "photo quality." By offering photo-oriented printers, cameras, papers, and software, companies such as

Hewlett-Packard and Epson strive to be the Kodak of printing. HP even slaps a Kodak label on its new 2000Cse, which we tested. We liked the model's print quality, speed, and networkability, but not its \$799 price. Epson's \$279 Stylus Photo 700, also ▶

photo-friendly, was the only new printer to make this month's chart. This ink jet produces lovely photos on ink jet paper—and unlike the others, it can print directly from a digital camera. Two other new color models, Epson's Stylus Color 850 and Okidata's Okijet 2020, didn't land on the chart (neither is photo-oriented).

The monochrome market remains calm, except that NEC is pulling its SuperScript 860 (number three in June); we'll test the successor unit in October. This month, NEC's cheap SuperScript 660plus rises to third place, and Lexmark's venerable Optra E+ returns to the chart in fifth.

EPSON'S PHOTO STRATEGY

THE STYLUS PHOTO 700 is one part of Epson's digital photo strategy; others include the \$499 PhotoPC 600 digital camera, which plugs right into the printer, and a \$99 Direct Print Kit that lets you connect them. This setup produced good results in our informal tests, but the prints are available only at 4 by 6 inches.

Even without a camera, the \$279 Stylus Photo 700 shines. Its six-color ink technology yields attractive color images and fairly crisp text, especially on ink jet paper. Color and text are duller on regular paper, as with most ink jets. The 700's weak spot is speed: At about one-and-a-half pages per minute on text and half a page per minute on graphics, it's much slower than most color personal printers.

Epson sells various media for the Stylus Photo 700, including glossy paper that enhances photos. Papers range from 4 by 6 inches for snapshots (\$6.54 for 20) to 8.3-by-22.5-inch banners (\$16.57 for 10). And the printer includes shutterbug software such as Adobe's PhotoDeluxe and a program for creating panoramics.

HP'S INK JET WORKHORSE

WITH ITS HIGH SPEEDS and networkability, HP's \$799 2000Cse breaks with ink jet tradition. It's one of a few ink jets that feature superb print quality, blazing speed—and higher prices. (The Epson Stylus Color 1520, number one on our color workgroup chart in July, is another.)

Is the 2000Cse worth \$799? Not for most users who aren't on a network—that's why it's not on our chart. But on merit alone it's terrific, and outrageously fast—its 5.6 ppm text speed beats even the lasers, and its 1.0 ppm graphics speed is twice that of all but one other ink jet (Epson's Stylus Color 800). Best of all, its text and graphics look great on plain paper, and breathtaking on ink jet stock.

Your \$799 also gets you individual ink tanks and print heads, so you can replace each color separately, and 2MB of memory (almost eight times that of most ink jets) to handle complex jobs such as large graphics. Finally, the 2000Cse accepts an optional 250-sheet paper tray—unusual for an ink jet—that sells for \$199.



GOOD PRINT QUALITY, paper choices, and price land the \$279 Epson Stylus Photo 700 at number four on our color chart.

The 2000Cse isn't perfect. Its mediocre software bundle is dominated by propaganda and other detritus such as document templates. The printed manual is short, with no table of contents or index, while the CD-ROM has too few illustrations. And for its high price, the support is weak: one-year warranty, no toll-free calls, and no on-site service. (For more on the 2000Cse, see July *New Products*.)

NEW PRINTERS TO AVOID

THE EPSON NAME is usually synonymous with good ink jets, but the company stumbles with the Stylus Color 850. At \$379, the 850 costs \$80 more than the established Stylus Color 800. Though positioned as a faster, networkable version of the 800, the 850 was no quicker in our tests and produced inferior prints: Blobs crop up in text, ink fades in places, and narrow lines seem to quiver. The 850's color looks okay on ink jet paper, but on plain paper it's gritty and washed out. The 800, which jumps to number two after a \$50 price drop, is a better choice.

We also don't recommend the other new printer we tested this month. Okidata is trying to launch itself into the cut-throat ink jet market with the \$199 Okijet 2020, but this printer doesn't live up to the company's good, inexpensive monochrome lasers. The 2020, at less than a page per minute on text and a fifth of a page per minute on graphics, is the slowest printer we've seen in ages. To top it off, output quality is wretched, with indistinct text and gritty, supersaturated graphics.

—Dan Littman ■

PRINT QUALITY SAMPLES

Print Quality May Depend on Paper



EPSON STYLUS PHOTO 700

On ink jet paper (above), our new number four yields slightly fuzzy text but smooth grays and sharp, realistic color—nearly the opposite of our Best Buy.

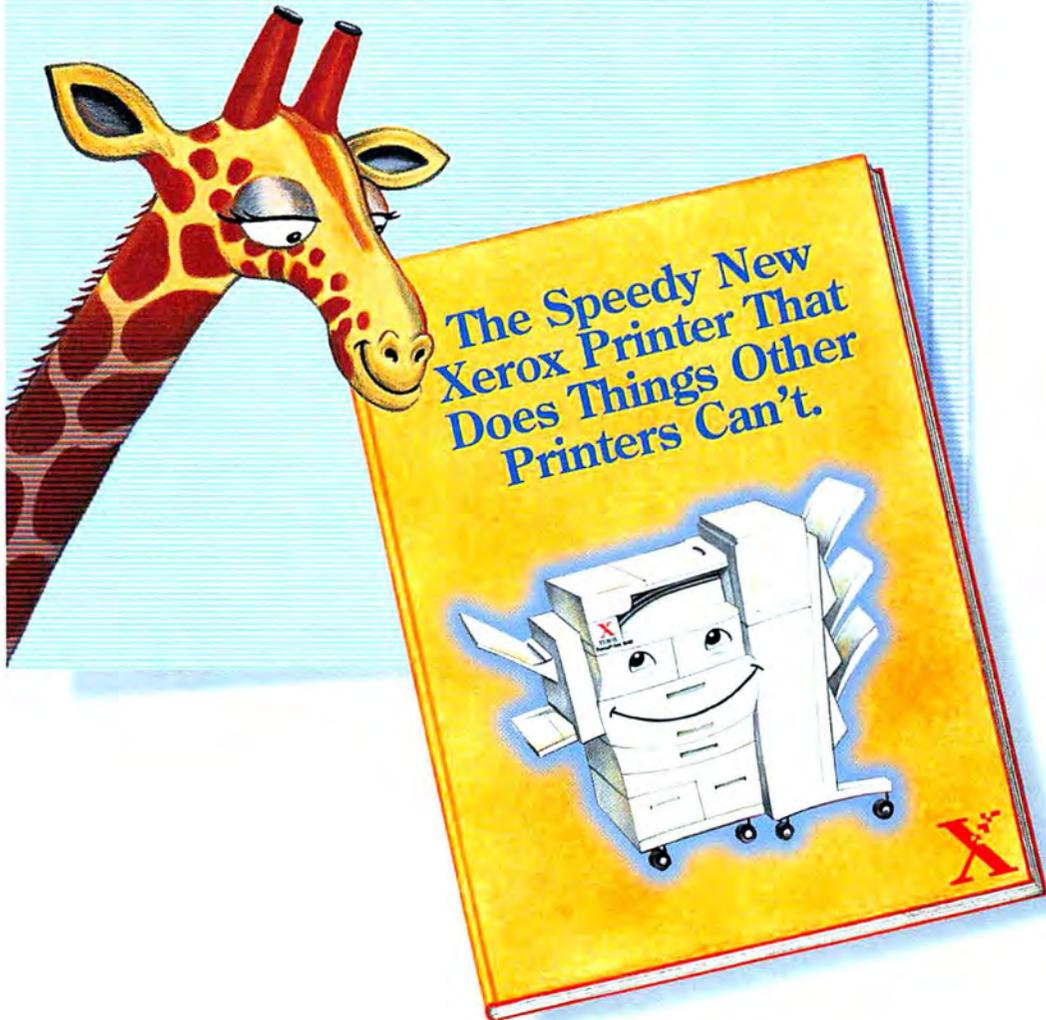
HP 2000CSE

Terrific print quality, even on plain paper (above), is a hallmark of the costly 2000Cse. Text is easy to read, and gray-scale and color images are detailed.

MINOLTA PAGERWORKS 6L

You'll have no trouble reading text printed with this compact, reasonably priced laser, though its gray-scale graphics are a bit darker than we prefer.

The following
breakthrough in
network printing
is no tall tale.

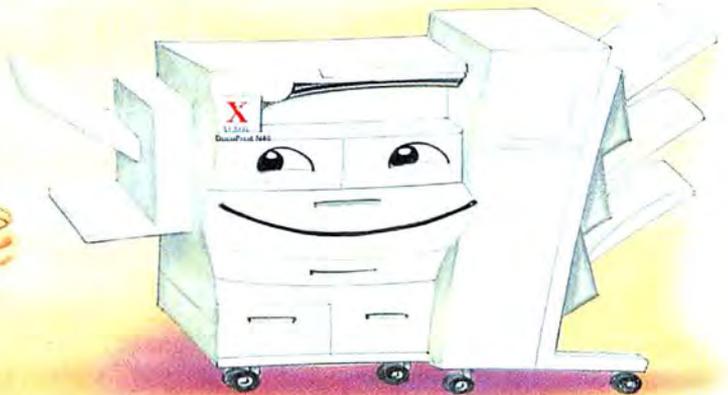


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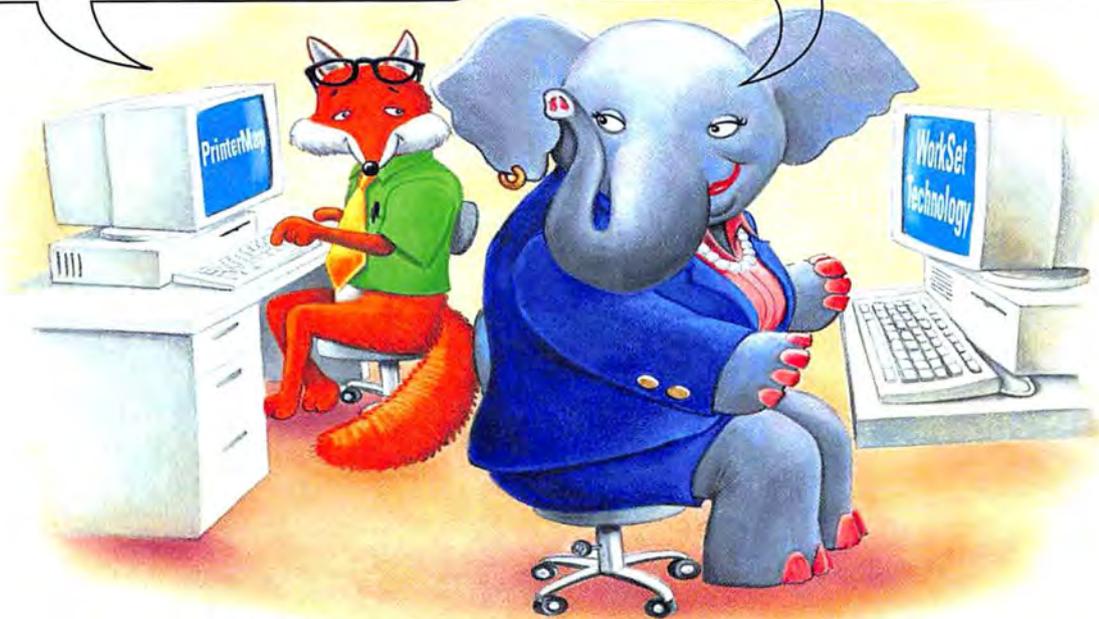
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N32

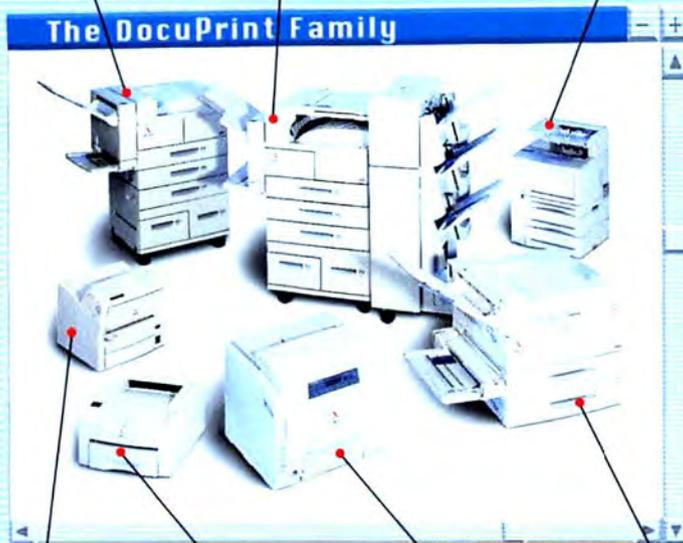
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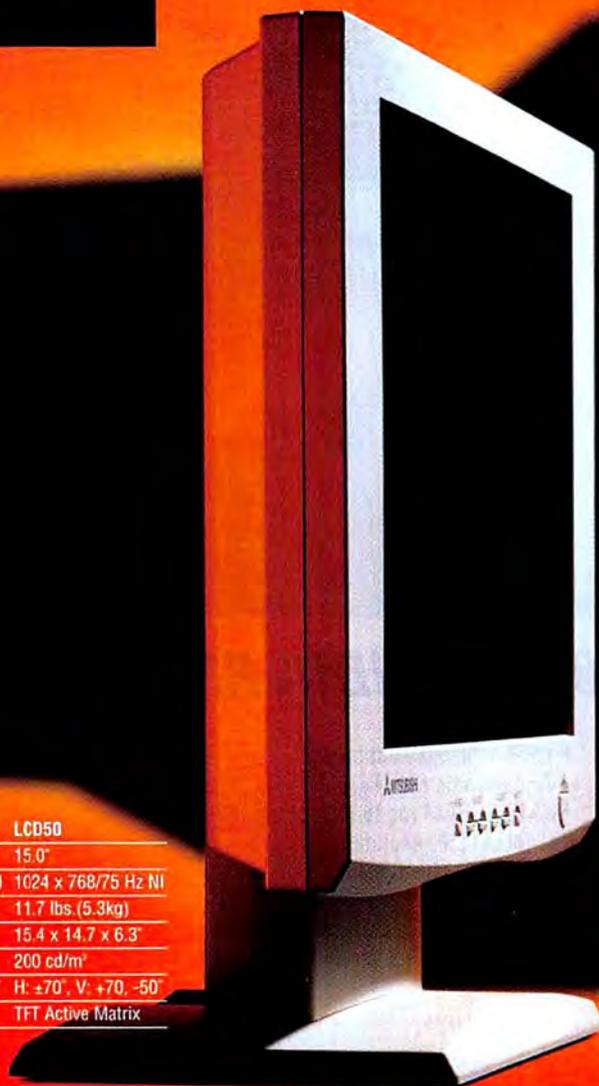
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Mitsubishi LCDs	LCD40	LCD50
Viewable size	14.0"	15.0"
Max Resolution	1024 x 768/75 Hz NI	1024 x 768/75 Hz NI
Weight	9.9 lbs (4.5kg)	11.7 lbs (5.3kg)
Dimensions (H,W,D)	14.7 x 14.0 x 6.3"	15.4 x 14.7 x 6.3"
Brightness	180 cd/m ²	200 cd/m ²
Viewing Angle	H: ±70°, V: +60, -50°	H: ±70°, V: +70, -50°
LCD Type	TFT Active Matrix	TFT Active Matrix



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Circle 200 on reader service card

TOP 10 MONITORS

	19-INCH MONITOR	Month tested	Street price (5/15/98)	Overall rating	Quality of text/graphics	Comments	Reader service number
1	 Iiyama VisionMaster 450 800/394-4335 www.iiyama.com	Apr 98	\$799	85	excellent/ very good	FEATURES: 17.6-inch viewable area, .26mm dot pitch tube, up to 94-Hz refresh rate, Plug and Play ready, ² three-year warranty, 12-hour weekday toll-free support. SUMMARY: \$100 price cut keeps unit with vivid graphics and razor-sharp text our number one Best Buy. On-screen controls lack numeric values for adjustment gauges.	611
2	 Cornerstone Color 45/101sf 800/562-2552 www.corimage.com	Apr 98	\$930	83	very good/ excellent	FEATURES: 17.6-inch viewable area, .26mm dot pitch tube, up to 94-Hz refresh rate, Plug and Play ready, ² three-year warranty, 11.5-hour weekday toll-free support. SUMMARY: Still pricey after a \$114 price cut, but superior graphics help Cornerstone keep second-place Best Buy. One complaint: It doesn't save settings automatically.	612
3	Hitachi SuperScan Elite 751 800/441-4832 www.nsa-hitachi.com	Apr 98	\$799	83	very good/ very good	FEATURES: 17.7-inch viewable area, .26mm dot pitch tube, up to 85-Hz refresh rate, Plug and Play ready, ² three-year warranty, 8-hour weekday toll-free support. SUMMARY: Another price cut—\$170—nudges monitor with fine picture up a notch. But you have to save control settings manually, and support hours tie for shortest.	613
4	NEC MultiSync E900 800/632-4636 www.nec.com	NEW	\$899	82	very good/ excellent	FEATURES: 17.7-inch viewable area, .26mm dot pitch tube, up to 85-Hz refresh rate, Plug and Play ready, ² three-year warranty, 12.5-hour weekday toll-free support. SUMMARY: Eye-catching colors and fine text almost match those of the Cornerstone, though this NEC's a bit pricey, and submenu controls take some time to master.	614
5	Hewlett-Packard M-900 800/752-0900 www.csp.com	Apr 98	\$841	82	very good/ very good	FEATURES: 17.7-inch viewable area, .26mm dot pitch tube, up to 89-Hz refresh rate, Plug and Play ready, ² TCO'95 compliant, three-year warranty, 11-hour weekday toll-free support. SUMMARY: Slightly better models edge fine performer down two places despite \$117 price cut; it doesn't save adjustments automatically.	615
6	ADI MicroScan 6P 800/228-0530 www.adiusa.com	NEW	\$649	80	very good/ very good	FEATURES: 17.9-inch viewable area, .26mm dot pitch tube, up to 85-Hz refresh rate, Plug and Play ready, ² TCO'95 compliant, three-and-a-half-year warranty, 9-hour weekday toll-free support. SUMMARY: Elegant design complements crisp text and graphics, but you must press Save and Exit before settings take effect.	616
7	Philips Brilliance 109 800/835-3506 www.philipsmonitors.com	Apr 98	\$829	80	very good/ good	FEATURES: 17.7-inch viewable area, .26mm dot pitch tube, up to 89-Hz refresh rate, Plug and Play ready, ² TCO'95 compliant, three-year warranty, 15-hour daily toll-free support. SUMMARY: Small fonts look sharp, and tech support has been increased by 5 hours, but middling image quality and high price mar this model's ranking.	617
8	Dell 1200 HS 800/289-3355 www.dell.com	Apr 98	\$729	79	good/ very good	FEATURES: 17.6-inch viewable area, .26mm dot pitch tube, up to 88-Hz refresh rate, Plug and Play ready, ² TCO'92 compliant, one-year warranty, 24-hour toll-free support. SUMMARY: Price drops \$195 on unit with great color and well-integrated controls, but so-so text quality and a skimpy warranty weaken its overall placement.	618
9	AcerView 99c 800/379-2237 www.acerperipherals.com	NEW	\$699	77	very good/ very good	FEATURES: 18-inch viewable area, .26mm dot pitch tube, up to 88-Hz refresh rate, Plug and Play ready, ² three-year warranty, 24-hour toll-free support. SUMMARY: An appealing price (the second lowest here) and a large viewable area put the 99c on the chart despite clunky on-screen controls and just a year of toll-free support.	619
10	Eizo Nanao FlexScan FX-D7 800/800-5202 www.eizo.com	NEW	\$999	77	very good/ good	FEATURES: 17.7-inch viewable area, .26mm dot pitch tube, up to 89-Hz refresh rate, Plug and Play ready, ² TCO'95 compliant, three-year warranty, 8-hour weekday toll-free support. SUMMARY: Fine features like advanced controls and USB hub help this unit make the chart, but it's the most expensive, and image quality falls short.	620



Best Buy

For review of products that didn't make the chart, visit www.pcworld.com/t10monitors.

All products: 902



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 (25 percent each), features and ease of use (25 percent), price (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

¹Highest refresh rate at 1280 by 1024 resolution. ²Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play.



BIG PRICE CUTS helped our two Best Buys stand their ground against the challenges from new arrivals. Of the new monitors we tested, NEC's E900 made the best showing, landing in

fourth place. It has great overall picture quality, but at \$899 it's one of the most expensive on the chart. In last place, Eizo Nanao's FlexScan has high-end controls and an integrated USB hub—but at \$999, it costs more than any other monitor on the chart. ■

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Common features listed above plus:

- 128MB 100MHz SDRAM
- 16.8GB Ultra ATA Hard Drive (9.5ms)
- 1600HS 21" (19.8" vis., .26dp, 1600 x 1200 max. res.) Trinitron® Monitor
- Diamond Permedia 2 8MB 3D AGP Video Card
- 40X Max™ Variable CD-ROM Drive
- Turtle Beach Montego A3D 64 Voice PCI Sound Card
- ACS-295 Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive

\$3499

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NEW DELL DIMENSION XPS R400 400MHz PENTIUM II PROCESSOR

Common features listed above plus:

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- NEW 11.5GB Ultra ATA Hard Drive (9ms)
- 1200HS 19" (17.9" vis., .26dp) Monitor
- ATI Xpert 98D 8MB 3D AGP Video Card
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- Turtle Beach Montego A3D 64 Voice PCI Sound Card
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- 1000HS 17" (16.0" vis., .26dp) Trinitron Monitor
- Diamond Permedia 2 8MB 3D AGP Video Card
- 40X Max™ Variable CD-ROM Drive
- 56K Capable™ U.S.R. x2 WinModem

★ Upgrade to 128MB 100MHz SDRAM, add \$70.
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Common features listed above plus:

- 96MB 100MHz SDRAM
- 8.4GB Ultra ATA Hard Drive (9.5ms)
- 1000HS 17" (16.0" vis., .26dp) Trinitron Monitor
- ATI Xpert 98D 8MB 3D AGP Video Card
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- NEW 6.4GB Ultra ATA Hard Drive
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- 56K Capable™ Gold Card Global Modem
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- 6.9 Pounds*

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July 1998 VisionMaster 450 \$699 ESP



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The VisionMaster 450 is unsurpassed for clarity, durability, uncompromising performance, exceptionally low emissions and unparalleled value. As the first monitor manufacturer to offer a full three-year warranty, iiyama clearly illustrates its commitment to consistently high

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CRT monitor Model/ Viewable Area	TCO	Dot Pitch/ CRT Type	Max. Horizontal Scan Rate	Max. Resolution	Est. Street Price
21" VisionMaster Pro 502 (19.5" VIS)	TCO '95	0.28mm/AG	110kHz	1800 x 1440 @ 74hz	\$1,059
VisionMaster Pro 501 (19.5" VIS)	TCO '95	0.28mm/AG	96kHz	1600 x 1200 @ 75hz	\$999
VisionMaster 502 (19.5" VIS)	TCO '95	0.27mm/dp	110kHz	1800 x 1440 @ 74hz	\$1,059
VisionMaster 501 (19.5" VIS)	TCO '95	0.27mm/dp	96kHz	1600 x 1200 @ 75hz	\$999
19" VisionMaster 450 (18.0" VIS)	TCO '95	0.26mm/dp	102kHz	1600 x 1200 @ 80hz	\$699
17" VisionMaster Pro 400 (16.0" VIS)	TCO '95	0.25mm/AG	96kHz	1600 x 1200 @ 75hz	\$529
VisionMaster 400 (16.0" VIS)	TCO '95	0.26mm/dp	96kHz	1600 x 1200 @ 75hz	\$489
15" VisionMaster 350 (13.7" VIS)	MPR-II	0.28mm/dp	69kHz	1280 x 1024 @ 65hz	\$248



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January 6, 1998
VisionMaster Pro 17



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May 1998
VisionMaster 450



Perfect Five-Star Rating
January 1998
VisionMaster 450
VisionMaster Pro 500



Perfect Five-Star Rating
November 1997
VisionMaster Pro 17



Performance & Technical Excellence
March 1997
VisionMaster Pro 21



Six Time Winner
Jan 1997, Feb 1997, March 1997,
April 1997, May 1997, June 1997
VisionMaster Pro 21



October 7, 1997
VisionMaster Pro 17



March 1997
VisionMaster Pro 21



Seven Time Winner
July 1996, Jan 1997, March 1997,
July 1997, Sept 1997, Jan 1998, May 1998
VisionMaster Pro 17
April 1998
VisionMaster 450

Circle 108 on reader service card

TOP 10 GRAPHICS BOARDS

	PCI BOARD	Month tested	Street price (6/1/98)	Overall rating	Mixed-media business rating	3D rating	Features rating	Comments	Reader service number
1	 Real3D StarFighter PCI 905/882-2600 www.atitech.com	NEW	\$290	85	average	excellent	average	FEATURES: 24MB of SGRAM (includes 16MB of dedicated texture RAM), 220-MHz RAMDAC, Intel-740 chip, bundled 3D game demos and 3D modeling program. SUMMARY: Terrific 3D and adequate business performance make this card a winner.	722
2	STB Velocity 128 800/234-4334 www.stb.com	retested this month	\$129	84	average	average	good	FEATURES: 4MB of SGRAM, 230-MHz RAMDAC, NVidia Riva 128 chip, bundled 3D games and 3D modeling program. SUMMARY: Not the top performer in any single area, but a good choice if you want to dabble in a little of everything.	723
3	Diamond Viper V330 800/468-5846 www.diamondmm.com	retested this month	\$120	82	average	good	average	FEATURES: 4MB of SGRAM, 230-MHz RAMDAC, NVidia Riva 128 chip, bundled 3D games and tools for VRML authoring and photo editing. SUMMARY: Couldn't run our PowerPoint test with 3D plug-ins because of a driver bug, but otherwise a good buy.	724
4	Intergraph Intense 3D Voodoo 800/730-2000 www.ingr.com	retested this month	\$200	81	average	excellent	average	FEATURES: 6MB of EDO DRAM (includes 2MB dedicated texture RAM), 220-MHz RAMDAC, Alliance ProMotion chip and 3Dfx Voodoo Rush chip, bundled 3D games. SUMMARY: A winner if you plan to do a lot of gaming, but not as good for the office.	725
5	Hercules Thriller 3D 800/532-0600 www.hercules.com	retested this month	\$99	79	average	excellent	below average	FEATURES: 4MB of SGRAM, 230-MHz RAMDAC, Rendition Verite V2200 chip, no bundled software. SUMMARY: Adequate for standard business use and fast in 3D, but without stronger features and support, it takes last place on the PCI chart.	726
AGP BOARD									
1	 Diamond Stealth II G460 800/468-5846 www.diamondmm.com	NEW	\$130	93	good	excellent	average	FEATURES: 8MB of SDRAM, 203-MHz RAMDAC, Intel740 chip, bundled 3D games, 3D animation and 3D visualization software. SUMMARY: An excellent buy for almost any task, this board is one of the best in all-around performance.	727
2	Real 3D StarFighter AGP 800/532-0600 www.hercules.com	NEW	\$130	92	good	good	average	FEATURES: 8MB of SGRAM, 220-MHz RAMDAC, Intel740 chip, bundled 3D games and 3D modeling program. SUMMARY: If you're a gamer looking for good overall 3D and a new collection of game software, this is a great option.	728
3	STB Velocity 128zx 800/234-4334 www.stb.com	NEW	\$150	90	average	good	good	FEATURES: 8MB of SGRAM, 250-MHz RAMDAC, NVidia Riva 128zx chip, bundled 3D games and VRML creator. SUMMARY: A good overall board if you're willing to take the risk that some games may not look their best.	729
4	Intel Express 3D 800/532-0600 www.hercules.com	NEW	\$119	81	good	good	average	FEATURES: 4MB of SGRAM; 203-MHz RAMDAC; Intel740 chip; bundled 3D games, 3D data visualization tool, and VRML creator. SUMMARY: Powerful overall board, but Intel doesn't get as much out of its own chip as the competition does.	730
5	Hercules Dynamite 3D/GL 800/532-0600 www.hercules.com	NEW	\$109	77	excellent	below average	average	FEATURES: 4MB of SGRAM, 250-MHz RAMDAC, 3DLabs Permedia 2 chip, bundled 3D game, image editor, and modeling program. SUMMARY: Best business performance on chart, but couldn't run some of our games and offers only 1X AGP support.	731



Best Buy

For reviews of products that didn't make the chart, visit www.pcworld.com/t10graphics.

All products: 910



TEST HOW WE TEST We test boards under Windows 95. Business tests include PC WorldBench 98, a PowerPoint test, and a Macromedia Director script. Our 3D score is based on four games, each evaluated on frame rate and image quality. For AGP cards we add a texturing test using Caligari's TrueSpace3. PCI boards were tested in a Micron Millennium Mme with a Pentium MMX-233 and 32MB of RAM. AGP boards were tested in an NEC Direction 333 with a PII-333 and 64MB of RAM. Overall rating is based on performance (PCI 50 percent, AGP 55 percent), features (25 percent), price (PCI 15 percent, AGP 10 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.



WITH NEW TESTS and the addition of AGP boards, this month's chart reveals plenty of shifts. The updated tests put previous Top 10 achievers through new challenges. STB's Velocity 128, which

had a 3D rating of very good in July, earns only an average this month. We've also split the chart: Because AGP is becoming more prevalent, half the chart is now occupied by boards that use this new bus. For more details, see "Whiz-Bang Graphics." ■



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Circle 215 on reader service card

TOP 10 MODEMS

	56-KBPS EXTERNAL MODEM	Month tested	Street price (5/21/98)	Overall rating	V.34 transfers/56-kbps downloads (min:sec per MB)	Comments	Reader service number
1	 3Com U.S. Robotics 56K Faxmodem 800/342-5877 www.3com.com	June 98	\$180	80	2:43/2:54	FEATURES: Supports V.90 and x2, distinctive ring, manual volume control, Caller ID, RapidComm software. SUMMARY: Great 56-kbps speed and a lifetime warranty keep this peppy external modem firmly ensconced in first place, even though it's on the expensive side, has relatively few features, and lacks toll-free support.	653
2	Zoom FaxModem 56Kx 800/631-3116 www.zoomtel.com	June 98	\$139	79	2:35/3:12	FEATURES: Supports K56flex, MNP-10EC error control, distinctive ring, COMit and WinFax Lite software. SUMMARY: Fast 33.6-kbps transfers, long support hours, and a free board-swap upgrade (if necessary) to the V.90 standard help the 56Kx remain high on our list. Still, it's a tad sluggish at 56-kbps downloads.	654
3	Shark Multimedia Leopard XT-56K 800/800-3321 www.sharkmm.com	Feb 98	\$110	78	2:34/3:08	FEATURES: Supports K56flex, distinctive ring, voice mail, speakerphone, VoiceView, ASVD, manual volume control, serial cable, Caller ID, DialTone software. SUMMARY: Inexpensive, full-featured modem performs well at 33.6 kbps, but Shark offers a short warranty and will perform a free V.90 upgrade only through software.	655
4	Diamond Multimedia SupraExpress 56e 800/727-8772 www.diamondmm.com	Oct 97	\$129	78	2:39/3:05	FEATURES: Supports K56flex, V.80 videoconferencing support, serial cable, COMit and FaxTalk software. SUMMARY: Affordably priced modem performed well on our 56-kbps tests and is backed by long support hours (including Saturday), but a V.90 upgrade is free only if it can be performed through software.	656
5	Boca External 56K Tidalwave Modem 561/241-8088 www.bocaresearch.com	retested this month	\$129	78	2:32/3:09	FEATURES: Supports V.90 and K56flex, V.80, distinctive ring, voice mail, speakerphone, Caller ID, QuickLink Message Center software. SUMMARY: Retested with updated firmware, the Tidalwave garners fifth place thanks to fast performance and improved support, which now includes weekends. But calls are still on your dime.	657
6	Archtek SmartLink 5634TS 888/912-9800 www.archtek.com	NEW	\$109	77	2:38/3:17	FEATURES: Supports V.90 and x2, MNP-10EC, V.80, distinctive ring, voice mail, speakerphone, VoiceView, ASVD, Caller ID, serial cable, QuickLink Message Center software. SUMMARY: Cheapest modem on chart has voice features and a serial cable, but it lags at 56 kbps. Its K56flex-based sibling, the 5634RS, is also a good buy.	658
7	E-Tech Cyber Bullet E56RVP 888/609-8885 www.e-tech.com	Apr 98	\$129	77	2:42/3:13	FEATURES: Supports K56flex, V.80, distinctive ring, voice mail, speakerphone, ASVD, serial cable, earphones, SuperVoice software. SUMMARY: Several positives—a \$20 price cut, plenty of features, and toll-free tech support—are offset by subpar documentation and slightly sluggish performance on 33.6-kbps transfers.	659
56-KBPS PC CARD MODEM							
1	 IBM 56K Cellular-capable PC Card Modem 800/772-2227 www.ibm.com/pc/us	June 98	\$249	81	2:27/2:55	FEATURES: Supports x2, V.80, cellular connectivity, Caller ID, digital line voltage protection, RingCentral software. SUMMARY: This cellular-equipped PC Card modem delivers outstanding performance and is backed by round-the-clock toll-free support, two factors that outweigh its high price.	-
2	TDK Global Freedom 5660 800/999-4835 www.tdksystems.com	NEW	\$229	80	2:34/3:10	FEATURES: Supports K56flex, MNP-10EC, distinctive ring, voice mail, Caller ID, digital line voltage protection, QuickLink Message Center software. SUMMARY: Voice features and speedy 33.6-kbps transfers make up for a software-only free-V.90-upgrade policy. TDK's similar CyberExpress 5600 is another good option.	660
3	3Com Megahertz 56K Cellular-Capable PC Card Modem 800/638-3266 www.3com.com	NEW	\$269	79	2:41/3:07	FEATURES: Supports x2, cellular connectivity, voice mail, speakerphone, Caller ID, digital line voltage protection, RapidComm software. SUMMARY: Most expensive modem on chart comes with voice features and a long warranty, but it's not among the speediest at either 33.6-kbps transfers or 56-kbps downloads.	661
 Best Buy		 For reviews of products that didn't make the chart, visit www.pcworld.com/t10modems .					All products: 905

TEST **PC WORLD CENTER** **HOW WE TEST** We test V.34 (limited to 33.6 kbps) modem-to-modem performance using two identical modems on a Telecomm Analysis Systems simulated phone network. It sends a text file over 55 line conditions, and a mix of four files—graphics, text, program, and compressed files—over one line condition. For our x2 or K56flex tests, we call a local Internet service provider and transfer .jpg, .doc, and .zip files continuously for 18 hours. TAS transfers are faster than ISP downloads because files used in the latter are less compressible. Results for the two tests are not comparable. We currently do not test 56-kbps V.90 modem performance due to lack of ISP support. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.



3COM AGAIN leads the external modem pack this month with its U.S. Robotics 56K Faxmodem. Boca's speedy 56K Tidalwave and Archtek's new SmartLink 5634TS join the party thanks to afford-

able prices and extra features. On the PC Card front, IBM's 56K Cellular-capable PC Card modem continues to be our Best Buy as a result of lightning-fast speed and excellent support, while voice-equipped models from TDK and 3Com make strong debuts. ■

This Notebook Gets Better With Age?

Now What Kind Of Company Could Pull That Off?

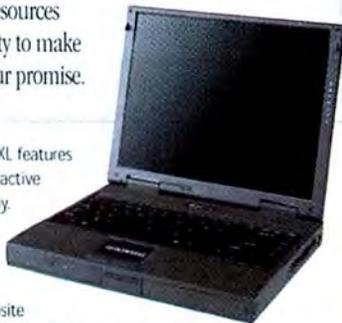
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A notebook that gets better with age? It's simple, really. The Vivanté SE from Transmonde was designed from the start to take advantage of the modular, upgradeable Intel® Mobile Module. And that means that we can easily upgrade your notebook when tomorrow's faster processors are introduced.

The result? Your state-of-the-art notebook stays exactly that.

THE RESOURCES TO ENSURE WE'LL BE THERE TO SUPPORT YOU.

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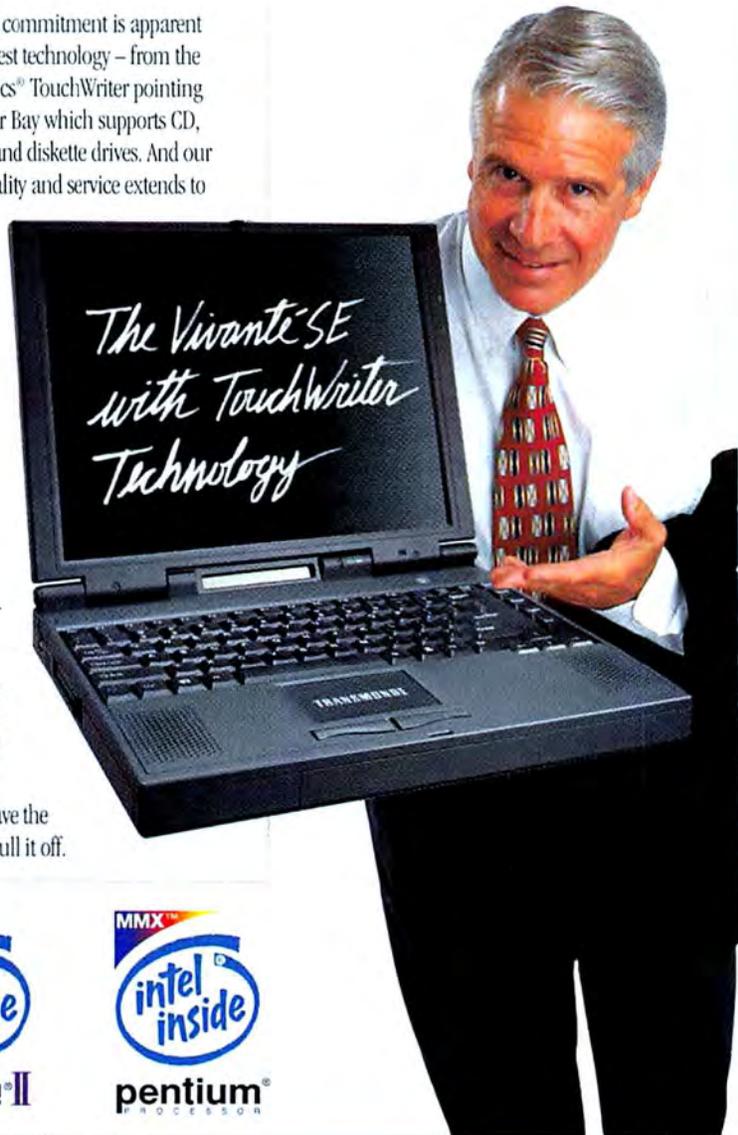


The Vivanté XL features a 14.1" XGA active matrix display.

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- Upgradeable to future Intel Processors
- 512KB Pipelined Burst Cache
- Synaptics® TouchWriter™ Pointing/Writing Device
- Modular Bay supporting Diskette Drive, LS-120, CD-ROM, Zip,™ DVD-ROM
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- 13.3" XGA TFT Display
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- Removable 4.1GB Ultra DMA Hard Drive
- 56Kbps PC Card Modem²

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Business Lease
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Vivanté SE 233

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- Removable 3.2GB Ultra DMA Hard Drive
- 56Kbps PC Card Modem

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Circle 242 on reader service card.

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Driving a Hard Bargain

Can auto Web sites help you find a great deal? Or are they just another bum steer? ♦ BY ANGELA NAVARRETE



THEY SAY YOU CAN TELL a lot about a person by the kind of car they drive. If this is true, I'm in a lot of trouble. My tiny 1992 VW Fox, when I bought it, said that I was a practical person who valued function over form. Now it says that I'm the kind of person who's late to work a lot. This fuse box on wheels shudders, wheezes, drifts to the left, and emits a high-pitched whine whenever I hit 15 miles per hour.

I finally admitted that it was time to get a car that captured the real me: stylish, sporty, practical-yet-cutting-edge—and late to work a lot. But as anyone who's survived the trauma of car shopping knows, checking out

cars, lining up financing, and choosing a dealer are only slightly less painful than enduring a root canal without anesthesia.

So what's a woman with very little time, a low tolerance for car salespeople, and a lust for the new 1998 Honda CR-Vs to do? Cruise the Web, of course. Auto sites promise to help you find local dealers and get price quotes with minimal haggling; they also provide helpful info like safety records, blue book values, and buying tips. I hoped that the Web could help me swing a deal on a new set of wheels. And if the new-car gods weren't smiling on me, I'd settle for a used Honda Civic. So with high hopes and four-wheel dreams, I took five auto sites for a test drive.

DEALER'S CHOICE

I STARTED AT Microsoft's **CarPoint**, a well-organized, easy-to-use site with lots of information on new cars. After downloading a plug-in, I was even treated to a "surround video" of my dream car, which I must confess wasn't nearly as satisfying as plunking down in a bucket seat and taking in that new-car smell.

When it came to actually buying a car, however, CarPoint stalled. I entered my zip code and was given a choice of two local Honda dealers (CarPoint's network has more than 2000 dealers nationwide). I picked one, typed in the options I wanted, and hit the send button. I could almost feel the steering wheel in my hands. A few hours later, I got an e-mail from the dealer, telling me they didn't have the car in stock. So far, I was unimpressed.

Undaunted, I sent a request to the second dealer, who phoned the next day. When I pressed him for a quote over the phone (that's what this is all about, right?), he said that the asking price was \$23,000, but he could offer the car to me for \$21,545. For him to go lower, I'd have to walk into the dealership, checkbook in hand. I reminded him that I knew the ▶

dealer invoice price for the EX model with a manual transmission was \$18,375, and that I wouldn't pay more than 5 percent over invoice (about \$19,300). Ten minutes later he called back and offered to sell me the car for my price. So I got the deal I wanted, but it certainly wasn't haggle-free.

Since I didn't want to give that guy a commission, I decided to check out CarPoint's Used Car Classifieds. After down-

freely I volunteered personal (not to mention financial) data. I get leery when an overeager salesperson leans on me for information, but when a computer asks, I might as well have taken truth serum.

I never heard from the dealer, but I did receive a follow-up from AutoWeb.com, which promised to resubmit my request. In the meantime I sent a query to one of the other dealers. Within 24 hours, I got

a quote of \$19,900 for an EX model with automatic transmission, a mere 4 percent over the invoice price of \$19,100. If I hadn't been so dedicated to my research, I might have whipped out my wallet then and there. But duty called, so I kept surfing.

Unlike CarPoint's, AutoWeb's used car area lets you search by dealer or by car. Once I found a car, it was easy to get its specs and e-mail the dealer for more details. The site also carries ads

from private parties (another feature CarPoint lacks). AutoWeb offers financing, insurance through State Farm, and an AAA-like Roadside Rescue program (basic membership \$19.95) that you can join whether or not you use the site to buy a car.

EASY RIDER

FROM THE MOMENT I pulled into the Auto-By-Tel page, I knew I was in for a smooth ride. The interface was more streamlined than the others, with more links to other useful sites like IntelliChoice, Edmund's (a well-known Net resource), AutoSite, and Kelley Blue Book. And the site offers pricing and specifications on just about every new car out there, in addition to the requisite dealership referral service.

An hour after I sent my purchase request, I was pleasantly surprised to receive an e-mail from a local dealer who had an LX model in stock and gave me a quote of \$18,744. At 7 percent of the dealer invoice, the markup was higher than what the other sites had turned up, but the quote was still below the suggested retail price.

Auto-By-Tel

Grade: **B**; www.autobytel.com

AutoConnect

Beta site—not graded; www.autoconnect.com

AutoWeb.com

Grade: **B+**; www.autoweb.com

Consumers Car Club

Grade: **A**; www.carclub.com

Microsoft CarPoint

Grade: **C+**; www.carpoint.com

I realized I hadn't thought about how I was going to actually pay for a new car. So just for kicks, I applied for financing through Auto-By-Tel, which sent my application to three lending institutions. The next morning, Auto-By-Tel came through with financing from Chase Manhattan bank. It's a good thing I got myself under control—the car was ready, the money was there, and a simple phone call would have had the papers drawn up and sent over. Luckily, I managed to rein myself in and kept looking.

Auto-By-Tel also offers used cars for sale through its member dealerships, and there are plenty of perks you'd never find on your own. Each car listed has passed an inspection and comes with a three-day money-back guarantee and a 3000-mile limited warranty. Try getting that through a newspaper ad.

WEBSITE SERVICE

WHEN I FIRST cruised by Consumers Car Club, I wasn't impressed. It seemed to provide the same information and dealership referrals as the other sites. But when I looked more closely, I discovered several services that set it apart.



NOT QUITE THERE: CarPoint's Web site had lots of great information, but its member dealers weren't up to par.

loading another plug-in and searching for a 1995 Civic, I was rewarded with links to very basic Web pages that listed each dealer's name and address, along with a few details about the car. Apparently, I was supposed to print this out and take it with me to the car lot. I had less information than I'd get from a newspaper ad, with more hassle. For this I need a computer?

AUTOMATIC TRANSMISSION

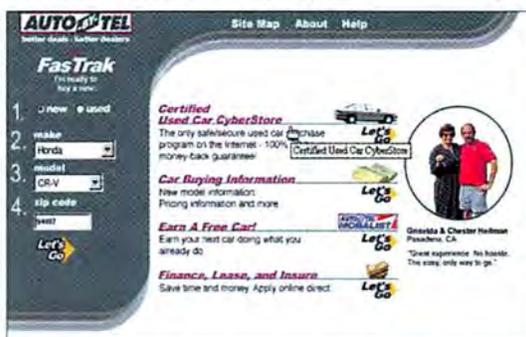
MY NEXT STOP, AutoWeb.com, was even easier to navigate than CarPoint, and offered a broad array of resources. But as with CarPoint, it took me two tries to get results. AutoWeb listed five local dealers, so I picked the closest one and filled out the form. The site also asked about the car I was trading in. I was surprised at how

F Y I



MAYBE TV HAS nothing to fear from the Web after all. Compared to people who aren't online, Americans who have Internet access are actually more likely to subscribe to cable TV or own a satellite dish.

SOURCE: IDC/LINK



EASY ACCESS: Auto-By-Tel didn't return the lowest prices, but it offered lots of useful car-buying resources.

*First we made it easy to use.
Then we made it easy to justify.*

NEW LOW PRICE
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SUGGESTED RETAIL PRICE



SNAPSCAN EZ

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AGFA 
The complete picture.

Circle 11 on reader service card



For example, I could hire a Personal Shopper to do all the work for me. Armed with my choice of car (and \$149), the Car Club rep obtains quotes from three local dealers—who are expected, since they know they're competing, to offer a low price.

The screenshot shows the Consumers Car Club website with a navigation menu on the left (research, purchase, finance, insurance, maintenance, classifieds, links) and a main content area with several service boxes: 'Purchase' (The Consumers' Champion: Buying Power to the People), 'Personal Shopper' (We'll do the legwork and paperwork...), 'Dealer Connect' (The FREE service links you with the Car Club's network of certified dealers), and 'Factory Direct' (It's worth the wait. This way, you order exactly the vehicle you want - model, color, options, you name it.). There are also award logos for 'Consumer's Choice' and 'YAHOO! #1 Rated Car Buying Site'.

AT YOUR SERVICE: Consumers Car Club gets an A for its Personal Shopper service, which offered the best price.

Amazingly, it worked. The very same day, I had an offer on an LX of \$18,920—a mere 3.8 percent over the invoice price of \$18,220. Beyond getting me a great deal, the rep explained and priced options such as aluminum wheels and antilock brakes. Had I accepted the offer, Car Club would have sent me the paperwork, coordinated the financing, secured insurance quotes, registered with the DMV, and even arranged delivery—the whole enchilada. Car Club can even order some cars directly from the manufacturer, bringing the price down further.

Though Car Club's used car classifieds section is somewhat less impressive, it isn't bad. It lists cars sold by private parties and dealers, but the pickings are slim. I searched for any 5-year-old car being sold within 50 miles for an asking price under \$20,000, and found only nine. But Car Club makes up for this with other programs that take a lot of the worry out of buying a used car. For \$89 (less than most mechanics charge) Car Club will send a

mechanic to inspect the car and give you a detailed report, so you know what you're getting into. Another \$12.50 gets you a faxed report on how many owners the car has had, whether it's had water or frame damage, and more. Car Club also offers a

protection coverage package, which is similar to an extended warranty. The price varies with the car's age and mileage, but for a 1995 Honda Civic with 40,000 miles, three years or 45,000 miles of comprehensive protection costs \$781.

By now that great price for the brand-new Honda CR-V was burning a hole in my brain. Then I did the math and real-

ized the payment wouldn't leave me much money for luxuries like, say, food. It would have to be a used car or no wheels at all.

THE NEWEST MODEL

FORTUNATELY, A NEW SITE called **AutoConnect** specializes in used car listings. It's a partnership between Manheim, the world's largest car auction company, and ADP Dealer Services, which provides computer inventory services to more than 18,000 car lots. Any dealership on that ADP network can put inventory online at the click of a button, and the site also features cars sold by private parties. The result? Listings for 500,000-plus used cars, far more than any other site.

Although AutoConnect was not fully operational at press time, the early version looked promising, with the usual buying tips, car specs, and reviews plus a slick search engine that makes it easy to navigate its massive selection. The site will be up and running by the time you read this.

Meanwhile, I'm too broke to buy the machine of my dreams and haven't found a used one I can live with. I guess I'm stuck with the whinemobile for now. But if I ever do get the cash together, I'll know where to look, what to get, and how to drive a good bargain—without ever setting foot on a car lot or getting chomped by some sales shark.

Angela Navarrete is staff editor for PC World.

Cell Phones: You Make the Call

IT TOOK A FLAT tire on the Connecticut Turnpike to convince me: I really do need a car phone. But how do you make sense of the endless array of pricing plans, phones, and features? A new Web site called **Wireless Dimension** (www.wirelessdimension.com) can help. Covering cellular and PCS carriers in 25 major markets, the site helps you choose the best plan for you—whether the phone's for emergencies only or for daily gabfests. If you order service from one of Wireless Dimension's business partners, it collects a finder's fee from the partner—but the site's information is unbiased, clear, and comprehensive.

Paging Doctor Dolittle

COMPUTER CHATTING: it's not just for people anymore. America Online recently hosted a chat session with Koko, the California gorilla who knows 2000 English words and 1000 American Sign Language signs. (Insert your



own joke about the average vocabulary of human online chatters here.) With a zoologist friend interpreting, the lowland gorilla discussed such topics as her pet cat and tastes in TV and food, attracting the sixth-highest turnout in AOL chat history. A thoroughly modern primate, Koko also has a Web site: www.gorilla.org.

The Best Search Site You've Never Tried

SICK OF SEARCH engines that bombard you with thousands of seemingly random links? Try **Ask Jeeves** (www.askjeeves.com), the least intimidating search site on the Web. Type in a question—say, "Who won an Oscar in 1977?"—and you'll get a tidy, point-and-click list of responses that's never overwhelming. Ask Jeeves is less successful with more obscure topics—for example, when I asked for the name of the principal bassoonist in the Boston Symphony Orchestra, it gave a list of classical concerts in Boston, plus information about a movie called *The Principal*. But its low-key, efficient approach is a refreshing alternative to data-overload behemoths like AltaVista. —Harry McCracken

F Y I

DOES SOFTWARE on the honor system work? Yes, mostly. In an Internet poll, almost two-thirds of the respondents had registered a shareware product—but 85 percent admitted to using some shareware without paying up.

SOURCE: SURVEY.NET

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What Price PC Glory? (About \$10K)

I SPENT A DAY helping a buddy upgrade his old clunker into a 333-MHz fire-breather. Big mistake. It made me realize how incredibly slow my ancient 133-MHz Pentium system had become. And how badly I wanted—no, *needed*—something faster. “It’ll help me write a better column,” I said to my wife, Judy, rationalizing like crazy.

I decided to build my dream system from scratch. This was going to be fun: Custom-build a mid-1998, no-limits screamer system; see what it can do; and expense it to *PC World*. Listen, I could think of worse things to do.

Well, hold onto your hats, folks, because I plunked down over \$4600, not including \$6000 for a very pricey custom monitor. Could I have done as well with a stock machine from Dell? Hang on a sec.

WHEN THE CHIPS ARE UP

FIRST ON THE LIST—Intel’s 400-MHz Pentium II processor. The thing’s blazingly fast, leap-frogging the 333-MHz chip by 21 percent. More important, Intel’s breakthrough 100-MHz 440BX chip set moves data 50 percent faster than the old 66-MHz boards. I could manipulate 2MB Photoshop files on the new machine so fast it brought tears to my eyes.

I chose an Intel SE440BX motherboard because of its guaranteed compatibility with the processor. The cost? At press time, roughly \$800 to \$900 for the processor and \$215 for the system board, at street prices. Check Tom’s Hardware Guide (www.tomshardware.com) for a wealth of motherboard info.

I hit one snag: I tried using whatever memory I had lying around. The new BX system board had a hearty laugh—the old memory was far too slow. I needed super-fast, 100-MHz synchronous dynamic



The hard drive tops out at 10,000 rpm and needs a pair of 6-inch bolts to hold it down.

RAM (SDRAM). Luckily, Crucial Technology’s Web site (www.crucial.com) clarified my memory requirements. Two 32MB DIMMs (about \$80 each) did the trick.

My pick for a video card was ATI’s \$322 8MB AGP-bus All-in-Wonder Pro. The card has everything I need: 2D graphics, 3D acceleration (perfect for Quake II), built-in video capturing, a TVTuner, and support for a DVD card.

With all this display power, I couldn’t use anything less than a huge monitor. Besides, I wanted to splurge. So I cajoled NEC into letting me try its \$5999 Multi-Sync LCD2000 monitor. Despite having a 20.1-inch viewable area, the LCD2000 is slim and svelte—8 inches deep and 22 pounds. Don’t worry about the LCD image: It’s stunning. The color is rich and the picture is crisp from any angle.

I needed a DVD drive, and Creative Labs’ \$299 PC-DVD Encore Dxr2 fit the bill. It reads DVD- and CD-ROMs, and its MPEG decoder interface connected seamlessly to the ATI video card. Granted, not many DVD titles are available yet. But the one I tried—Wing Commander IV—jolted me out of my seat it was so realistic.

Images are far sharper than those in regular games, and the DVD movie I rented looked distinctly better than the videotape version.

On the sound front, I matched Creative Labs’ AWE64 Gold card (\$149) with a set of the company’s audiophile-quality MicroWorks speakers (\$250). Quake II’s creatures reverberated in the room with me, and my jazz CDs sounded magnificent, better even than on my home stereo system.

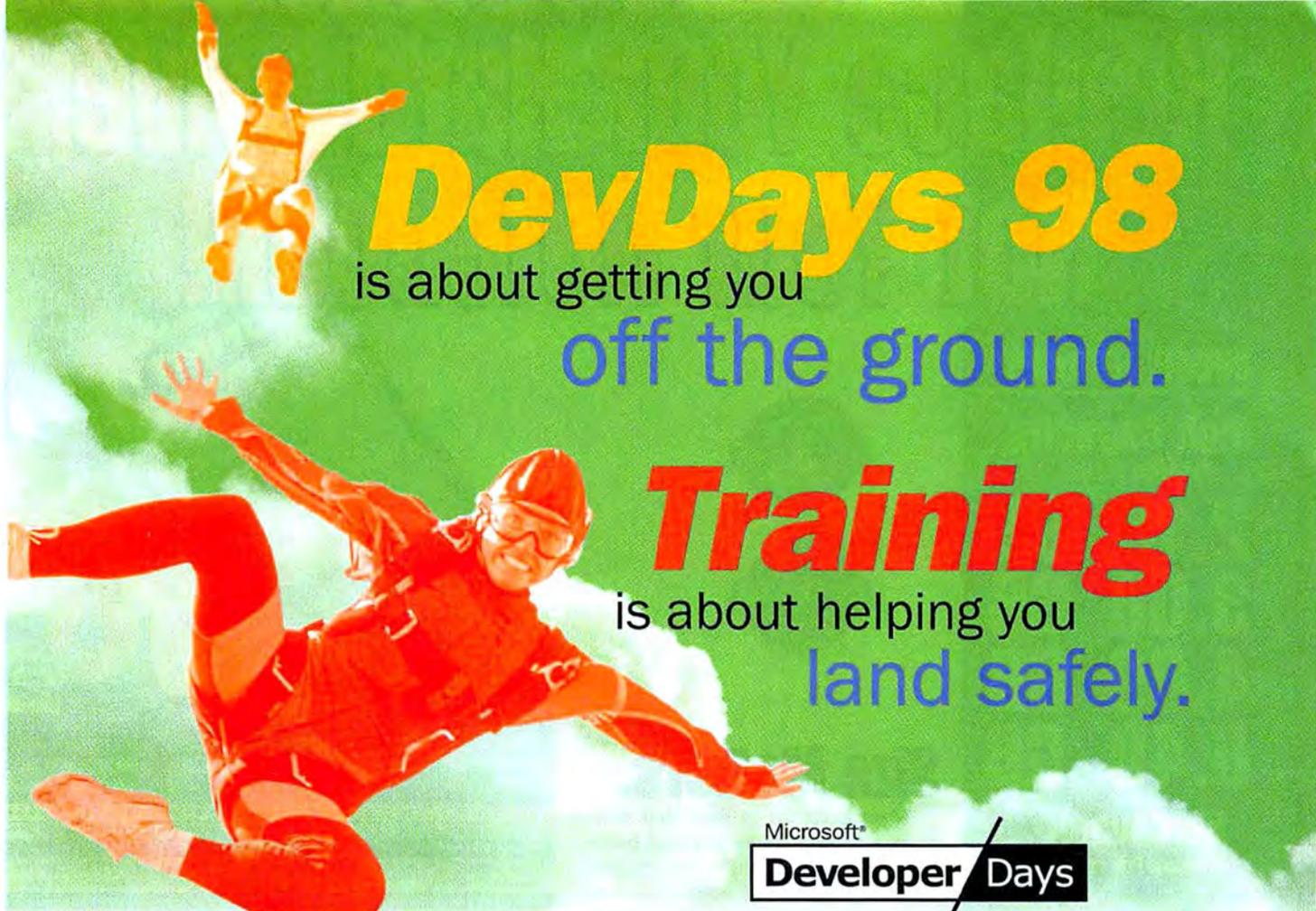
Finally, I needed hard drive space—and a lot of it. Last year I was happy with 4GB, but now I’m cranking out space-hogging audio and video files (maybe an MTV music special: *Bass Unplugged*), so

in went Seagate’s Cheetah ST18202, an 18GB Ultra2 SCSI drive priced at \$1795. Spinning at 10,000 rpm with a brisk 5.7-millisecond seek time, the lightning-fast Cheetah needs a pair of 6-inch bolts to hold it down. I connected the hard drive to Adaptec’s AHA 940U2W SCSI controller, which can transfer data at rates of up to 80MB per second—two to four times the speed of other SCSI controllers.

Okay, it’s a perfect system (too bad I have to send it all back now). But I’ll tell you what: For about \$3700, I could have done just as well—and maybe even better—with a Dell Dimension XPS R400. The Dell comes with more memory, a modem, and a 19-inch monitor. But would I build my own system again? You bet. Even on my own nickel.



Find more information about these products at PC World Online (www.pcworld.com/aug98/home). Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 14 for more information). ■



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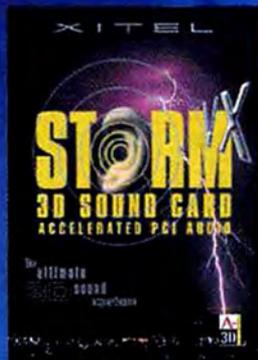
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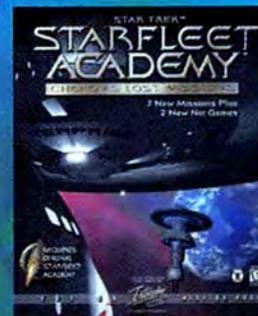
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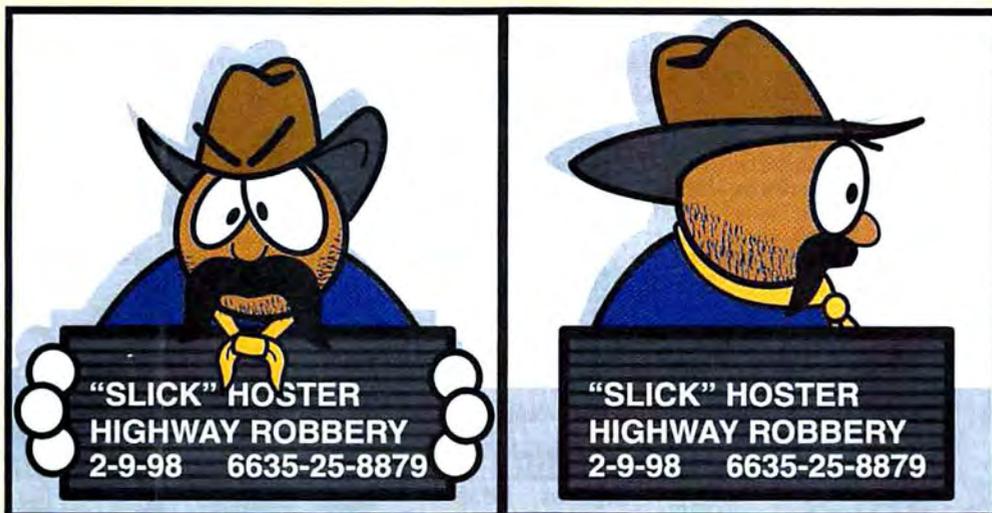
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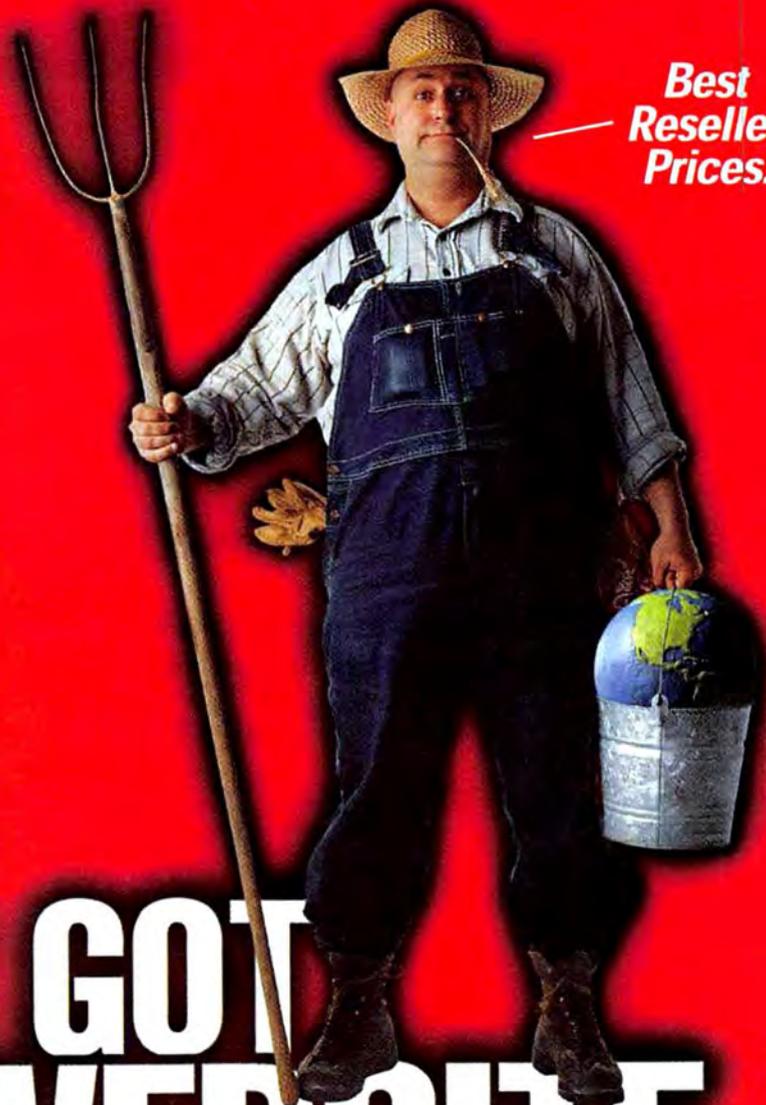
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HERE'S HOW


WINDOWS TIPS

SCOTT DUNN

Windows Explorer Hits the Big Screen

9X INTERNET EXPLORER 4.0 provides you with a bigger view of any Web page by allowing you to expand the browser to fill the entire screen (except for the space the toolbar occupies at the top). To do this in IE 4.0 or Windows 98, choose *View•Full Screen* or click the *Full Screen* button on the toolbar.

But what if you want to do the same thing in plain old Windows Explorer?

You won't find the Full Screen command on the menu or toolbar, but you can still fill your screen with Explorer by using this undocumented keyboard shortcut: Just press <F11>. Press <F11> a second time to restore the window to normal size.

This is a useful way to get the biggest

possible view of Explorer, especially if you're stuck with a low-resolution monitor or you just want to see all three panes (file tree, Web-view preview panel, and file list) on the screen at once (see **FIGURE 1**).

In the latter case, you should set up your multipane view before zooming, because you won't have access to the menu bar in full-screen mode. Choose *View•as Web*

Page to display the preview panel, and choose the Explorer Bar of your choice from the *View•Explorer Bar* submenu. Then press <F11>. In full-screen mode, the Explorer bar slides in and out in front of the preview panel when you move the pointer to the left. If you want to make the Explorer Bar stay in one place, just click the push-pin button.

MANAGE FILES ON THE FLY

9X YOU DON'T HAVE TO depend on Explorer for all your file management tasks. You can do many of them on the fly in most standard Windows 9.x file dialog boxes. Just right-click an object to cut, copy, delete, or rename. Right-click a blank space to paste any cut or copied files and undo almost any file operation, including copy, move, delete, and rename. If you need a new folder, clicking the *Create New Folder* button adds one to the current location. (Why couldn't Microsoft have added that button to every Explorer toolbar?)

In Windows 98, a new button makes short work of another common task: Click the *Show Desktop* button, and you'll jump to the desktop instantly.

One last note: Some of these tricks don't work in Word or Excel, since those programs lack the standard Windows 9.x dialog box. Judging by interface standards, you'd never know Windows and Microsoft Office were made by the same company.

PUT YOUR PROGRAMS ON ANOTHER DRIVE

9X WHEN YOU INSTALL Windows 95, 98, or NT 4.0, Windows installs accessories in its Program Files folder. In addition, many applications attempt to install their folders in the Program Files folder by default. The idea is basically good: Organizing applications hierarchically, rather than letting each of

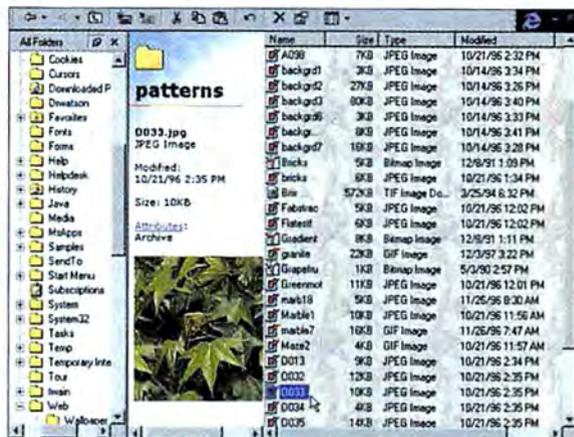


FIGURE 1: SEE MORE OF YOUR FILES with the undocumented <F11> shortcut for blowing up Windows Explorer's window.

them create its own folder in the root directory, makes them easier to find.

Keeping applications in the Program Files folder, apart from data files, also makes backups more efficient. You can make one (occasional) backup of all your applications and separate (daily or weekly) backups of your data files, which change more often than your applications. Separating applications from data files also prevents you from accidentally deleting important data files when you uninstall applications.

But what happens when you start running out of room on your Windows drive? (This occurs commonly as you add applications, particularly since programs typically cram many files into the Windows folder as well as into their own folder.) Fortunately, as Daniel W. Finley of Federal Way, Washington, discovered, you can make most programs install to another default location (for example, `d:\apps\program`) by changing a single key in the Windows Registry.

Before you edit the Registry, back up the following files: `system.dat`, `system.dao`, `user.dat`, and `user.dao`. Then select *Start*•*Run*, type `regedit`, navigate to `hkey_local_machine\software\microsoft\windows\currentversion`, and change the `Program-FilesDir` key to the path you want.

If you want to move existing programs to a new drive, you have two choices: uninstalling and reinstalling, or moving files and editing the Registry and other system files. Either way, it's a lot of work.

To take the first approach, find out where your application's settings and preferences are stored, since you'll lose them when you uninstall. Some applications store settings in an `.ini` file, but this varies greatly among applications. Hint: Search your application folders by date—a file with a much more recent date than the others may include preferences. Back up these files. Your next step is to choose *Start*•*Settings*•*Control Panel* and double-click the *Add/Remove Programs*

icon. Select the application, click *Add/Remove*, and follow the prompts on the screen to run the application's uninstaller. Then reinstall the application to your new drive. Finally, restore any preference files to the corresponding locations on the new drive. Since some applications store their settings in the Registry, you may have to redo some of your preference or customization settings (they were likely eliminated during the uninstall process). But you won't have to do large-scale Registry editing.

MOVE PROGRAMS WITHOUT REINSTALLING THEM



IF YOU WANT TO MOVE a lot of applications to another disk, or if you've lost the original program disks or disc, here's an alternate approach. Be warned that it requires many changes to the Windows Registry and may take an hour or more of steady work. Proceed at your own risk.

Here's what to do: First, back up the following files in your Windows folder: `system.dat`, `system.dao`, `user.dat`, `user.dao`, `win.ini`, and `system.ini`.

Next, decide where you want to place your application files, then drag the Program Files folder (and any other folder holding applications) to the new destination, and rename the folder(s) if you like.

The next step is to get your system to recognize where the applications have gone. Choose *Start*•*Run*, type `regedit`, and press <Enter>. In the Registration Editor,

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choose *Edit*•*Find*. In the 'Find what' box, type `c:\progra` and press <Enter>. If the Find command highlights a string value (indicated by an 'ab' icon), double-click it (or press <Enter>) and edit its Value data to change `C:\Program Files` or `C:\Program 1` to the new path (see FIGURE 2 on the next page). Note that the path may appear several times in a single Value data box; change them all. After editing, click *OK* to close the dialog box, and press <F3> to find the next item to change. To speed things up, select the new path the next time you type it and copy it to the Clipboard (press <Ctrl>•<C>). Then you can just select the old path in each dialog box and paste the new path by pressing <Ctrl>•<V>. Repeat as often as necessary.

In a few instances, the Find command may turn up a binary value (indicated by an icon with `1s` and `0s`) in which the ▶

The Second Coming of Cardfile

CARDFILE WAS A HANDY Windows 3.x accessory for storing basic information in cardlike format, but it didn't make the cut to Windows 95 and beyond. Not to worry: AZZ Cardfile has most of Cardfile's features plus several more, including on-the-fly filtering of the card list, automatic launching of phone-dialer, e-mail, browser applications, password protection, and customizable colors and fonts. AZZ Cardfile imports Cardfile files with ease and can export its files to text format. All this, and it's free!

The brainchild of Antanas Zdravys, AZZ Cardfile is available on PC World Online.



Now comes the acid test.

Once all the files have been copied to the new drive and/or folder, rename the Program Files folder. Then restart your computer and try starting a few of your applications.

If all is well, you can simply delete the Program Files folder and all the duplicate applications it contains.

If you have problems with only one or two applications, reinstall them, this time specifying their new location.

But if you are running into problems with all applications, copy your backup Registry and .ini files back to the Windows folder and restore the name of the Program Files folder.

 Find files from this article on PC World Online at www.fileworld.com. Windows Tips welcomes your tips and questions and pays \$50 for published items. Scott Dunn is a contributing editor for PC World and a principal author of The PC Bible, 2nd Edition (Peachpit Press, 1995, 800/283-9444). See page 14 for contact information.

<Enter> to open this file in a text editor. Search for `c:\progra` as before, and edit each instance to reflect the new path. (If you're lucky, you won't find any occurrences.) Repeat this sequence for the `system.ini` file.

Finally, update any affected Shortcuts.

To edit Shortcuts on the Start menu, right-click the Start button and choose *Explore* or *Open*.

Select an icon for an application whose path will be changed, and press <Alt>-<Enter> to open its Properties sheet (or you can right-click the icon and then select *Properties* from the menu). Next, click the *Shortcut* tab and edit the path in the 'Target' and 'Start in' boxes. Then click *OK*.

If the proper icon doesn't appear, you may need to return to the Shortcut tab of the Properties sheet, click *Change Icon*, and point it to the proper path. If you're not sure which Shortcuts are linked to your new folder and which are linked to items in your Windows folder, you can skip this part of the process until you run into trouble and then edit each problem Shortcut in piecemeal fashion. But at this stage, you should at least check out all the Shortcuts in your StartUp folder in the Start Menu folder so you don't get errors when you start Windows.



FIGURE 3: EDITING A BINARY REGISTRY entry is easy if you first export that Registry branch to an editable text (.reg) format.



FIGURE 2: MOVE YOUR PROGRAMS to any drive or folder, but be sure to let Windows know by editing paths in the Registry, .ini files, and Shortcuts.

path is part of the Value name, which can't be edited. If this happens, you must export that part of the Registry to a text file, edit the text file, and then reimport it to the Registry.

To do this, close the dialog box and press <Tab> once to move the highlight to the folder in the tree pane. Choose *Registry>Export Registry File* (see FIGURE 3). Make sure the *Selected branch* option is selected, then save this portion of the Registry to an easy-to-find location (such as the desktop) with a name of your choice. Once the branch has been saved, press <Delete> to delete the folder you just exported. Minimize the Registry Editor and locate the file you just saved.

Now right-click the icon, and choose *Edit* to open the file in Notepad.

Edit the old path information as needed, following the form in the file. (For example, if the path uses pairs of slashes, don't disturb these as you change the names of drives and folders.) Save the file and exit Notepad. Then right-click the icon for the exported Registry file and choose *Merge*. Press <Enter> to acknowledge the confirmation.

Next, you need to take care of any settings stored in `win.ini` or `system.ini` (files that Windows maintains for backward compatibility with older applications). Choose *Start>Run*, type `win.ini`, and press

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Copy fancy text boxes ♦ Show a clean screen in WordPerfect ♦ Simplify label making

Put Favorite Templates on Your Windows 95 Desktop

TEMPLATES SAVE LOTS of time by storing often-used document elements such as text, graphics, margins, and styles. But you can make templates even more efficient by putting shortcuts to them on your Windows 95 desktop (see **FIGURE 1**). A simple double-click will start the program and load the template automatically.

Here's the easiest way to set this up:

1. First, locate the folder that contains your template files. Each application listed below offers a quick way to find that folder.

ences dialog box. Make a note of the folder named in the SmartMaster field of the Word Pro Preferences dialog box.

2. Right-click the Windows 95 Start button, and select *Explore*.
3. In Explorer, open the folder containing the template that you want to use.
4. Right-click and drag the template file to the desktop, and then select *Create Shortcut(s) Here*. Repeat as needed to create shortcuts for all your favorite templates.

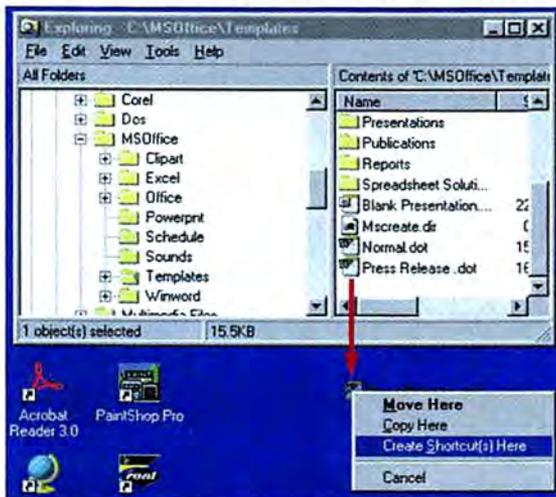


FIGURE 1: LAUNCH FREQUENTLY USED TEMPLATES from shortcuts on your Windows 95 desktop.

- **Word 7 and 8:** Select *Tools•Options*, and click the *File Locations* tab in the Options dialog box. Make a note of the folder for User Templates.

- **WordPerfect 7 and 8:** Select *Tools•Settings*, and double-click the *Files* icon in the Settings dialog box. Click the *Template* tab. Make a note of the folder named in the 'Default template folder' field of the Files Settings dialog box.

- **Word Pro 96 and 97:** Select *Files•User Setups•Word Pro Preferences*, and then click the *Locations* tab in the Word Pro Prefer-

Select the text or object you want to move, and press **<F2>**. Using the arrow keys, move the shadow cursor to the desired location, and then press **<Enter>**.

COPY WORD TEXT BOXES

WORD 97'S NEW TEXT BOXES, which you create painlessly by selecting *Insert•Text Box*, are great for document layout. You can assemble very complex objects by embedding additional text boxes, WordArt objects, and other discrete objects inside

Search for Text in Word Without the File Dialog Box

IF YOU WANT TO FIND multiple occurrences of the same search text in Word without having the Find dialog box on the screen, you can do it easily. This trick is particularly handy when you need to format specific text many times, as in a catalog document.

Start by selecting *Edit•Find*, enter your search text, and click *Find Next*. Then close the *Find* dialog box. To find each additional occurrence, just press **<Alt>•<Ctrl>•Y**.

a complex text box, you may want to copy and paste it several times on a page—to create a sheet of gift certificates or name badges, for example. If so, here's a nifty trick you should know:

If you simply select the text box, copy it to the Clipboard, and paste it into a new location, only the main text box and its basic contents will get copied. If you've nested other text boxes or objects inside (as in **FIGURE 2**), you need to select all the objects as a group.

To do this, first drag the mouse pointer over the edge of the outermost text box, clicking when it turns into a four-pointed arrow. Next, hold down **<Shift>** as you drag over each of the remaining objects, and click when the pointer changes. Each object will display its border, signaling that it is selected. If the four-pointed arrow doesn't appear when you drag over an object, that object will be copied with the surrounding text box automatically. Now you can copy the entire group of objects to the Clipboard for pasting. ▶

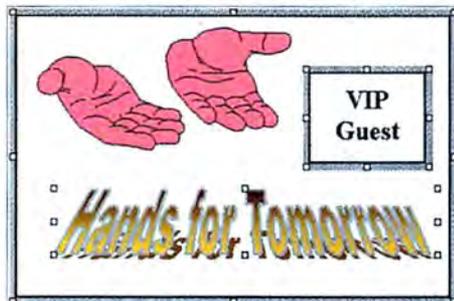


FIGURE 2: TO DUPLICATE A TEXT BOX, select all its objects and copy them to the Clipboard.

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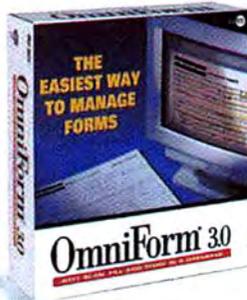
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DISPLAY AND HIDE TOOLBARS IN WORDPERFECT

WANT TO WORK ON your WordPerfect 6.1 or later document on a clean screen without all the toolbars, etc.? Just press **<Alt>-<Shift>-<F5>**. The first time you do this, you'll see a confirmation box. To avoid subsequent requests for confirmation, click the *Do not show this message next time I hide bars* check box, and press **<Enter>**. To return to the normal screen after hiding the interface, press **<Esc>**.

SIMPLIFY LABEL MAKING IN WORD 97

IF YOU'RE TIRED of struggling with labels in Word 97, try using the Avery Label Wizard, supplied with Office 97 but not installed with the program.

Designed by label manufacturer Avery Dennison, this wizard lets you create full pages of the same label, type different text on each label, or create and use a simple database of addresses for your labels. The wizard supports virtually every label format available from Avery and most formats from other label suppliers—and its step-by-step process for creating labels is less complex than the method Word's built-in label wizard uses (see **FIGURE 3**). Its only drawback: It doesn't provide a way to let you add graphics to labels.

To install the Avery Label Wizard, exit Word and insert the Office 97 CD in your CD-ROM drive. If you don't automatically see the contents of the drive, double-click *My Computer* on your desktop, then double-click the icon for your CD-ROM drive. Double-click the *Valupak* folder icon, then double-click the *Averywiz* folder. Finally,

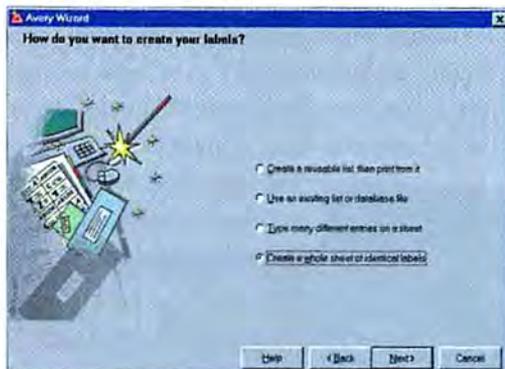


FIGURE 3: THE AVERY LABEL WIZARD makes it easy to whip up any standard label in Word.

double-click the *Setup.exe* icon in the *Averywiz* folder and follow the prompts.

After installing the wizard, you can access it by selecting *File>New* in Word, then clicking the *Avery* tab in the New dialog box, or by clicking the *Avery Wizard* icon on the main toolbar. Just follow the wizard's instructions to create your labels. (If you don't want to keep the Avery icon around, right-click the toolbar, select *Customize* at the bottom of the menu, drag the icon off the toolbar, and click *Close* in the *Customize* dialog box.)

STRADDLE THE CENTURIES IN WORDPERFECT 8

WORDPERFECT 8 HANDLES 21st-century dates without a glitch, but it makes a few assumptions you need to know about. In table cells set in the mm/dd/yy date format, if you enter a year smaller than 50, WordPerfect assumes that the intended year is after 2000. If you enter 50 or a number greater than 50, WordPerfect assumes this refers to the 20th century. So if you enter 8/16/24, the program's calculations will treat that date as August 16, 2024. If you enter 8/16/55, the date will be treated as August 16, 1955.

Also, if you enter a date, but change the year later on, WordPerfect assumes that the century remains the same. So if you change 8/16/24 to 8/16/55, WordPerfect will treat the new date as August 16, 2055.

Of course, you can override this automatic feature by entering four-digit numbers for years.

CREATE QUICK LINES IN WORDPERFECT

IF YOU NEED to create a horizontal or vertical line or rule quickly in WordPerfect 6.1 or later, place the cursor where you want the line to appear, and press **<Ctrl>-<F11>** for a horizontal line or **<Ctrl>-<Shift>-<F11>** for a vertical line. By default, the line will extend from margin to margin.



FIGURE 4: OPEN WORDPERFECT 8 WITHOUT all the folderol by disabling the splash screen.

In versions 6.1 and 7, you can't enable this feature unless you've already entered text or blank spaces on the page, since you must position the cursor where you want the line. In version 8, however, the new *Shadow Cursor* lets you click anywhere on the page, even before typing, so you can set up lines on a blank page using the technique described above.

To move or format one of these lines, move the mouse pointer slowly over the line until it changes into an arrow, then click. Now you can drag the selected line to a new location or double-click it to access the *Edit Graphics Line* dialog box.

DISABLE WORDPERFECT 8'S STARTUP LOGO DISPLAY

SEEN ENOUGH of WordPerfect's splash screen by now? To avoid it, right-click the *Windows Start* button, select *Open*, and double-click the *Corel WordPerfect Suite 8* icon. In the resulting window, right-click *Corel WordPerfect 8* and select *Properties* from the menu. In the dialog box, click the *Shortcut* tab, then click at the end of the text in the *Target* field. Type a space and a colon, then click **OK** (see **FIGURE 4**). Now the program will launch directly into the document window.

Word Processing welcomes your questions and tips and pays \$50 for published items. Contributing Editor George Campbell is a contributor to The PC Bible (Peachpit Press, Berkeley, California, 1995). See page 14 for contact information. ■

No, this is not a misprint.



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¹All hard drives, GB=billion bytes. ²This drive will not read CD-R media. ³The K56flex protocol is designed only to allow faster downloads from K56flex compliant sources. Maximum achievable download transmission rates currently do not reach 56 Kbps and will vary with line conditions. ⁴14X Max CD-ROM drive data transfer rates may vary from 1200 to 1800 Kbps. All Compaq products sold at Compaq Works are refurbished unless otherwise noted. Our selection of refurbished products includes customer return units, evaluation units, cosmetically blemished products and older discontinued products. All refurbished products are retested at Compaq, where replacement of components is made, if necessary, to bring the product up to fully functional condition. All refurbished products carry a 90-day, limited warranty and may be taken to any Compaq Authorized Service Agent for service. All excess new products carry the Compaq standard limited warranty. For a complete copy of our warranties, please write Compaq Works, 10251 N. Freeway, Houston TX 77037. Compaq Works shall not be liable for technical, pictorial or editorial errors or omissions contained herein. Product availability limited to products on hand. All prices shown are Compaq Works prices and do not include applicable state and local sales tax or shipping to recipient's destination. All sales FOB Houston. Prices subject to change. Compaq, Presario and the Compaq logo are registered in the U.S. Patent and Trademark Office. The Intel Inside logo and Pentium are registered trademarks of Intel Corporation. Other product names mentioned herein may be trademarks and/or registered trademarks of their respective companies. ©1998 Compaq Computer Corporation. All rights reserved. PCW0898

Circle 61 on reader service card

Print a File's Path in an Excel Header or Footer



I CAN'T FIGURE OUT how to print an Excel workbook's complete path in the header or footer. I can add the file's path manually, but if I move a file I'd like the path to be updated automatically on future printouts. Am I missing something?

Ron Daniel, Bartlesville, Oklahoma

THIS IS ONE OF EXCEL'S most requested features. The solution is a macro. If you'd prefer not to create a macro yourself, you can try an Excel 97 add-in that I developed. The Add Path add-in asks you where you want the path printed, then inserts the appropriate macro code for you (see FIGURE 1). You can download it from FileWorld at PC World Online or from my Web site (www.j-walk.com/ss).

If you're the type who likes to create macros, follow these steps in Excel 97:

1. Press **<Alt>-<F11>** to activate the Visual Basic Editor.
2. Locate your workbook in the Project window and double-click its file name.
3. Double-click *ThisWorkbook* to display the code module for the workbook object.
4. Enter the following subroutine into the code module *ThisWorkbook*:

```
Private Sub Workbook_BeforePrint(Cancel As Boolean)
    ActiveSheet.PageSetup.LeftHeader = ActiveWorkbook.FullName
End Sub
```

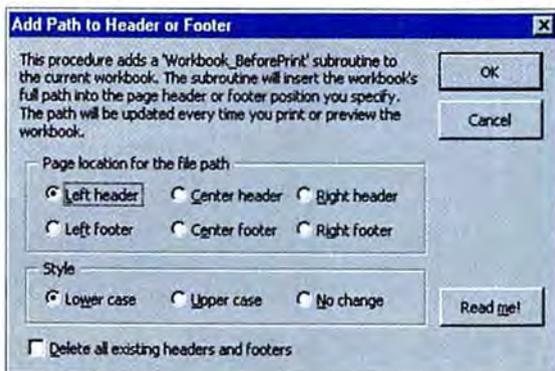


FIGURE 1: THE ADD PATH ADD-IN DISPLAYS A WORKBOOK'S complete path in the page header or footer.

This subroutine takes advantage of a "before print" event in Excel 97. Before you print or preview any sheet in the workbook, the macro inserts the workbook's full path into the left header. To put the path in a different page location, substitute any of the following for *LeftHeader*: **CenterHeader**, **RightHeader**, **LeftFooter**, **CenterFooter**, or **RightFooter**. Note: This subroutine will overwrite any existing information in the specified header or footer.

In earlier versions of Excel, you need to take a different approach:

1. Select **Insert>Module** to insert a new Visual Basic module.

2. Enter the following subroutine:

```
Sub UpdatePath()
    For Each sht In ActiveWorkbook.Sheets
        sht.PageSetup.LeftHeader = ActiveWorkbook.FullName
    Next sht
End Sub
```

This subroutine adds the workbook's path to the left header of each sheet. As in the previous subroutine, you can use different keywords to place the path elsewhere on the page. Note: You must execute this subroutine at least once to put

the path name on the sheet, since it doesn't automatically happen before you print—and then again if the workbook is moved or renamed. To execute the macro, select **Tools>Macros** and double-click *UpdatePath*.

NEGATIVE TIME IN EXCEL

SINCE EXCEL STORES dates and times as numeric values, it's possible to add or subtract one from the other.

Join Text From Multiple Cells

USE AN AMPERSAND (&) to join the text from two or more cells. For example, column A might contain a list of first names, and column B the last names. The following formula will combine the first and last names:

```
=A1&" "&B1
```

In Excel, you can also use this formula to join the contents of cells that contain values.

In 1-2-3 and Quattro Pro, you must first convert those values to strings with the following formula:

```
@string(A1,0)&" "&string(B1,0)
```

However, if you have a workbook containing only times (no dates), you may have discovered that subtracting one time from another doesn't always work. Nega-

	A	B	C	D
	Consultant	Hours worked	Hours paid	Hours Remaining
1	Abe	34:00	36:00	2:00
2	Barbara	30:00	28:00	-2:00
3	Charlie	18:30	40:00	21:30
4	David	24:00	20:00	-4:00
5	Combined	106:30	124:00	17:30
6				
7				

FIGURE 2: NEGATIVE TIME VALUES are displayed correctly in Excel's optional 1904 date system.

tive time values appear as a series of pound signs, even though you've assigned the [h]:mm format to the cells. By default, Excel uses a date system that begins with January 1, 1900. A negative time value generates a date/time combination that falls before this date, which is invalid.

The solution is to use the optional 1904 date system. Select **Tools>Options**, click the **Calculation** tab, and check the 1904 date system box to change the starting date to January 2, 1904. Your negative times will now be displayed correctly, as in FIGURE 2.

Find files from this article on PC World Online at www.fileworld.com. Spreadsheets welcomes your questions and tips and pays \$50 for published items. Contributing Editor John Walkenbach is the author of nearly two dozen spreadsheet books, and maintains *The Spreadsheet Page* (www.j-walk.com/ss). See page 14 for contact information.

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Tidy Up Your Mailbox to Speed Deliveries

DOES YOUR MAIL PROGRAM seem to be taking longer to log on to your Internet service provider's mail server and retrieve messages? This may be happening because your program leaves copies of messages on the ISP's server after retrieving them, creating an overstuffed mailbox that takes a long time to access and might even bounce mail back to senders with a message that your mailbox is full.

Most mail programs come set up to delete downloaded e-mail automatically. In Netscape Messenger, pull down the *Edit* menu and select *Preferences*. Highlight *Mail Server* under *Mail & Groups*, and in the *Mail Server Type* box, confirm that the line 'Leave messages on server after retrieval' isn't checked.

In Outlook Express, select *Tools* ♦ *Accounts*, click the *Mail* tab, select the service, click the *Properties* button, click the *Advanced* tab, and choose among message removal options in the *Delivery* section.

But if you're using filtering rules to winnow out spams or messages with large file attachments, make sure those unwanted messages aren't lingering on the ISP server. Temporarily deactivate any filtering rules you've set up, and then log on to the server to download any existing mail.

ARRANGE YOUR BOOKMARKS

BOOKMARKED URLS are the cyber equivalent of business cards you never get around to filing. Fortunately, several shareware and freeware utilities let you arrange shortcuts to Web pages in con-

venient folders on your desktop. In addition, these utilities can convert Internet Explorer Favorites into Communicator Bookmarks (and vice versa), and let you view some sites with one browser and others with a different browser.

My favorite is QuikLink Explorer (see **FIGURE 1**) by QuikLink Interactive. One click loads your preferred browser and the Web page. QuikLink (www.quiklinks.com) comes as freeware or as \$20 shareware; a fancier \$40 version supports FTP software.

Thomas Reimann has created the free program Linkman (available on PC World Online), which lets you import, organize, and copy and paste bookmarks. It also tracks all the Web pages you visit in case you decide to bookmark any of them later.

FILES VIA JUNO

IF YOU USE the free Juno e-mail service (www.juno.com), you know its major limitation: You can send only text files without attachments. Well, here's a workaround: Encode the file (that is, turn it into text) in a standard coding format such as UUencode, and then insert it into the body of a message. Your recipient will



Turn Off Web Pictures

TIRED OF DRUMMING your thumbs as glitzy Web graphics download? Speed things up by telling your browser to download only text. In Internet Explorer 4.x, select *View* ♦ *Internet Options*, click the *Advanced* tab, and in the *Multimedia* category, uncheck *Show pictures*. Click *Apply*, then *OK*. In Netscape Navigator 4.x, select *Edit* ♦ *Preferences*, click *Advanced*, uncheck *Automatically load images*, then click *OK*. To view a page's images while you're online, just click the *Display Images* button at the top of the screen.

have to use decoding software to read it.

Unfortunately, Juno inserts ads for itself every hundred lines or so in messages that are sent to Internet addresses outside of Juno. These recipients may need to strip out those lines, and possibly the message's header, before decoding.

The best utility for encoding and decoding files is Snappy Software's freeware Wincode, available on PC World Online.

To encode a graphics or word processing file, first launch Wincode and select *File* ♦ *Encode*. Select the file that you want to encode, and choose *UUE* from the *Code Type* drop-down list. If the file in question is smaller than 30KB, click the *>>Clipboard* button to send the encoded file to the Windows Clipboard; from there, you can paste it directly into a Juno message.

But you have to break up files larger ▶

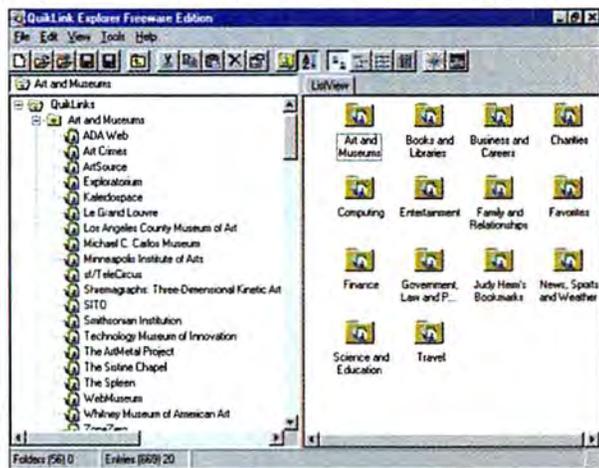


FIGURE 1: QUIKLINK EXPLORER LETS YOU ORGANIZE bookmarks into folders, and import bookmarks from different browsers.

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FIGURE 2: TO SEND LARGE files using Juno, split them into smaller files after encoding them. The encoded file will seem garbled before you send it.

than 30KB into smaller files and send each one as a separate message. To split a file into multiple parts, select **Actions • Join/Split Files** from the Wincode menu, and click the **Split** tab. Click the icon next to the 'File to split' edit box and double-click your file (it should include a .uue extension). Under the Split Options panel in the Join/Split Files dialog box (see **FIGURE 2**), select **Advanced**. Specify a Part Size in bytes, then click the **Split** button. The first portion of the file will have a .uue extension, the second part .002, the third .003, and so on. You'll need to insert each of these into separate messages.

To import your encoded files into a Juno message, head to Juno's **Write** tab and enter the recipient's address and a subject. Click on the area where you'd write your message and, if you've sent your encoded file to the Windows Clipboard, press **<Ctrl>+V** to paste it in. It will look like gobbledygook (see **FIGURE 2**).

If you have split your encoded file into multiple files, press **<Ctrl>+I** and then select the first file. Create another message to

send the next part of the file, and so on.

Once they've received the encoded message(s), other Juno users can display each on their screen, select **File • Save Message as Text File** from the Juno menu, and load Wincode. If the message was sent as multiple files, they can select **Actions • Join/Split** and click the **Join** tab. Once the files have been joined, they can click the **Decode** button and select either **UUE** or **Auto-1** from the Code Type list.

Sending the encoded file to an outside e-mail address can be trickier, depending on how the file arrives. If your recipients receive the message as an attachment, they have to open the message, click the attachment button in their mail program, and save it to a file. If the encoded information arrives in the body of the message, they must cut and paste the gibberish into a word processor, then save it as a text-only file. Either way, they have to edit out the Juno ads and possibly the message header lines, then stitch together the files (if there are more than one) with Wincode. Finally, they must decode the resulting file, also with Wincode.

If you're on Juno and you want someone to send you a graphics or word processing file, tell that person to send it as a regular MIME attachment to a message. The file will arrive in two messages—one

Break the File-Attachment Code

THE INTERNET'S MAIL transport system requires that all mail be sent in 7-bit format, but binary files like graphics, programs, and word processing documents are 8-bit files. To be e-mailed, binary files must be encoded as 7-bit documents and either inserted into an e-mail message or attached to it.

Mail programs give you the choice of encoding file attachments in MIME or UUencode formats. Which should you choose?

Whether you encode the file with UUencode and insert it into an e-mail message or send the file as a MIME-encoded attachment depends on the preferences of your recipient's mail server. Generally, try MIME first, since it's a more robust system.

Free Chat for Corporate Sites

YOU CAN LINK a chat room to your business's Web site for free by visiting Talk City (www.talkcity.com). For a small charge, you can display your company's logos and banners (instead of Talk City ads) on the site's screen. Talk City also offers other features such as chat moderators for annual fees.



containing gobbledygook. Open this message and select **File • Save message as text file**. Now start your word processor and delete all the header information before the message. Save *that* as a text-only file. Close the file, go to Wincode, and decode the file by specifying **MIME (Base64)**.

If you're thinking all this is a hassle, you're right. The best solution is to sign up for a regular ISP.

TAKE A MAIL TIME-OUT

WHEN YOUR E-MAIL program shoots you a 'TCP/IP time-out' error, it's telling you that it couldn't get a response from your ISP's mail server. That could mean that you're not actually connected to your ISP or that your mail server is down or sluggish because of heavy traffic. Peak times are after school in the afternoon, and between 9 and 10 at night, when many people check their mail.



Find files from this article on PC World Online at PC World's File-World (www.fileworld.com). Internet Tips welcomes your questions and tips and pays \$50 for published items. Contributing Editor Judy Heim is a coauthor of *The Quilter's Computer Companion* (No Starch Press, 1997, 800/420-7240). See page 14 for contact information. ■

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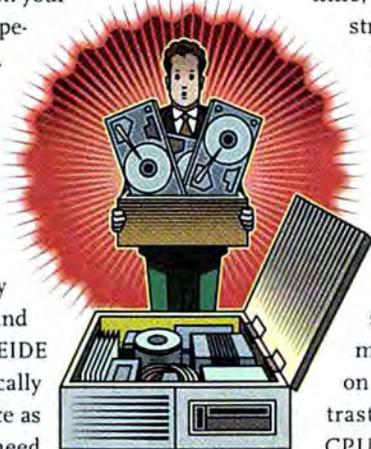
Match EIDE controllers and drives ♦ SCSI versions ♦ Splurge for surge protection

Get the Right Interface for Your New Hard Disk

PICKING A NEW HARD DISK is like selecting a dinner wine: You start with two basic categories and then face a bewildering menu of choices.

The two main interfaces are ATA (more often called IDE or EIDE) and SCSI. Each provides the connection between your hard disk and your computer and controls the flow of data between them. The right one for you depends on your budget and on your specific computing needs.

EIDE drives rate as the better choice for most users. They're cheaper than SCSI drives, they don't require that you own a SCSI adapter, and they are easier to install. And in most applications, EIDE drives deliver practically the same performance as SCSI drives. If you need superfast performance, however, you may be better off with a SCSI drive.



KNOW YOUR SPEED NEEDS

VERY HIGH SPEED drives benefit users who need to grab lots of disk-bound data—huge graphics, video, or database files—quickly. (You know who you are.) But these drives don't significantly improve performance of tasks that are less disk intensive, such as word processing or using small worksheets, though large programs will load noticeably faster.

The most common way to gauge drive performance is to compare maximum transfer rates. But keep in mind that these are theoretical maximums. The effective transfer rate may depend on other factors.

Bus mastering—a technique that cuts the CPU's load by shouldering the data routing

duties for each SCSI device—gives SCSI drives a performance edge over all but the most recent EIDE devices.

That process is especially helpful for running multiple devices at the same time, or for continuous data streaming. Burning a CD-ROM on a CD-Recordable drive, for example, requires an uninterrupted flow of data streaming off the hard disk onto the CD. A SCSI drive delivers the necessary continuous data stream to the CD-R, permitting the CPU to focus on creating the CD. In contrast, with EIDE drives the CPU must shift its attention back and forth, leading to interruptions that can ruin the process.

SCSI is also best at juggling multiple peripherals, since each SCSI controller supports a chain of up to seven devices, as opposed to the maximum of two devices that an EIDE controller can handle.

Here's how to figure the right flavor of EIDE or SCSI for enhancing your PC.

WHAT'S THE BIG EIDE?

INSTALLING AN EIDE drive is easy, since most motherboards have a built-in EIDE controller or two. You just plug the cable from the hard disk into the connector on the motherboard. And each connector can support two devices on the same cable—a master drive and a slave drive.

But your fancy new EIDE hard drive won't run at full speed unless it's attached



Staying Well Grounded

ALWAYS GROUND YOURSELF before working inside your PC, since the slightest touch of static electricity can zap a component. Before opening the computer, ground yourself by touching an unpainted spot of the case's metal frame while the unit is plugged into a grounded outlet. But if you have a new PC that doesn't completely power down even when it's turned off, be sure to unplug the cord before you open up the box.

If you do a lot of upgrade work, buy a \$5 grounding strap that attaches to your wrist.

to a controller that supports the same version of the ATA spec. Here and in **FIGURE 1** are ATA versions:

ATA (IDE). ATA (AT Attachment) is the formal name for what's often called the original IDE specification. But IDE (Integrated Drive Electronics) actually refers to the attachment of the hard drive's controller electronics to the drive itself. ATA has one connector on the motherboard and supports a master and a slave drive, each with a maximum size of 528MB.

ATA performance depends on a data transfer technique called Programmed Input-Output mode. All ATA disks and controllers support PIO mode 0, and some support modes 1 and 2.

If your PC is more than three years old, it probably has an ATA interface. To check, examine your motherboard. ATA motherboards have only a single ATA connector (without a second cable plugged in next to the place where your hard drive cable attaches). To upgrade to ATA-2, you need to install an EIDE controller card such ▶

ATA version	Mode	Maximum data rate (MBps)
ATA-1	PIO mode 0	3.3
ATA-1	PIO mode 1	5.2
ATA-1	PIO mode 2	8.3
ATA-2	PIO mode 3	11.1
ATA-3	PIO mode 4	16.7
ATA-4	Ultra DMA	33

FIGURE 1: RUN YOUR EIDE DRIVE at the fastest possible PIO mode to get the best performance.

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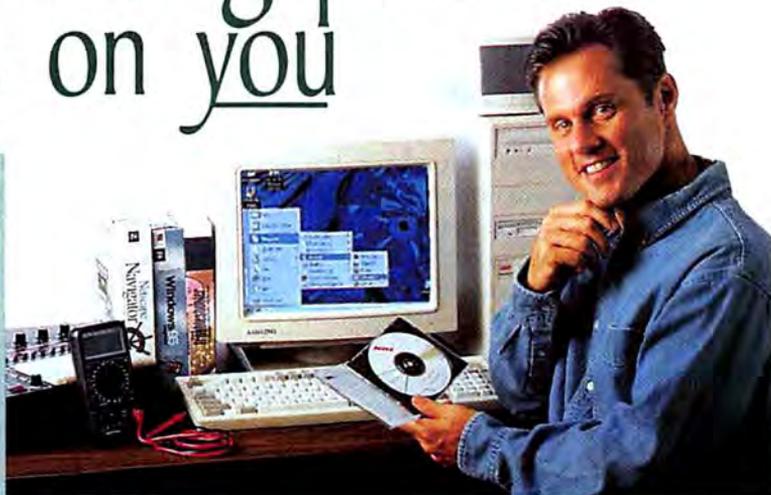
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as Promise Technology's EIDEMax card. **ATA-2 (Enhanced IDE/Fast ATA).** If you bought your PC within the last three years, it almost certainly supports ATA-2 or higher. To check, look for the 'Logical Block Address (LBA)' or 'Cylinder, Head, Sector (CHS)' setting in the hard disk setup menu of your system setup program.

ATA-2 supports disks as big as 8.1GB. It also allows up to four devices to be connected via two channels, each channel accommodating one master and one slave device. One channel is considered the pri-

Remember, to reap the benefits of Ultra ATA, you need a free PCI expansion slot for your controller card. The ISA bus tops out at 8MBps, so any drive rated for PIO mode 3 or 4 won't achieve maximum transfer rates if it's connected via the ISA bus.

SCSI SCREAMERS

SCSI CONTROLLERS AREN'T included on most motherboards. To install a SCSI hard disk, you must first buy and install a SCSI controller card. Diamond's FirePort 40 Ultra SCSI card is a good example.

SCSI TYPES AND TRANSFER RATES

SCSI standard	Common name	SCSI bus width (bits)	SCSI bus speed (MHz)	Maximum transfer rate (MBps)
SCSI	SCSI	8	5	5
SCSI-2	Fast SCSI	8	10	10
SCSI-2	Wide SCSI	16	5	10
SCSI-2	Fast Wide SCSI	16	10	20
SCSI-3	Ultra SCSI	8	20	20
SCSI-3	Wide Ultra SCSI	16	20	40
SCSI-3	Ultra2 SCSI	8	40	40
SCSI-3	Wide Ultra2 SCSI	16	40	80

FIGURE 2: SCSI VERSIONS describe the drives' bus width, bus speed, and top performance rate.

mary and the other the secondary. Always attach your fast hard disks to the primary channel and slower devices like CD-ROM drives and older hard disks to the secondary one. This placement is particularly important on 486 and early Pentium systems because the primary channel is attached to the fast PCI bus and the secondary channel is connected to the much slower ISA bus.

When you buy an EIDE hard disk, make sure it supports PIO mode 3 (introduced with ATA-2) or higher.

ATA-3 (Fast ATA-2). This version of ATA supports PIO mode 4, which produces maximum transfer speeds of 16.7 megabytes per second.

ATA-4 (Ultra ATA/Ultra DMA/Ultra DMA/33). The latest standard doubles PIO mode 4's maximum transfer speed to 33 MBps. It also incorporates a technology for bus mastering, using the PC's DMA channels to reduce the processing load on the CPU. If your motherboard supports only ATA-2, you can buy a card like Promise's Ultra33, with Ultra ATA connections on it.

The good news is that installing a SCSI card and device has become easier. (For more information, see *Upgrade Guide*, June 1997.) You still have to assign an ID number to each device and make sure the chain is terminated, but improved software makes the process a lot less painful.

There are three official SCSI standards—SCSI-1, SCSI-2, and SCSI-3—and many intermediate flavors (see FIGURE 2). As with EIDE, you have to match the disk controller's SCSI version with the hard disk's SCSI version for best performance, but most newer drives and controllers are backward compatible and function in different version combinations.

SCSI version names reflect the maximum transfer speed and allude to what makes that speed possible. *Wide* refers to a wider cable—16 bits instead of 8 bits. *Fast* refers to a 10-MHz bus speed, double the standard 5 MHz. *Ultra* means 20 MHz, and *Ultra2* means 40 MHz.

As with EIDE, any SCSI drive that can move data faster than 8MBps needs to be run from a PCI-based SCSI controller.

SURGE PROTECTOR DOESN'T



LAST WEEK MY WIFE and I decided to stop waiting around for PC prices to drop and made the big purchase.

Three hours and \$2000 later, we were setting up our new addition and playing with it. Until, thanks to El Niño, everything went black: the computer, the lights, the television. A nearby lightning strike knocked them all out, and only the lights and the television came back on. Evidently, the \$13 surge protector that the salesperson recommended had failed. Was I misled?

Grigg DeWitt, Salinas, California

ALMOST CERTAINLY. The unit that you purchased may have been a high-grade surge protector on sale, but \$13 surge protectors tend to be little more than extension cords with extra outlets. The best way to check the quality of a product is to look for the Underwriters Laboratory UL 1449 rating. If you don't see that information marked on the surge protector, don't buy the device.

A direct lightning hit can generate voltages way beyond the 6000-volt limit of the UL 1449 tests, and there's no way you can protect your PC against that. But to maximize your system's chances of survival, look for a surge protector with a response time of less than 1 nanosecond; indicator lights that warn you of failed components in the unit and of improper grounding in your building's wiring; and ports for your modem and any other line connected to the PC. And buy a model that comes with insurance.



For more hardware tips, visit PC World Online (www.pcworld.com/hereshow). Kirk Steers is a PC World contributing editor. Hardware Tips welcomes your questions and pays \$50 for published items. See page 14 for contact information. ■

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Readying for installation ♦ Keep one program on top ♦ Automate PC shutdown

Removing Your Name From Your Old Computer



I'M SELLING MY OLD PC and buying a better unit. How do I remove the 'Registered to' name—the one you see when you right-click My Computer and select Properties—from the old system? I want to remove my name so the new owner doesn't have to look at it.

Bill Fay, Dubuque, Iowa

YOU MIGHT THINK Microsoft doesn't want you to sell that computer. Since there's no simple way to change or drop your name from an old copy of Windows, you'll have to edit the Registry.

But before you undertake this dangerous task, back up the following Registry files: `system.dat`, `system.dao`, `user.dat`, and `user.dao`. (See "Back Up Your Registry" in the June *Answer Line* for details.)

Once you've made your backup, click the *Start* button and select *Run*. Enter the command `regedit` to bring up the Registry Editor. Navigate through the left pane, as if you were in Windows Explorer, to reach `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion`. In the right pane, select `RegisteredOwner` and then press **<Enter>**.

At this point, you can either type in the name of your computer's new owner or press **<Delete>** to leave the name blank. Press **<Enter>**, exit the Registry Editor, and reboot Windows.

If you opt to leave the name blank, you need to be aware of the dangers involved. When I tried this on a Windows 95 OSR2 installation, Windows insisted on walking

me through the full Setup Wizard. The wizard doesn't ask for a name (which is strange, since a blank name field

triggers it), but it demands the Product Identification Number on the Certificate of Authority that came with your Windows package. And if the new owner lacks the certificate and doesn't know the number, Windows simply won't run.

Of course, when you sell an old computer to someone, you should include the complete operating system that originally came with it, including all documentation and certificates. Taking the time to collect and hand over the relevant paperwork for the PC ought to minimize the new owner's problems.

WHO'S ON WINDOWS?



AT OUR OFFICE, people sometimes work on a computer running Windows 95 without knowing who they're logged on to the network as. Is there a simple way to identify the current logged-on user on the taskbar?

Harvey Hope

Manotick, Ontario

THAT'D BE an obvious convenience in any situation where people share a PC. But no one, to my knowledge, offers a program to do this. We'll just have to be clever ourselves.



Keep FlexCD Out of Startup

FLEXCD, A SYSTEM TRAY-BASED audio CD player that comes with Microsoft's free PowerToys collection, is a great way to listen to music. It loads automatically every time you put in a CD, so there's no point in having it load when you start Windows, too.

But FlexCD's installation program puts a shortcut into your StartUp folder, where it takes up space even when not in use. To reclaim the space, open Windows Explorer, navigate to `c:\Windows\Start Menu\Programs\StartUp`, and remove the FlexCD icon.

We could assign each person a distinct wallpaper, but people don't like to be told how to decorate their desktop. So let's get the name on the taskbar as you requested.

Select *Start>Settings>Control Panel*, and double-click the *Passwords* icon. Click the *User Profiles* tab in the Password Properties dialog box, and then select the option that begins *Users can customize their preferences and desktop settings*. Make sure the *Include Start Menu and Program groups in user settings* option is checked. (By the way, if you go the wallpaper route, you should also make sure that *Include desktop icons and Network Neighborhood contents in user settings* is checked. That way, every user can select his or her own wallpaper.) Click *OK*.

Next, do the following for everyone who logs on to that PC (see **FIGURE 1**). ▶

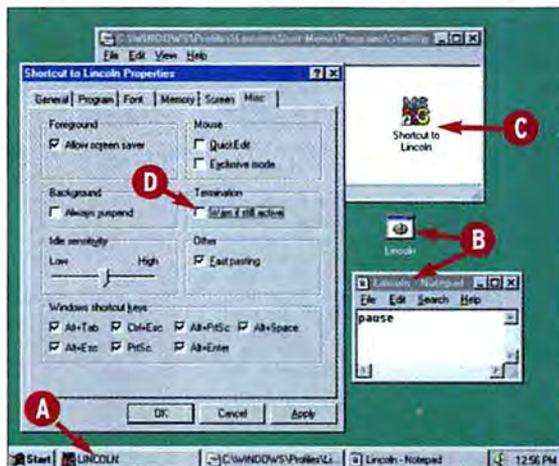


FIGURE 1: PUT THE CURRENT USER'S NAME on the Taskbar (A) with a short batch file (B) and a shortcut in the user's StartUp folder (C). Stop the warning (D) in the shortcut's Properties box.

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Outlook Express People Finder

NEED TO FIND someone's e-mail address or telephone number quickly? In January, we examined how Netscape Communicator makes this job easier. Microsoft's rival Outlook Express can handle the job, too.

To find that certain someone—whose name you already know—select *Edit•Find People*. In the resulting window, you can enter a name, an e-mail address, or both, and select from any of seven online people-searching services. Unfortunately, you can't search them all simultaneously.

Don't expect absolute success, either. Only two of the seven services gave my primary e-mail address, and many of them cited addresses that I no longer use.



1. Use Notepad to create a batch file called *username.bat*, where *username* is the user's name (for me, it would be *Lincoln.bat*). The batch file needs to contain only one word, **pause**. Store the batch file in an out-of-the-way place.
2. Go to the user's StartUp folder (located at *c:\Windows\Profiles\username\Start Menu\Programs\StartUp*), and create a shortcut to that batch file. The easiest way to accomplish this is to right-drag the batch file to the StartUp folder, and then select *Create Shortcut(s) Here* from the options in the pop-up menu.
3. Right-click the shortcut and select *Properties*. In the Run field of the resulting dialog box's Program tab, select *Minimized*. On the Misc tab, uncheck *Warn if still active*. Finally, click OK.

From now on, every time a user logs on, his or her name will appear on the taskbar as a running program. I guess we don't need freeware for this after all.

CLEARED FOR INSTALLATION



I'VE HEARD THAT before installing software in Windows 95, you should press **<Ctrl>-<Alt>-** and then close everything you have running except Explorer and Systray. Yet other sources (Dell tech support, for one) say that closing everything is unnecessary and can actually cause problems. Which advice is correct? Also, if you should close everything except Explorer and Systray, why don't any applications tell you that in their installation instructions?

Craig Ramsay, *New Paltz, New York*
THE OPENING screens of many—perhaps most—installation programs say something like “To prevent unintended disasters, please close all open applications and leave yourself at our mercy.” Well, something like that.

Nonetheless, whoever advised you to close everything except Explorer and Systray was being overly cautious.

It makes sense to close your regularly running applications, since these apps could be using shared files that the installation program needs to replace with newer versions. But you don't have to knock out every last background task before you set to work.

Try this instead:

Prior to installing a program, select *Start•Shut Down*. What you should do next depends on your system's Shut Down Windows options.

If your options include *Close all programs and log on as different user*, select it and click *Yes*.

Eventually you'll get the Enter Windows Password dialog box. Type in your password if you have one; then hold down **<Shift>** as you press **<Enter>**, and continue to hold it down until the hourglass turns into an arrow.

If your Shut Down Windows box doesn't offer the ‘Close all programs’ option, select *Restart the computer*. Hold down **<Shift>** as you click *Yes*, and keep holding it down as Windows closes and restarts, and your desktop icons reappear on screen.

Don't release it until the hourglass turns into an arrow.

Both options leave many more tasks running than just Explorer and Systray, but probably nothing that will interfere with an installation. For instance, your antivirus program may still be running in the background, but that's not a bad thing when you're installing software.

KEEP ONE PROGRAM ON TOP



I WANT THE Windows 95 Calculator visible at all times. How can I make it stay on top, even if it isn't the active window? Failing that, can I download a small, simple calculator that will remain in view while I work in another application?

Peter Worsley, *Inverness, California*
IF YOU'RE OTHERWISE satisfied with Windows' Calculator, don't bother looking for a replacement. You can make Calculator—or any other program—stay on top without spending a dime.

Several freeware programs enable you to keep any window you choose out in front. My favorite of these is Don Neufeld's Nailit (see **FIGURE 2**). You can download this from PC World Online's FileWorld (www.fileworld.com).

Nailit is astonishingly simple to use. Just run the program, and it puts its icon in the system tray. To make a window stay on top, double-click the *Nailit* icon (or right-click it and select *Nail*). This turns the mouse cursor into a thumbtack, which you simply click when you're on the desired window.

To turn off this change, you need only right-click the *Nailit* icon, select *UnNail*, and click the window again. ▶

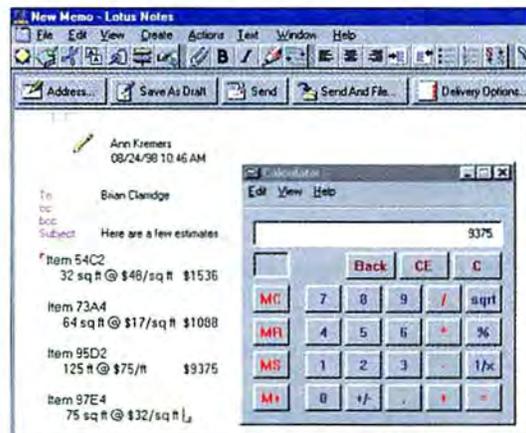


FIGURE 2: THE NAILIT FREWARE PROGRAM lets Calculator, or any other window, stay on top at all times.



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AUTOMATIC TURNOFF



MY DELL DIMENSION computer automatically powers off whenever I shut down Windows 95. Is there any way I can use this feature to make the computer turn itself off at night?

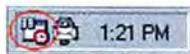
Vincent Caintic

Williamson, West Virginia

YES, BUT IT requires some additional software. You'll need a program that shuts down Windows and a scheduler to launch that program at a designated time.

You can set up a combination of the two programs to shut down Windows at any time. It's up to your computer whether the procedure will also turn off the PC.

About the software: You may already own a launching scheduler without knowing it. Both Microsoft Plus and Windows 98 come with one—the same one, in fact. To



access this scheduler, double-click

the *Task Scheduler* icon in the system tray.

Another popular program that comes

with its own scheduler is Norton Anti-virus. The utility is called Norton Program Scheduler; and if you have this icon in  your system tray, the utility is already running. Double-click the icon to schedule an event.

If you don't have such a utility, you can try out a shareware scheduler for free and register it for pocket change. I recommend *TimerOn* by Computerama—not because it's a fantastic piece of software, but because it works and costs only \$10.

Many free programs for shutting down Windows are available. One of these, *Shutdown.exe* from Bernhard Rosenkraenzer's w95tool.zip collection, is available from www.fileworld.com.

Since I don't know which scheduler you're using, I can't give you specific keystroke and mouse-click instructions. But here are some general guidelines:

1. Make sure your scheduler loads when you start Windows. If it doesn't put a shortcut into the StartUp folder, add one.

2. Create a new event in your scheduler with the following characteristics:

- Set up the event to launch your shut-down program.
- Set it to happen once a day, every day.
- Schedule the event for a time that's safely past your workday.
- Save the event and let it do its work.

Don't leave an application running with an unsaved file in it at the end of the day (you shouldn't do this anyway). If you do, the computer will remain on, waiting for you to decide whether to save the file.

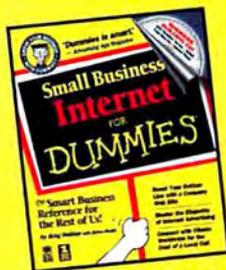


Find files from this article at www.fileworld.com. Answer Line welcomes your questions and pays \$50 for published items. Humor columnist Lincoln Spector is a contributing editor for PC World. See page 14 for contact information. ■

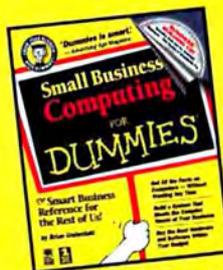
TimerOn

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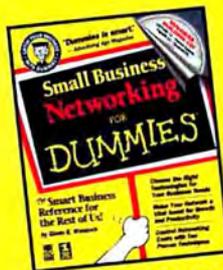
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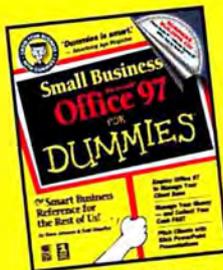
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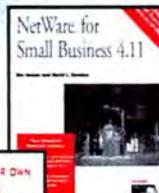
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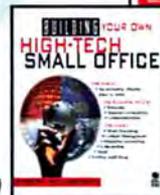
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PC Magazine, May 5, 1998

The latest edition improves the *ease-of-use and power* of existing functions like setting up schedules, allocating resources, calculating cash flow . . . Fortune, Technology Buyer's Guide, Winter 1998

...*easy to learn and use*, and offers considerable *control* over even the most complex undertakings.

PC Computing, May, 1998

The program's **Strength** lies in its flexible layout and presentation tools.

Info World, April 6, 1998

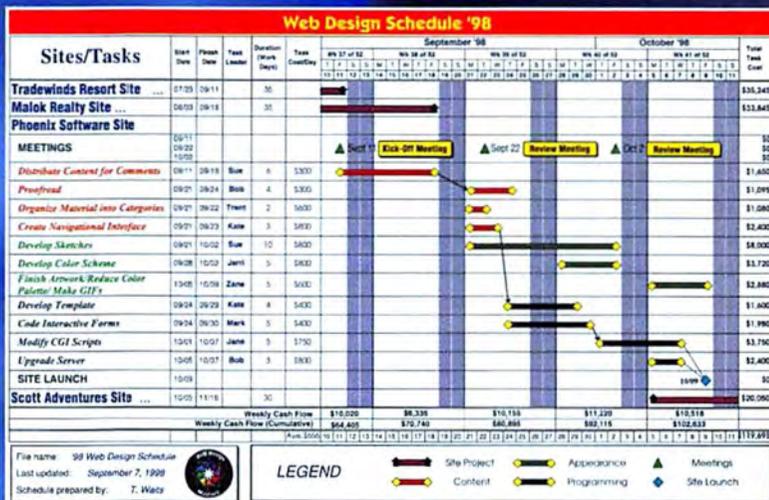
. . . a good bet for companies that are looking for basic but *easy-to-configure* project scheduling.

PC Week, March 18, 1998

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At the low end, drives like the Iomega Zip (www.iomega.com) and Imation SuperDisk (www.superdisk.com) offer cartridge capacities in the 100MB to 120MB range. The SuperDisk also reads standard 3.5-inch 1.44MB floppies. High-end cartridges range from the 1GB SyQuest SparQ (www.syquest.com) and the 1.5GB SyQuest SyJet to the latest Iomega Jaz, which can hold 2GB. (See "A Gig in Your Pocket" in our March issue.)

Drives also vary by connection method. External parallel port drives are the easi-

est to install and the most portable, but they're relatively slow. SCSI versions—both internal and external—let you make fast backups, run applications directly from a cartridge, and play audio or video files. But they require a SCSI add-in card that usually costs about \$100. The new internal EIDE removable-cartridge drives, meanwhile, offer a reasonable balance between performance and ease of installation. (Zip and SyJet drives are available in EIDE versions, with prices comparable to those of their internal SCSI versions.)

Prices are all over the lot, starting at about \$150 for the SuperDisk, then \$200 for the Zip Plus or SyQuest SparQ 1GB, \$279 for an internal Iomega Jaz 1GB (\$299 for an external version), \$300 for a SyQuest SyJet 1.5GB, and \$499 for a Jaz 2GB. Cartridge prices begin at about \$15 for the Zip and SuperDisk, jumping to \$33 for the SparQ, \$66 for the SyJet, \$99 for the 1GB Jaz, and \$125 for the 2GB Jaz.

If you opt for an internal drive, check to see whether you must add drive rails (unlikely) and to see if it's easier to mount the drive before attaching the cables.

Whichever product you choose, here's how to get your drive up and running.

Stan Miastkowski is a PC World contributing editor.

1 Hook up a parallel port drive. Enter your PC's BIOS setup program (details vary by manufacturer) and make sure the parallel port is set to EPP mode.

Shut down your PC.

Attach the drive's cable to the drive and the PC's parallel port. (If you have a local printer, disconnect the printer cable from the PC, attach the drive cable to the drive and the PC's parallel port, and then plug the printer cable into the drive's printer port.)

Hook up the power connections.

Skip to step 5.

```
ROM PCI/ISA BIOS (2A69HJL9)
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IDE HDD Block Mode      : Disabled
IDE Primary Master PIO  : Mode 1
IDE Primary Slave PIO   : Mode 0
IDE Secondary Master PIO: Auto
IDE Secondary Slave PIO : Auto
On-Chip Primary PCI IDE : Disabled
On-Chip Secondary PCI IDE: Disabled
PCI Slot IDE 2nd Channel : Disabled
Onboard PCI SCSI Chip   : Disabled

Onboard FDC Controller  : Disabled
Onboard Serial Port 1   : Auto
Serial Port 1 MIDI      : Disabled
Onboard Serial Port 2   : 2F8/IRQ3
Serial Port 2 MIDI      : Enabled
Onboard Parallel Port   : 378/IRQ7
Parallel Port Mode      : EPP1.9+EPP
```



2 Hook up an internal EIDE drive. If there's a free connector on the data cable between your hard drive and motherboard, set the removable-cartridge drive jumpers to "slave" (A). If this is not the case, set the drive to "master."

Feed the data and power cables through the new drive's bay, and connect them to the drive (B). (If the cables aren't long enough to

reach the drive, you will have to mount the drive before you connect the cables.) If there isn't a free connector on the existing data cable, attach the cable that came with the removable-cartridge drive to the second EIDE connection on the motherboard.

Next, mount the drive (C).

Skip to step 5.



3 Hook up an internal SCSI drive. If your PC doesn't have a SCSI card, install one. Shut down your PC, remove the cover, and follow the directions that came with the card. (For more on installing SCSI cards, see the June 1997 *Upgrade Guide*.)

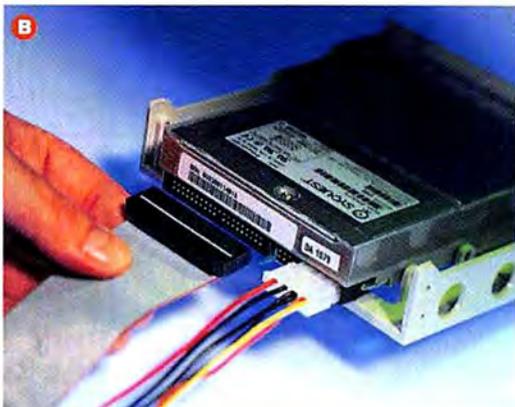
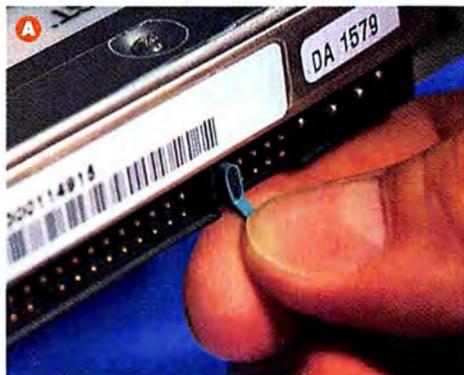
Check the SCSI ID and termination on the drive. Internal drives typically require that you set jumpers (A) for both. You can usually go with the default jumper settings, but read the manual carefully just to be sure.

Plug a free power connector into the drive.

Hook up the ribbon (data) cable between the drive and the SCSI card (B). Make sure the cable's red wire is connected to pin 1 on both the drive and the card.

Mount the drive (C).

Skip to step 5.



4 Hook up an external SCSI drive. If your PC doesn't have an add-in SCSI card, you'll need to install one (A). Shut down your PC, remove the cover, and follow the directions that came with the card. (For more on installing SCSI cards, see the June 1997 *Upgrade Guide*.)

Check the drive's SCSI ID and termination (B). You can generally use the factory default SCSI ID. Most drives handle termination automatically, but be sure to carefully check the drive's manual.

Hook up the data cable between the SCSI card and the drive, then hook up the power connections (C).

Go to step 5.



5 Install the software. The final steps for installing the software vary by manufacturer; read the directions that came with your drive. Typically, you need to insert the cartridge that came with the drive, turn on the drive and your PC, and then run the setup program from a floppy disk that came with the drive.

If the installation software doesn't find your new drive, shut down your PC and double-check all your connections.

For external drives, make sure the power supply is connected to a live outlet. If your drive has an on/off switch, make sure it's turned on.

If you continue to have problems, select *Start*Settings*Control Panel*, double-click the *System* icon, and click the *Device Manager* tab. If your new drive has an exclamation point next to it, select *Start*Help*, search for hardware conflict troubleshooter and follow the step-by-step directions.



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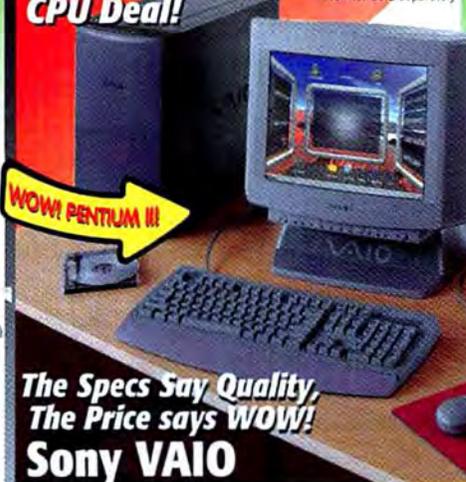
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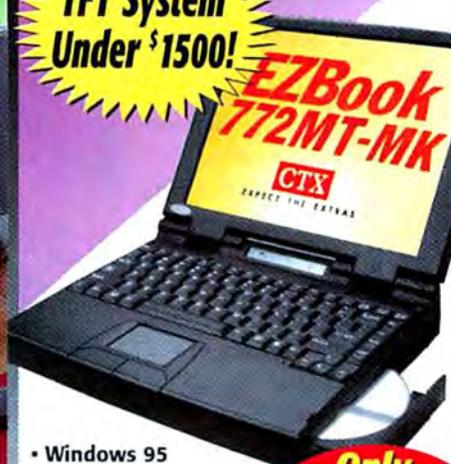
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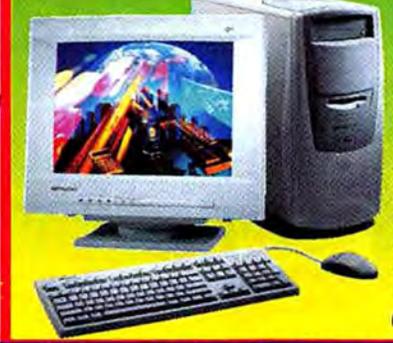
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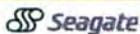
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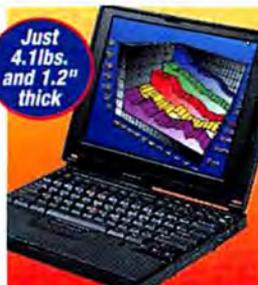
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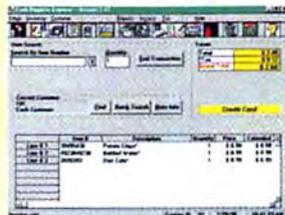
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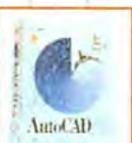
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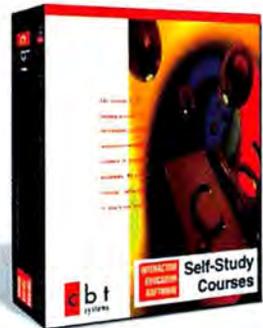
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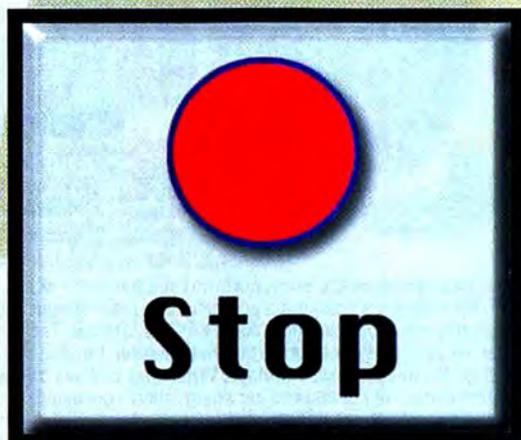
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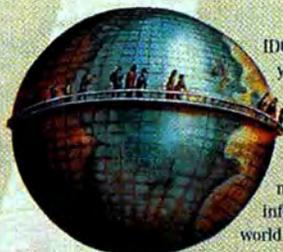
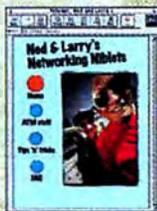


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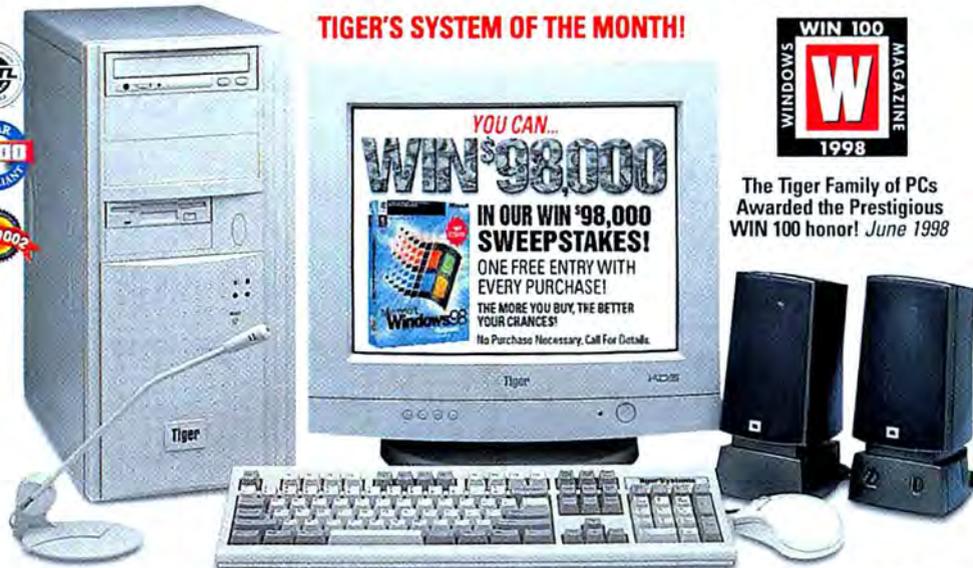
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Software's Consistent Inconsistency

A COUPLE OF YEARS AGO, before Microsoft coughed up the hair ball it calls Internet Explorer 4.0, I used this space to question whether a Web browser would truly be wonderful as a universal interface. Now the returns are in, and the answer: Not yet.

Back then I cited Ralph Waldo Emerson on the foolish consistency he called "the hobgoblin of little minds." Alas, Microsoft continues to stumble over hobgoblins big and small, including one in particular: the idea that the interface for online interactions should match the interface for local ones.

Its initial mistake in this regard was the Microsoft Network, which mimicked Windows 95 right down to the file-and-folder scheme. That turned out to be a dumb idea, because clicking a file that lives at the end of a slow dial-up connection evokes a far slower response than clicking a file on your hard drive. After you accidentally keep opening the same remote file because you can't tell if anything is happening when you click, you realize that differences in response times call for different approaches.

What did Microsoft learn from its MSN experience? Not much. The Win 98-meets-IE 4.0 interface tries to make everything look like an HTML page, whether it's online or local. That seems consistent at first, but the uniformity is only skin deep. "Everything" in the local world amounts mostly to icons and labels of files and folders. That's a poor substitute for what you get on the Web: the *contents* of files and folders. Global file viewers would let us see what's inside the icons, but Microsoft's conformity czars didn't bother to supply them.

ONE CLICK OR TWO?

THEN THERE'S THE single-click interface. Microsoft lifted it from Web browsers and briefly touted it as the One True Way. But in Windows 98, Gates and company chickened out and made single-clicking optional, in part because users who had already learned how to double-click discovered that a single-click inter-



Integrated Web and file browsing may be a noble goal, but here it wastes screen space and gets in your way.

face is a pain when it comes to things like selecting groups of files.

Besides, Microsoft didn't make single-clicking truly consistent. Even if you select it as your method of choice in Windows 98, it doesn't apply to application dialogs like Save As and Open. The result: The decision to double-click or single-click hinges on the question, "Where am I?" Single-click-but-only-sometimes isn't easy to explain to new users, and it turns routine operations into confusing ones.

Those application dialogs themselves are models of inconsistency. Even though IE 4.0 and Win 98 modify them to include smooth scrolling, their windows remain among the few in Windows that you can't resize. You can still sort files so that the most recent ones appear at the top of the list, but you can't see all the details at once. Why can't we resize these boxes? Foolish inconsistency.

MY FOOLISH FAVORITES

FOR A MODEL OF foolish consistency, take the way IE 4.0 handles bookmarks. Instead of treating them separately the way its predecessors did, it lists them intermingled with the "favorites" folders you've set up for your files. Integrated Web and file browsing may be a noble goal, but here it wastes screen space and gets in your way when all you want is to get at a particular bookmark. It's consistent, all right—and annoying.

And how about inconsistency from one release to another? I loved the history folder Microsoft introduced in version 2 of Internet Explorer. Despite some quirks, it made reconstructing and revisiting recent Web paths simple, because you could sort it by date, title, or URL.

IE 4.0 "improved" the history folder by changing it into a bar that can be sorted in one goofy way: chronologically, then alphabetically and hierarchically within each day. That's rarely useful. The inconsistencies don't stop there. An epic could be written on the anomalies in Office applications, like the many ways in which Excel and Word work differently for no good reason. Here as elsewhere we get both foolish consistency and foolish inconsistency, instead of the appropriate consistency. At least we get them consistently.

PC World Contributing Editor Stephen Manes is a columnist for the New York Times and is coauthor of *Gates, a biography of Microsoft's chairman*.



PC World* (ISSN 0737-8939) is published monthly at \$29.90 for one year (12 issues), \$59.80 for two years (24 issues), \$89.70 for three years (36 issues) by PC World Communications, Inc., 501 Second St., #600, San Francisco, CA 94107. Foreign orders must be prepaid in U.S. funds with additional postage. Add \$20 per year for Canada and Mexico; add \$46 per year for airmail for all other countries. Canadian GST Registration #R124669680. Periodicals postage paid at San Francisco, California, and additional mailing offices. Canada Post International Publications Mail Product. (Canadian Distribution) Sales Agreement No. 0463566. POSTMASTER: Send address changes to PC World, Subscription Dept., P.O. Box 55029, Boulder, CO 80328-5029. Editorial and business offices: 501 Second St., #600, San Francisco, CA 94107, 415/243-0500. Copyright © 1998, PC World Communications, Inc. All rights reserved. The trademark PC World is owned by International Data Group and used under license by PC World Communications, Inc. PC World Top 20*, Top 20*, PC World Top 10*, Top 10*, PC World Top 100*, Top 100*, and Consumer Watch* are trademarks of International Data Group, Inc., and used under license by PC World Communications, Inc. Printed in the United States.

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